

THE CANADIAN SPACE AGENCY

1999-2000

Estimates

A Report on Plans and Priorities

The Estimates Documents

The Estimates of the Government of Canada are structured in several parts. Beginning with an overview of total government spending in Part I, they become increasingly more specific. Part II outlines spending according to departments, agencies and programs. This part also contains the proposed wording of the conditions governing spending which Parliament will be asked to approve. The previous Part III of the Estimates has been split into two documents: a Spring report "*A Report on Plans and Priorities*" and a Fall report "*Departmental Performance Report*".

A Report on Plans and Priorities provides additional detail on each department and its programs primarily in terms of more strategically oriented planning and results information with a focus on outcomes.

The *Departmental Performance Report* provides a focus on results-based accountability by reporting on accomplishments achieved against the performance expectations and results commitments as set out in the *Spring Report on Plans and Priorities*.

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THE CANADIAN SPACE AGENCY

1999-2000
Estimates

Report on Plans and
Priorities

John Manley
Minister of Industry

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1.1 Minister's Portfolio Message

Our vision of Canada at the dawn of the new millennium is that of a strong and dynamic country poised to be a global leader in the knowledge-based economy of the 21st century. Canada continues to face the challenges of responding to the rapid pace of global change, and of harnessing the benefits of the knowledge-based economy for all Canadians. The government's goal is to create economic growth and more jobs for Canadians, in order to improve incomes and our standard of living.

Our standard of living depends directly on productivity, and improving productivity growth will be one of Canada's key challenges in the years ahead. The Industry Portfolio has a pivotal role to play in meeting this challenge. With 42 percent of federal science and technology funding and many of the government's micro-economic levers at its disposal, the Industry Portfolio has a unique capacity for innovation, research excellence, and partnership. The 13 Portfolio members bring together a versatile array of complementary programs to help improve Canadian productivity and competitiveness by focusing on such strategic priorities as promoting innovation through science and technology, helping small- and medium-sized enterprises to grow, encouraging trade and investment, and promoting economic growth in Canadian communities.

I am pleased to present the Report on Plans and Priorities for the Canadian Space Agency. This Report sets out for Canadians the planned activities, priorities and resources over the course of the next three years. The Canadian Space Agency aims at meeting Canadian needs and supporting the development of an internationally competitive space industry in the country. This will be achieved through the implementation of three key strategies: the advancement of knowledge with programs such as Space Science and Canadian Space Station to position Canada in the world-wide exploration and utilization of space; the development of satellite-based advanced multi-media and mobile communications products and services to position our industry on this expanding international market; and the development of Earth Observation technologies to maintain Canadian leadership in the emerging market for satellite-based environment monitoring and resource management products and services. These plans illustrate how the Canadian Space Agency, as a member of the Industry Portfolio, will contribute to improving Canada's competitiveness.

Canada is well equipped to be a leader in the knowledge-based economy of the 21st century. We have the people, the institutions and the research excellence. We have the vision to not only connect all Canadians, but also to connect them to the global marketplace. We know the challenges that we face and the opportunities afforded to us. By mobilizing our resources, we can be a leader in the new economy. By working together, we can ensure continuing success as we embark on the new millennium.

The Industry Portfolio is...

Atlantic Canada Opportunities Agency
 Business Development Bank of Canada*
 Canadian Space Agency
 Competition Tribunal
 Copyright Board Canada
 Canada Economic Development for
 Quebec Regions
 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
 Western Economic Diversification
 Canada

**Not required to submit Reports
 on Plans and Priorities*

The Honourable John Manley

1.2 Message from the Secretary of State, Science, Research and Development

Science, research and development are crucial to Canada because our economy - and the global economy - is changing rapidly. Our future success will be built on a virtually limitless resource: knowledge. Our ability to create future wealth will depend on the effective management of knowledge - the ability to create it, acquire it, disseminate it and exploit it. This ability forms the foundation of what is known as a knowledge-based economy.

Science, research and development are all about the search for knowledge - the discovery of new information and new understanding of how our world works. Knowledge is the key to improving the human condition and to improving our quality of life. Search for knowledge must be an ongoing process and a top priority in all sectors because of the potential applications in health and social sciences, education and the environment, business and the economy.

Canadians have worked together to build a society and an economy that are envied around the world. Canada is already a world leader in science, technology, research and development. Our challenge, indeed our opportunity, is to build on our co-operative links and partnerships with all sectors so that we are prepared for the new knowledge-based economy.

The government is committed to maintaining the high levels of success that Canada has attained in the past. We will accomplish this as a nation by continuing our investment in education and the discovery of knowledge and, by sharing, cooperating and working together to improve our economy and quality of life. By continuing to build stronger communities and, thereby, a stronger Canada, we will be able to compete in the new global economy.

Canada has unlimited potential to be a leader in the global knowledge-based economy. I am confident we will remain a strong and prosperous nation with enormous opportunities for all Canadians as we move into the new millennium.

The Honourable Ron J. Duhamel

1.3 Management Representation Statement

I submit, for tabling in Parliament, the 1999-2000 Report on Plans and Priorities (RPP) for the Canadian Space Agency.

To the best of my knowledge, this Report:

- accurately portrays the Agency's mandate, plans, priorities, strategies and expected key results of the organization;
- is consistent with the disclosure principles contained in the *Guidelines for Preparing a Report on Plans and Priorities*;
- is comprehensive and accurate;
- is based on sound underlying agency information and management systems.

I am satisfied as to the quality assurance processes and procedures used for the RPP's production.

The planning and reporting structure on which this document is based has been approved by Treasury Board Ministers. It is the basis for accountability for the results achieved with the resources and authorities provided.

W. M. (Mac) Evans, President

Date

2.1 Mandate, Role and Responsibilities

2.1.1 Mandate

The legislated mandate of the CSA, from the Canadian Space Agency Act, *SC. 1990, c. 13*, 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.»

2.1.2 Mission

The Canadian Space Agency is committed to leading the development and applications of space knowledge for the benefit of Canadians and humanity.

To achieve this, the CSA will promote an environment where all levels of the organization will:

- pursue excellence collectively;
- advocate a client-oriented attitude;
- support employee-oriented practices and open communications;
- commit to both empowerment and accountability, and;
- pledge to cooperate and work with partners to our mutual benefit.

2.2 Objectives

Canada's unique geographic and demographic character has inspired Canadians to adapt space science and technology to meet their national goals. Canada is involved in space activities with a view of achieving the following concrete objectives:

- to develop and apply Space Science and Technology (S&T) to meet Canadian needs;
- to develop an internationally competitive space industry.

2.3 Operating Environment

2.3.1 Space Policy Framework

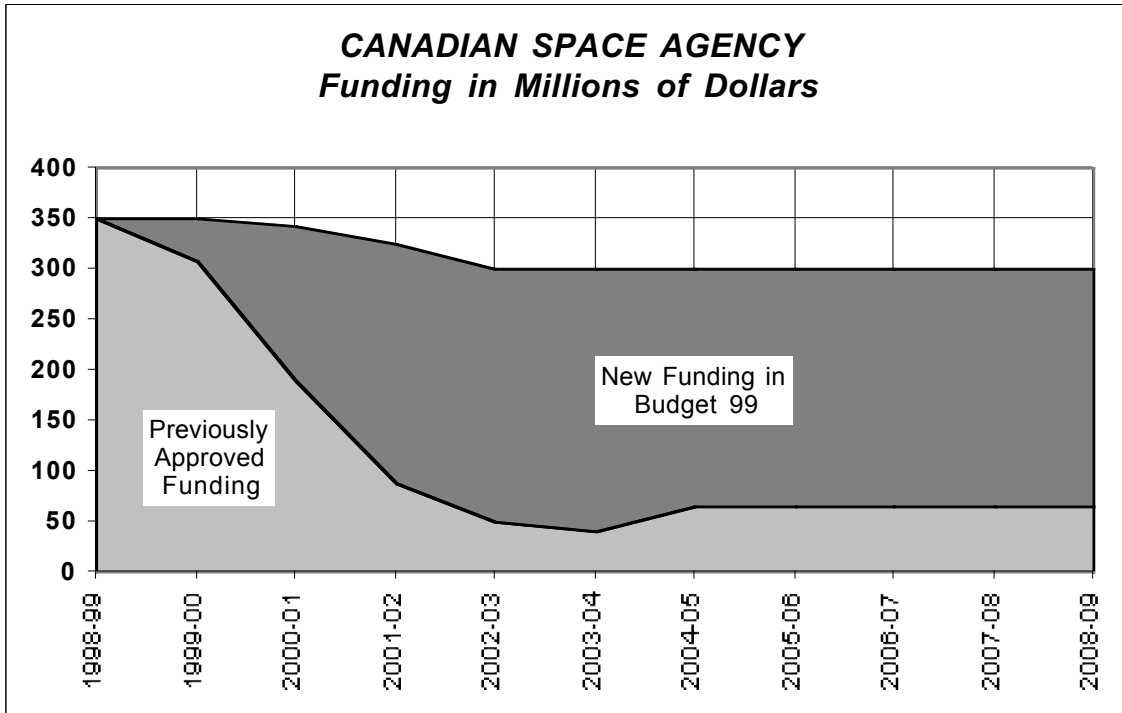
The Space Policy Framework, approved by the government in 1994 as part of Long Term Space Plan II, establishes the strategic importance of space in Canada's transition to a knowledge-based economy and to the government's social, scientific, sovereignty, industrial, security and foreign policy objectives. This framework makes the CSA responsible for coordinating all of the federal government's policies and programs in civil space-related research, science and technology, industrial development and international cooperation. It allocates an increased role to industry in managing the Earth Observation and Satellite Communications Programs, with a view to encouraging the development of space products and services responding to market requirements.

Its key elements are as follows:

- Give priority to developing and applying space technologies in the Earth Observation and Satellite Communications Programs.
- Design programs to maximize the leverage of federal funding and ensure commercial success through partnerships with industry.
- Open participation in space programs to more firms, particularly small- and medium-sized enterprises (SMEs).
- Pursue sustainable regional industrial development through the use of regional distribution guidelines.
- Encourage synergy between civil and defence space activities to optimize the effectiveness of federal space funding.
- Implement a country-wide communications and space awareness program.

2.3.2 Stabilized Funding for the CSA

In the 1999 Budget, the government announced its decision to provide the Canadian Space Agency (CSA) with stable, ongoing funding. In this Budget, the government provided the CSA with additional funding of \$430 million over the next three Fiscal Years; thereafter, funding will be stabilized at a level of \$300 million annually. The cash flow chart below displays the resultant long-term funding envelope for the CSA.



The strategic priorities that guide the program content for the Canadian Space Program are as follows:

Space Sciences Business Line:

- prepare Canada to use the Space Station by enhancing the microgravity and life science programs;
- strengthen Canadian participation in international efforts to better understand and monitor global climate change through upper atmospheric and environmental research funding;
- participate in international space astronomy and planetary exploration missions, thereby offering new challenges to Canadian industry and the research community; and
- ensure regular flight opportunities for Canadian astronauts to serve our scientific needs and fulfill Canada's commitments to the International Space Station Program.

Space Applications and Industry Development Business Line:

- maintain Canada's position as the world leader in the development, operation and use of radar Earth observation systems;
- support the increased use of Earth observation data by developing the next generation of satellite-based information systems for environment, resource management, disaster management and surveillance;
- maintain Canada as a full partner in the International Space Station Program by ensuring that the Mobile Servicing System meets requirements for the construction and the ongoing operation of the Station;
- enhance the international competitiveness of the Canadian satellite communications industry by supporting the development of high-risk advanced technologies and applications in partnership with companies, and by providing low-cost opportunities to space-qualify leapfrog technologies;
- maintain our industry's global competitiveness in strategic niche technologies that meet Canadian needs, by developing innovative leapfrog technologies; and
- maintain the David Florida Laboratory as a national facility for spacecraft assembly, integration and testing.

2.3.3 Summary of Progress to Date in LTSP II Delivery

In June 1994, the Government approved Long Term Space Plan II (LTSP II) with the primary objectives of meeting Canadian needs and developing an internationally competitive space industry. In March 1997, LTSP II was adjusted to provide for the building of the Special Purpose Dexterous Manipulator within existing funds.

The following table, which highlights key accomplishments by business line, shows the considerable progress which has been achieved in implementing LTSP II Programs.

LTSP II Programs by Business Line	Key LTSP II Accomplishments
Space Science	
<p data-bbox="250 352 423 380">Space Science</p> <p data-bbox="250 680 496 737">Canadian Astronaut Program</p>	<p data-bbox="609 352 1469 457">Acceptance of several Canadian proposals and subsequent industrial development of scientific instruments for international missions such as NASA's <i>EOS/AM-1</i> and <i>FUSE</i>, Sweden's <i>ODIN</i>, Russia's <i>Interball</i>, Japan's <i>Nozomi</i></p> <p data-bbox="609 489 1469 541">Agreement with NASA to launch the first Canadian-led science satellite (<i>SciSat</i>) since <i>Alouette</i> in the early 1960s</p> <p data-bbox="609 573 1469 646">Development of space life and microgravity sciences experiments for flight on <i>Space Shuttle</i> (e.g. <i>Neurolab</i>, <i>STS-95</i>) and Russian <i>Mir</i> station (e.g. <i>Canadian Protein Crystallization Experiment</i>)</p> <p data-bbox="609 678 1469 762">Securing so far of eight flights for Canadian astronauts to provide more opportunities for research in space (5 flights have occurred and 3 will happen next year)</p> <p data-bbox="609 793 1469 846">Canadian participation in <i>Operational Space Medicine Program</i> and <i>Human Space Flights Program</i></p>
Space Application and Industry Development	
Earth Observation	<p data-bbox="609 961 1469 1066">Canadian space industry expanded sales, generated employment, developed new skills and enhanced its commercial competitiveness (a study identified 5300 jobs and \$1.2 billion in sales of which 45% were export sales in 1997)</p> <p data-bbox="609 1098 1469 1182">Commercial operations of <i>RADARSAT-1</i> started in April 1996; <i>RADARSAT</i> data are used throughout the world and the CSA has received royalties of \$2.6M and a repayment of \$10M to date</p> <p data-bbox="609 1213 1469 1287">Signature of a contract with <i>MacDonald Dettwiler & Associates</i> to build and operate a more advanced <i>RADARSAT-2</i> satellite within the allocated federal budget envelope</p> <p data-bbox="609 1318 1469 1402">CEONET design for on-line access to data, upgrade of Canada's ground receiving stations and awarding of 25 contracts to industry valued at \$8.8M for data application development</p> <p data-bbox="609 1434 1469 1486">Baseline-mapping of North America and first complete mapping of Antarctica using <i>RADARSAT</i> data completed</p>
Satellite Communications	<p data-bbox="609 1539 1469 1623">Canadian firms awarded contracts valued at \$66M in federal funds, with provision for an incremental 25% of industry contributions, in order to develop multi-media satellite communications technologies</p> <p data-bbox="609 1654 1469 1728">Awarding of 15 contracts valued at \$9M in federal funds with average 50% industry contributions to position Canadian industry in the fast growing market for mobile/personal communications services</p> <p data-bbox="609 1759 1469 1812">Awarding of several contracts to Canadian firms under ESA's <i>ARTES</i> to develop advanced technology related to future multi-media systems.</p> <p data-bbox="609 1843 1469 1896">As a direct result of these, Canadian firms have won many additional international contracts.</p>

LTSP II Programs by Business Line	Key LTSP II Accomplishments
International Space Station	<p>The test and integration of the SSRMS are ongoing and it is scheduled for delivery to NASA in March 1999</p> <p>Mobile Servicing System operations and training simulator complex completed</p> <p>Training provided to the first two teams of astronauts who will operate Mobile Servicing System on the <i>International Space Station</i></p> <p>Manufacture of the Special Purpose Dexterous Manipulator under a fixed price has commenced</p>
Space Technology	<p>Awarding of 300 contracts valued at \$45M to industry (one-third of the funding allocated to SMEs) for advanced R&D in priority space technology areas for Canada. These contracts have resulted in the development of new technologies as well as improving current technologies.</p>
Space Qualification Services	<p>Environment tests performed for RADARSAT, MSAT and Mobile Servicing System at DFL; thermal vacuum laboratory completed and midlife refit activities continued</p>
International Relations	<p>CSA's relations with foreign agencies and partners were managed to support Canadian Space Program implementation and industry's export activities</p> <p>Built new relationships with emerging space powers</p> <p>Maintained and expanded relationships with established markets: US, Europe, Japan</p>
Space Awareness	<p>Implementation of the CSA's communication strategy including a major Space Awareness and Education Program dedicated to promoting S&T careers with youth</p> <p>Several graduates and post doctoral fellows supported through CSA/NSERC university-industry partnership programs.</p>

2.3.4 Summary of External Factors Influencing the CSA

The dominant trends affecting the world's space sector represent both opportunities and threats for the Canadian space sector. These trends are outlined below

Globalization of the Economy

Globalization is now reaching sectors of the economy like space and defence that used to have a greater degree of protection for strategic reasons. Globalization increases industry concentration, and is driving a restructuring of the world's space industry around a few giants which can produce complete satellite systems and associated services, from design through launch and operation. As many of these systems are designed to provide world-wide coverage, this situation creates significant challenges for Canada's space industry, particularly in satellite communications where our industry has traditionally built its capability to answer domestic market. Globalization also creates greater international competition and interdependency among trade partners. International cooperation and specialization appear to be the answer to this situation, and Canada is well positioned in this respect.

Knowledge-based Economy

Industrial economies are becoming increasingly driven by science and technology, innovation, and a well-educated work force. Space helps Canada evolve towards a knowledge-based economy by stimulating R&D, fostering the development of advanced strategic technologies and creating high-quality jobs.

Growing Concern for Global Environment

Population growth and the accelerating industrialization of many developing countries are generating spiralling demands for energy and natural resources. These trends will not revert in the foreseeable future, adding even more pressure on the environment. In the 21st century, environment protection and natural resource management will become increasingly important in government agendas. These concerns will likely lead governments to invest substantial funds to monitor the Earth's environment from space (the most efficient way to look at the Earth as a whole) and better understand the phenomena associated with global changes. Canada's space sector is very well positioned to take advantage of this trend.

Changing Role of Government

Canada has been a leader in commercializing space activities, starting with the creation of Telesat to market satellite-based communications. More recently, RADARSAT International (RSI) was set up to market RADARSAT data, and RADARSAT-2 has been privatized. Now, government programs are evolving towards positioning domestic industry to supply goods and services for large projects led by multi-national corporations. Also, governments seek to prepare their industries for the next generation of international programs by funding R&D to help leapfrog to innovative technologies to meet future needs. The government retains a critical role in adapting the Canadian Space Program to these new realities, and the CSA's international programs are increasingly focussing on positioning industry for global user-driven commercial markets.

2.3.5 Summary of Opportunities Influencing the CSA

Along with the above trends, other factors intrinsic to the space environment heavily influence the future of the CSA. The following briefly discusses these factors, and the opportunities they present for Canada's space programs:

Space Science

The human quest for knowledge about space, the growing interest in planetary exploration and the new era soon to be opened by the *International Space Station* will provide new opportunities to the Canadian scientific community in the years to come. Space Science has been a cornerstone of the Canadian Space Program from the very beginning with *Alouette* in 1962. Our Space Science Program ensures that Canada maintains a position of excellence in the world-wide exploration and utilization of space. Based on cooperation with both Canadian and international scientific communities, the Program allows our universities to contribute to the global knowledge base and, in particular, to federal objectives related to global climate change and health through the life sciences activities. The program enhances Canada's technological base and productivity through contracts awarded to SMEs to developing unique scientific instruments.

Earth Observation

A world-wide emphasis on global environmental monitoring and natural resource protection, and a trend towards the commercialization of satellite data and products are two major factors influencing the Earth observation (EO) business. Canada is exceptionally well positioned in this emerging international market: it has an innovative, technologically-advanced industry, and has privatized satellite data marketing with RADARSAT International (RSI). The LTSP II Earth Observation Support Programs, by modernizing Canada's data reception infrastructure and encouraging industry to develop the products and services demanded by world markets, play an essential role in ensuring Canadian leadership in international markets. Moreover, the development of a high performance RADARSAT-2 by industry will further enhance Canada's competitive position in Earth observation.

Space Technology

The trend towards smaller, shorter and less expensive space missions among the world's space faring nations is based on rapid and far reaching development of new space technologies offering promising opportunities for industrial growth. Canada cannot ignore this new international mode of operation and needs to develop new technologies and processes relating to small satellite missions. Space Technology Programs help industry develop strategic technologies in specific niches, establish links with foreign firms and improve access to international markets. In close cooperation with industry, the CSA identifies and supports R&D projects that will contribute to the development and productivity improvement of SMEs across all regions of Canada. The SciSat Program approved as part of LTSP II is a precursor of a new approach based on smaller space missions.

International Space Station

The signing of the Intergovernmental Agreement to incorporate Russia as a partner in the *International Space Station* confirmed the commitment of the world's space faring nations to this program. Also, the American Space Policy calls for a greater role for robotic technologies in NASA's space exploration programs, which should open opportunities for Canadian industry. The signing of the Special Purpose Dexterous Manipulator Offset Arrangements making Space Station utilization more affordable for Canada also opens exciting opportunities for microgravity and life sciences, areas which in themselves promise substantial economic returns.

Satellite Communications

Space-based communications are expected to expand considerably to meet the growing demand for advanced multi-media and mobile personal services. With the trend towards deregulation and global satellite communications systems, it may prove difficult to safeguard Canadian manufacturing capabilities in an industry dominated by a few giants serving global markets with large constellations of satellites. However, this sector offers tremendous market opportunities at the sub-system and component level for Canadian industry, provided that our companies keep enhancing their product lines to stay at the leading edge of rapidly evolving communications technologies. This is the aim of the LTSP II Advanced Satellite Communications Initiatives Program.

2.4 Financial Spending Plan

(\$ millions)	<i>Forecast Spending 1998-99</i>	<i>Planned Spending 1999-00</i>	<i>Planned Spending 2000-01</i>	<i>Planned Spending 2001-02</i>
Gross Program Spending	344.0	312.9	190.3	87.9
<i>Less : Revenue Credited to the Vote</i>	2.1	4.1	7.0	0.0
Net Program Spending	341.9	308.8	183.3	87.9
<i>Plus : New funds</i>	0.0	41.0	152.0	237.0
Total Net Program Spending	341.9	349.8	335.3	324.9
<i>Less : Revenue Credited to the Consolidated Revenue Fund</i>	0.4	0.5	0.5	0.5
<i>Plus : Non- budgetary</i>	0.0	0.0	0.0	0.0
<i>Plus : Cost of Services Provided by other Departments</i>	0.0	1.6	1.6	1.6
Net Cost of the Agency	341.5	350.9	336.4	326.1
Nota: 1) Forecast Spending for 1998-99 reflects best forecast of total planned spending to the end of the fiscal year. 2) New funds represent funds provided in the 1999 Budget. 3) Due to rounding, figures may not add to totals shown.				

3.1 Summary of Key Plans, Priorities and Strategies

This table summarises expected results and priorities of the Canadian Space Program, under CSA's two Program Business Lines: Space Sciences and Space Applications and Industry Development. The items listed under Results Statements column are extracted from the Planning, Reporting and Accountability Structure. All service line tables which follow, refer to these Planning, Reporting and Accountability Structure results. 1997-1998 Departmental Performance Report results were changed following CSA's new Planning, Reporting and Accountability Structure. Note that this table does not reflect the new funding provided in Budget 1999.

PRAS Result Statements	Summary of Priorities
Space Sciences	
A better understanding of space, the universe and basic physical and chemical processes	Ensure that the results of experiments are disseminated in professional and academic channels (journals, conferences, etc.) and to general public through media
Opportunities for research in space for Canadian scientists in universities and in industry	<p>Ensure launch and flight operations on NASA or other space agencies satellites of Canadian instruments, including FES/FUSE, MOPITT, OSIRIS/Odin, TPA/Nozomi and other experiments of the Small Payloads (micro-satellite, sounding rocket and balloon) and Small Scientific Satellite (SciSat) Programs.</p> <p>Perform 10 Canadian projects aboard <i>Space Shuttle</i> missions and <i>International Space Station (ISS)</i> assembly flights</p> <p>Ensure Canadian astronauts Payette, Garneau, and Hadfield participate in <i>Space Shuttle</i> operations and the assembly of the <i>ISS</i>, and that Canada has use of the Station</p>
Canadian scientists with skills and expertise in space R&D	Ensure extensive participation of Canadian scientists and engineers in international programs through the Small Payloads and Small Scientific Satellite (SciSat) Programs, and various experiments launched by NASA and other agencies
Operational solutions to terrestrial problems developed from knowledge gained through research in space	Continue utilization of data from Space Science instruments by operational space weather facilities and atmospheric modelling research teams
New and improved processes and applications, especially in space robotics technology	Successful high-profile use by Canadian and international astronauts of the Canadian built Space Remote Manipulator Simulator, Canadian Space Vision System and Space Station Remote Manipulator System in the construction of the <i>International Space Station</i>
Medical improvements from space research leading to health, well-being and productivity of humans in space	Continue the implementation and further development of the Canadian Operational Space Medicine Program
Space Applications and Industry Development	
Improved technical capabilities and economic benefits to Canadian industry from the use and application of space science and technology	<p>Transfer dozens of applications for industrial and operational uses through CSA Programs, such as Space Technology, the Canadian Space Station Program, Earth Observation and Advanced Satellite Communication</p> <p>Successfully exploit the world market in Earth observation through the operation of <i>RADARSAT-1</i></p> <p>Complete Canada's components of the <i>International Space Station</i> (SSRMS, MBS, and SPDM) for delivery to NASA</p> <p>Complete technology development under ESA's ARTES Program and position Canadian industry to participate in Skybridge and other global constellation programs</p>
Participation of Canadian SMEs in all regions of Canada in space technology development programs and development by SMEs of technologies for space applications	<p>Deliver the five major contracts awarded to Canadian industry in late 1997 under the Advanced SatCom Initiatives</p> <p>Implement the Earth Observation Support Program in cooperation with the Canada Centre for Remote Sensing to improve access to satellite data, develop new applications and develop a strong Canadian value-added industry across Canada</p> <p>Make best use of funding in Space Technology for innovative technology development that enhances Canadian SME industrial competitiveness by demonstrating capabilities and generating patents and spin-off applications</p>
Participation of Canadian industry in S&T programs on an international scale	<p>Complete Canada's components of the <i>International Space Station</i> (SSRMS, MBS, and SPDM) for delivery to NASA</p> <p>Sustain the revenue and employment generation of the Canadian Space Station Program, for which \$880 million of contracts have been awarded from 1988 to 1997</p>

PRAS Result Statements	Summary of Priorities
Improved competitiveness, coordination and global relevance of the Canadian space industry	<p>Implement RADARSAT-2 mission by the private sector for launch in 2001 and operation with revenues matching business plan</p> <p>Support innovative technology development and demonstration that enhances Canadian SME industrial competitiveness by demonstrating capabilities and generating patents and spin-off applications</p> <p>Negotiate co-funded industry/Government projects valued at \$8M under the International Mobile SatCom Programs</p> <p>Complete the environment testing of the Special Purpose Dexterous Manipulator and RADARSAT-2 at the David Florida Laboratory (DFL)</p> <p>Develop international business development strategies and initiatives</p>
International recognition of Canada's leadership in space technology and research	<p>Perform on-orbit commissioning of all Mobile Servicing System elements, and implement the interim Mobile Servicing System Operations Centre</p> <p>Support the Canadian Space industry international marketing efforts and develop access to emerging markets for industry</p> <p>Increase efforts to commercialize DFL services on international markets and to seek new partners</p>
Maximise industrial benefits of the Canadian Space Program to all regions of Canada	<p>Complete integration and performance testing of the SSRMS and the MBS for delivery to NASA. \$880 million worth of contracts given to industry from 1988 to 1997 by the Canadian Space Station Program</p> <p>Develop strategic information tools designed to assist Canadian companies in search of market opportunities</p>
Use of space technology and space-based research to support the sustainable development of Canada through improved resource management and disaster management, and more reliable techniques for predicting climate and pollution problems	<p>Promote the application of Earth observation satellite technologies and data to better manage Canada's environment and natural resources</p> <p>Ensure timely and high-quality supply of RADARSAT-1 data to clients</p> <p>Continue the acquisition of global coverage as part of the RADARSAT Background Mission</p> <p>Provide on-line geomatic databases to operational users and the general public</p>
Economic development deriving from the application of space technology and space-based research	<p>Develop a Canadian <i>International Space Station</i> utilization plan</p> <p>Lift remaining LOGO on Advanced SatCom to generate contracts to industry</p> <p>Manage existing LTSP II Space Station Programs to maintain the level of contracts to industry (\$880 million of contracts from 1988 to 1997)</p> <p>Promote spin-offs of space science and technology into other parts of the economy</p>
Benefits to the economy and society from the application of space technology and space-based research	<p>Develop new space-based services for Canadians in cooperation with the CCRS and the CRC</p> <p>Develop an <i>International Space Station</i> commercialization strategy</p>
Public awareness of the role of S&T in Canada's future	<p>Achieve a 6% increase in the level of awareness of the CSA and its programs among public, media, SMEs, and stakeholders and 20% increase in requests from people across Canada and access to the website</p> <p>Implement and assess the Space Awareness Program and communications strategy in order to increase the support from various segments of the public and to enhance S&T culture in Canada</p>
Youth involvement in S&T through increased interest in space activities	<p>Implement new initiatives to inform students and young Canadians of our space-related activities and milestones</p>
Highly qualified personnel are available to the public sector and the high-tech industry	<p>Support employment of students on career paths to become space scientists and engineers</p>

3.2 Details by Business Lines

The plans, priorities and strategies of the CSA are carried out through three business lines:

- Space Sciences
- Space Applications and Industry Development
- Management

Financial Spending Plan by Business Line

(\$ millions)	<i>Forecast Spending</i> 1998-99	<i>Planned Spending</i> 1999-00	<i>Planned Spending</i> 2000-01	<i>Planned Spending</i> 2001-02
Business Lines				
Space Sciences	30.5	25.5	20.7	16.4
Space Applications and Industry Development	291.2	268.4	150.5	52.3
Management	22.3	19.0	19.1	19.2
Gross Spending	344.0	312.9	190.3	87.9
<i>Less: Revenue Credited to the Vote</i>	2.1	4.1	7.0	0.0
Net Spending	341.9	308.8	183.3	87.9
<i>Plus: New funds</i>	0.0	41.0	152.0	237.0
Total Net Spending	341.9	349.8	335.3	324.9
Nota: 1) Forecast Spending for 1998-99 reflects best forecast of total planned spending to the end of the fiscal year. 2) New funds represent funds provided in the 1999 Budget. 3) Due to rounding, figures may not add to totals shown.				

3.2.1 Crosswalk from Old Structure

<i>Previous Business Lines</i>	<i>New Business Lines</i>
Space Science Canadian Astronaut Program	Space Sciences
Earth Observation Space Technology Canadian Space Station Program Satellite Communications	Space Applications and Industry Development
Executive and Horizontal Coordination	Management

The CSA has moved from seven to three business lines as shown above to better focus each business line on specific outcomes for specific target clienteles. As space applications have evolved from the early days of space research, increasingly, space services are end-user-driven and service-oriented. Their future is tied to value-added applications and their integration terrestrial technologies.

Consequently, against a backdrop of Canada's own needs for space, future investment must focus on ensuring that these lucrative opportunities are available to Canadian industry, building on expertise in telecommunications, remote sensing, robotics or other areas. Industrial manufacturing of key elements should remain a Canadian niche, however, in today's globalized world needs are met by international players on a larger scale, whether commercially or for humanitarian or environmental purposes. Accordingly, Canada is seeking to play a more active role through partnerships that will emerge to provide global services.

Furthermore, these services will be increasingly commercialized, and Canada's service providers will be no exception. Corporations will meet global needs as participants in international consortia established for profit. To position our industry to play a strong role in global markets, the Canadian government must continue to ensure investment in the next generation of technology development.

Through its three new business lines, the Agency has moved away from project oriented business lines and positioned itself to know how well it is performing in meeting these challenges.

The financial cross-walk is shown in Table 12 of Section IV.

3.2.2 Space Sciences

(\$ millions)	<i>Forecast Spending</i> 1998-99	<i>Planned Spending</i> 1999-00	<i>Planned Spending</i> 2000-01	<i>Planned Spending</i> 2001-02
Business Line				
Space Sciences	30.5	25.5	20.7	16.4
Gross Total	30.5	25.5	20.7	16.4
Less : Revenue Credited to the Vote	0.0	0.0	0.0	0.0
Net Total	30.5	25.5	20.7	16.4
Nota: 1) Forecast Spending for 1998-99 reflects best forecast of total planned spending to the end of the fiscal year. 2) Planned Spending does not include new funds provided in the 1999 Budget.				

Objectives

To advance knowledge and develop core competencies in space sciences.

Description

Working with Canadian scientists, universities and graduate students, the Canadian Space Agency contributes to the advancement of space knowledge, and the development of scientific expertise, new processes and applications. This is achieved through two service lines as follows:

- Space Science — ensuring Canada's continued eminence in the international scientific exploration of space, and procuring from Canadian industry the instruments needed to obtain relevant scientific data.
- Canadian Astronaut Program — training Canadian astronauts to participate in international human space flights, contributing to Canadian science and technology (S&T) experiments in space, and inspiring Canadian youth to pursue careers in S&T.

Space Science

External Factors Influencing the Service Line

The Space Science Program is a portfolio of over 50 projects, almost all of which are international in nature. In most cases, Canada is dependent on the priorities and schedules of the host agency. For instance, launch delays in several instruments (e.g., MOPITT/AM-1, FES/FUSE, OSIRIS/Odin) create extra cost pressures as the scientific and technical expertise has to be retained until at least in-orbit commissioning; the delay in completing the negotiations with NASA on the SciSat-1 Program has led to a very tight development schedule with its inherent risks. The development of complex scientific instruments in this environment is challenging and requires a flexible funding approach.

New funds announced in Budget 1999 will enable Canada to maintain its eminence in the world-wide scientific exploration and utilization of space. The injection of additional funds will ensure that the Canadian space science community continues to contribute in key areas and help our industry enhance its technological base.

Key Plans and Strategies for 1999-2000 to 2001-2002

The Space Science Program procures scientific instruments from Canadian industry and arranges for their deployment, operation and use to obtain scientific data relevant to Canada's needs. To best use the new funds for the benefit of Canadians, the scientific community and the space industry, the CSA will implement the following strategies during the planning period:

- continue international science cooperation with Canada's traditional partners and other space-faring nations to complete existing projects, keep abreast of new opportunities for collaboration to leverage our funding, and gain access to a wider range of scientific data. Specific undertakings during the period would involve NASA, Russia, Japan, Sweden, Finland, France and Australia;
- continue the domestic Small Payload and Small Satellite Programs providing university and industry access to space for leading-edge scientific and technology returns;
- carry out Canadian and international Announcements of Opportunities, ensuring wide participation in new scientific ventures and the development of novel instrumentation in Canada, with well established disciplinary advisory committees identifying research thrusts that best meet Canadian needs in space science;
- strengthen collaboration with other government departments (OGDs) in support of their operational responsibilities and research priorities;
- leverage Canada's participation in the *International Space Station* by establishing international agreements for the use of its space, life sciences, and microgravity sciences research facilities; and,
- use the Canadian industry's advanced research and development capabilities especially in small- and medium-sized enterprises to manufacture space science instruments, to help Canadian companies maintain their international competitiveness through technology transfer from universities.

Priorities for 1999-2002 include:

- implement the SciSat Program;
- perform launch (on NASA or other space agencies' satellites) and flight operations of the following instruments, FES/FUSE, MOPITT/AM-1, OSIRIS/Odin;
- continue implementation of the Small Payloads Program with the development and launch of the MOST micro-satellite, the GEODESIC sounding rocket and the balloon experiments MANTRA and BAM, along with new announcements of opportunities for space physics, atmospheric sciences and space astronomy payloads/missions;
- initiate development work in new international atmospheric sciences, space physics, space astronomy and planetary exploration undertakings such as the Next Generation Space Telescope, Mars Sample Return and Mars Express Missions, FIRST/Planck;
- implement enhanced Space Life and Microgravity Sciences Programs to develop scientific experiments to be carried out on the *International Space Station* ;
- continue to operate, maintain and enhance the Canadian network of ground-based instruments for the study of upper atmosphere and ionospheric phenomena;
- conduct the experiments listed above, acquire and analyse the data generating from those instruments and publicize the results in scientific journals and the media; and
- train graduate students in space science.

These priorities will ensure the participation of Canadian scientists in space science projects which meet Canada's needs. They anchor Canada's place in space by delivering world-class space science research opportunities for Canadian universities. They also reinforce Canadian expertise in developing scientific instrumentation for space, and help many Canadian small and medium companies gain technology, capabilities and competitiveness, and win international reputations for their work in this field. Finally, they permit companies across Canada to hone their competitive edges and gain international recognition.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
A better understanding of space, the universe and basic physical, chemical and biological processes	Peer review of papers published or presented at conferences	Dozens of scientific papers published, presented at conferences, and peer reviewed
Opportunities for research in space for Canadian scientists in universities and in industry	Number of Canadian research experiments accepted by NASA and other space agencies for launch	A few large and small experiments launched or accepted for launch by NASA or other space agencies on satellites, sounding rockets or high-altitude balloons or aircraft, and on the <i>International Space Station</i>
Canadian scientists and industry with skills and expertise in space R&D	Number of scientists and engineers involved in space S&T	Dozens of Canadian scientists and engineers involved in the program Scientists seen as world-class researchers and Canadian advisors in high tech areas
	Number of instruments and spacecraft systems developed in industry	Instruments and spacecraft systems developed in industry Improvement in technology, skills and management in industry
Operational solutions to terrestrial problems are developed from knowledge gained through research in space	Processes attributable to involvement with Space Sciences	Attribution to the CSA of improvements in space weather, climate and pollution monitoring and/or prediction techniques
New and improved processes and applications.	Improvements in processes, materials and medical procedures	Implement Enhanced Space Life Sciences and Microgravity Sciences Programs
	Processes attributable to involvement with Space Sciences	
Highly qualified personnel are available to the public sector and the high-tech industry.	Number of highly-trained Canadian graduate students hired by Canadian firms, government and academia for space-related work	Dozens of graduate students involved in Space Science projects in universities and having obtained research and application positions in the industry

Canadian Astronaut Program

External Factors Influencing the Service Line

Canada has established itself as a vital partner in international human space flights and our astronauts are being trained to participate in *International Space Station* assembly. Canadians can now use the space environment and the effects of microgravity to advance S&T and enhance their quality of life. Public fascination with humans in space provides an excellent opportunity to take advantage of Canadian astronauts to leverage S&T education messages.

New funds announced in Budget 1999 will enable the Canadian Astronaut Program to continue at the same level of activity as in the 1990s, with seven mission specialists.

Key Plans and Strategies for 1999-2000 to 2001-2002

The Canadian Astronaut Program service line ensures that Canadians, particularly those in the scientific community, benefit from Canada's participation in human flights in space and that the CSA maintains an astronaut corps that can respond to Canadian needs for human space missions.

The overall strategy is to maintain the Canadian astronauts corps to perform shuttle operations and Space Station assembly and operations. Other ongoing activities of the Program (e.g., Canadian researchers' access to space and space awareness) will also continue. Additional resources will allow for the reinforcement of Canada's Space Medicine Program.

Priorities for 1999-2002 include:

- ensure that Canadian astronauts support shuttle operations and Space Station assembly and operation, and are fully prepared to meet Canadian needs for human space operations and experiments;
- support ISS assembly flights of Canadian astronauts Payette, Garneau and Hadfield;
- take full advantage of Mission STS-100, in which astronaut Chris Hadfield will install the SSRMS aboard the ISS;
- develop space medicine applications through R&D related to the prevention, diagnosis and treatment of crew health problems, and to maintaining the well-being and productivity of astronauts;
- have astronauts accompany the development and testing of Canadian space products and microgravity and Life Science experiments;
- initiate and support studies in human life and health support technologies;
- inspire youth to pursue careers in S&T (e.g., astronauts' visits to schools, students visiting CSA astronauts at Johnson Space Centre); and
- inform the public of the economic and social benefits obtained from Canadian participation in national and international space programs.

These priorities provide access to space for research which contributes to the health, well-being, and general wealth of Canadians. They also contribute to the international recognition of our astronauts and sustain their role as standard bearers for the Canadian Space Program.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Opportunities for research in space for Canadians scientists in universities and in industry	Number of Canadian research experiments accepted by NASA or other space agencies for space shuttle missions	Approximately 10 Canadian projects will be performed on shuttle missions and <i>International Space Station</i> assembly flights over the next 3 years
		The continued existence of a strong contingent of highly trained Canadian astronauts
New and improved processes and applications, especially in space robotics technology	Processes attributable to involvement with Space Sciences, Technology and Systems	The use of the Canadian-built SRMS, CSVS and SSRMS in the construction of the <i>International Space Station</i> Canadians well informed and increasingly involved in S&T
	Improvements in technology, materials and medical procedures	Visibility of Canadian space robotics technology and of Canada's role as an essential partner in the construction of the <i>International Space Station</i> OSM Program implemented fully Canadian medical products and techniques used during long term space missions

3.2.3 Space Applications and Industry Development

(\$ millions)	Forecast	Planned	Planned	Planned
	Spending	Spending	Spending	Spending
	1998-99	1999-00	2000-01	2001-02
Business Line				
Space Applications and Industry Development	291.2	268.4	150.5	52.3
Gross Total	291.2	268.4	150.5	52.3
Less : Revenue Credited to the Vote	2.1	4.1	7.0	0.0
Net Total	289.1	264.3	143.5	52.3
Nota: 1) Forecast Spending for 1998-99 reflects best forecast of total planned spending to the end of the fiscal year.				
2) Planned Spending does not include new funds provided in the 1999 Budget.				

Objectives

To ensure that Canadian industries benefit from space knowledge. To contribute to the sustainable development of Canada and the world and to create better awareness of the importance of space technology in all regions of Canada.

Description

Working with industry, the Canadian Space Agency facilitates the use and application of space science and technology, and stimulates an internationally-competitive, export-oriented Canadian space equipment and services sector. Space applications link Canadians from coast to coast, enhance the management of our environment and natural resources, and advance human understanding of how phenomena in space affect life on Earth. The CSA also undertakes various communications activities to contribute to better awareness of space in all regions of Canada and encourage young people to pursue careers in science and technology. This is achieved through seven service lines as follows:

- Earth Observation — ensuring Canadian leadership in the international Earth observation market and meeting Canadian environmental monitoring and resource management needs.
- Space Technology — ensuring that Canada remains at the forefront of space technology development in preparation for Canada's future space programs and enhancing Canadian industry's international competitiveness through technology development and diffusion.
- Canadian Space Station Program — enhancing Canada's ability to operate in space and to exploit the potential of space technologies, particularly automation and robotics, and meeting our commitments to the International Space Station Program.
- Satellite Communications — ensuring that Canadians have access to new multi-media, personal, and mobile communications services made possible by advanced satellite communications, while maintaining or expanding Canadian industry's share of the international market for these new services.
- Space Qualification Services — providing an environmental test facility capable of meeting the current and emerging needs of Canada's space community and space related objectives.
- External Relations — building foreign partnerships to support the implementation of the Canadian Space Program, supporting the space industry's domestic and export development efforts, supporting and monitoring industrial regional development, and managing CSA's political relations with Canadian and foreign agencies and partners.
- Space Awareness — providing support for space awareness activities.

Earth Observation

External Factors Influencing the Service Line

Canada is recognized as a world leader in civilian spaceborne radar technology and data commercialization. *RADARSAT-2* is intended to secure Canada's long term investment in EO. Negotiations of the Master Agreement with MDA, the selected prime contractor, have led to the signing of a firm price contract, relieving cost pressure on the government. The Master Agreement provides for the CSA to negotiate the *RADARSAT-2* launch and related services from NASA or another partner, in return for data to be supplied by MDA. Should a launch or cost offset agreement not be possible, CSA would then examine funding the launch from within its approved reference levels.

Commercial sales of *RADARSAT International Inc* (RSI - private company that sells *RADARSAT* data world-wide) are not generating royalties in line with the original expectations. The revenue shortfall for the first five years of *RADARSAT-1* operation (April 1996 to March 2001) is estimated at \$36.5M.

The approval of additional funding in Budget 1999 will allow for the strengthening of EO ground data receiving infrastructure and the development of satellite data applications by industry. This is an essential element of the strategy to maintain Canadian industry's competitiveness on the emerging international remote sensing markets, a position increasingly jeopardised by competitors from the USA and Europe.

Key Plans and Strategies for 1999-2000 to 2001-2002

Working with the private sector and other domestic and international partners, this service line produces Earth observation data and develops Canadian space and ground technologies to meet domestic and international needs, particularly in the areas of environmental monitoring, resource management, surveillance and disaster management.

The overall strategy is to maintain the present Canadian leadership in Earth observation radar technology in international civilian markets. The development of *RADARSAT-2* by the private sector is a key factor to help maintain Canadian leadership in radar satellites. This will secure the commercial viability of the *RADARSAT* family of satellites by ensuring continued availability of data after 2001, offering new advanced capabilities, transferring expertise to industry and encouraging the development of data applications for world-wide markets.

Strategies related to specific elements include the following:

- working with RSI to promote the use of data in operational systems and increase *RADARSAT-1* revenues by 40% per annum;
- maintain Canadian leadership in civilian radar satellites through government-industry partnerships;
- ensure the commercial viability of the *RADARSAT* family of satellites through successful exploitation of the world market in Earth observation;
- demonstrate the use of Earth observation data and techniques for environment monitoring, and for meeting government objectives related to climate change; and,
- develop and demonstrate space-based technologies and applications for resource management, disaster management, and surveillance in cooperation with user departments and communities.

Earth observation priorities for 1999-2002 include:

- timely and high-quality supply of *RADARSAT-1* data to clients; increased annual royalty revenues; continued acquisition of global coverage as part of the *RADARSAT* Background Mission, including meeting new application requirements (e.g. stereo coverage, interferometric coverage, natural oil seepage monitoring);
- maintenance and enhancement of existing partnerships with NASA (Second Antarctic Mission in the Fall 2000), NOAA, CCRS, *RADARSAT* International and the provinces;
- implementation of the *RADARSAT-2* mission by the private sector with critical design review of the satellite subsystems in FY1999/2000, integration and testing at the David Florida Laboratory in early 2001, and launch planned for November 2001; R&D of new applications specific to *RADARSAT-2* capabilities;
- development of enhanced radar imaging technology for *RADARSAT-3* and identification of potential international collaboration;
- development of advanced electro-optical imaging technologies for participation in hyperspectral missions and identification of international mission opportunities;
- implementation of Earth Observation Support Programs in cooperation with the Canada Centre for Remote Sensing (CCRS) to improve access to satellite data, develop new applications for radar satellite data in areas with greatest market potential, and develop a strong Canadian value-added industry;
- new initiatives in partnership with other departments to use space-based technologies to study cold climate land and ocean ecosystems, the cryosphere, and the sustainable development of forest lands in order to understand better climate change;
- development and demonstration of applications and systems for the management of land, coastal and aquatic resources and for disaster management and surveillance, in partnership with users; and,

These priorities build upon Canada's leadership, strength and international reputation in Earth observation. They contribute to the emergence of Earth observation as a major Canadian knowledge industry and to increasing the number of companies selling technology products and value-added services - some 170 Canadian companies, primarily SMEs, with an estimated \$300M revenues in 1997-98. They also sustain the 20% annual growth of employment and revenues in this business, of which 40% are produced from export sales.

Finally, they promote the operational use of Earth observation data and services by the public and private sectors in Canada.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Improved technical capabilities and economic benefits to Canadian industry from the use and application of space sciences and technology	<p>Development of partnerships with OGDs, industry, universities and the provinces for advancing the use of Earth observation</p> <p>Numbers of new applications transferred to industrial or operational users</p>	<p>Positive feedback from NASA, NOAA and RADARSAT International at international steering meetings and bilateral communications</p> <p>Definition of RADARSAT-3 mission with industrial partner by March 2000</p> <p>Decision for Canadian participation in a first foreign hyperspectral mission by December 1999 and announcement of opportunities</p> <p>Positive feedback from OGDs following the initiation of new resource and environment demonstrations</p> <p>Three new applications of RADARSAT data successfully transferred to industrial or operational users over a one-year period</p> <p>Demonstration phase of forest land management based on Earth observation data completed by March 2002</p>
Participation of Canadian SMEs in all regions of Canada in space technology development programs and development by SMEs of technologies for space application	<p>Numbers of new technologies brought to market and licenses negotiated</p> <p>Periodic economic analysis showing increased employment and regional distribution of industrial activity as a result of Canada's investment in EO</p> <p>Growth of the Canadian space sector in terms of total revenues, exports and employment</p> <p>Development of an internationally competitive Canadian Earth observation industry</p>	<p>Three new technologies/ techniques successfully transferred to industry for commercial use</p> <p>New technologies for disaster management and marine surveillance successfully transferred to industry for commercial use by March 2002</p> <p>Progress towards meeting the regional distribution targets with an overall 20% annual increase in revenues</p> <p>Addition of two RADARSAT foreign stations to the RADARSAT international network over a one-year period</p> <p>Agreement from six foreign stations to receive RADARSAT-2 data by March 2002</p> <p>Development of Canadian ground station and infrastructure technologies to meet requirements from future foreign Earth observation satellites</p>

Result Statement	Indicator	Targets for 1999-2002
Improved competitiveness, coordination and global relevance of the Canadian space industry	<p>Numbers of new technologies brought to market and licenses negotiated</p> <p>Growth of the Canadian space sector in terms of total revenues, exports and employment</p> <p>Development of an internationally competitive Canadian Earth observation industry</p>	<p>Three new technologies based on the integration of radar, hyperspectral and in-situ data successfully transferred to industry for commercial use by March 2002</p> <p>Successful execution of RADARSAT-2 contract by MDA for a launch in November 2001 and operation with revenues corresponding to the RADARSAT-2 business plan</p> <p>Development of international partnerships in support of the RADARSAT-2 mission</p> <p>Development of industrial collaboration opportunities in hyperspectral missions and identification of a second hyperspectral mission by March 2001</p>
Maximized industrial benefits of the Canadian Space Program to all regions of Canada	<p>Annual increase in royalty revenues generated by RADARSAT-1</p> <p>Increases in the number of firms in the Canadian remote sensing industry which are commercially exploiting Earth observation satellite data</p> <p>Development and application of Earth observation products and services to meet client needs</p>	<p>A 40% annual increase in royalty revenues generated by RSI from the operation of RADARSAT-1</p> <p>A 10% annual increase in the number of firms in the Canadian remote sensing industry commercially exploiting Earth observation satellite data</p> <p>Three new firms exploiting Earth observation technologies for marine applications by March 2002</p> <p>On-line connection to two private sector Earth observation service providers over a one-year period</p> <p>Commercial near real-time flood management services offered by Canadian industry</p>
Improved relationships with governmental, academic, private sector and space organizations throughout the world	<p>Positive feedback from stakeholders</p> <p>Positive feedback from international partners</p>	<p>Positive feedback from NASA at International Steering Committee meetings and through bilateral communications</p> <p>Positive feedback from NASA and ESA at bilateral meetings regarding increased benefits resulting from partnerships in Earth observation</p>

Result Statement	Indicator	Targets for 1999-2002
Improved resource management and disaster management and improved techniques for the prediction of climate and pollution problems which support sustainable development of Canada, through the application of space technology and space-based research	Case studies showing the diffusion of space-based technologies and data into resource management, disaster management and surveillance	Meet the image requirements of operational users: Canadian Ice Service, Canadian Forest Service, Manitoba Natural Resource Department (flood) Repeat mapping of the Canadian landmass (RADARSAT-1 standard mode) as part of the continued Background Mission Completion of and supplementary acquisition for the global landmass coverage (RADARSAT-1 ScanSAR mode) as part of the Background Mission Initiation of RADARSAT-2 Background Mission as part of the permanent Government Archive
	Access to a broad range of Earth observation products and services	Achieving an imaging performance index equal to or greater than 95% Availability of real-time in-situ data on-line as part of the next phase of CEONET
	Environmental monitoring and sustainable development of resources based on Earth observation data	Active participation of at least six provinces / territories in the use of Earth observation data for forest land management by March 2002 Implementation of the Global Observation of Forest Cover Project with national and international partners Demonstration of new products to measure the role of Canadian forests as a CO ₂ source/sink in support of government policy and obligation by March 2001 Availability of on-line information on the interaction between Climate Change and Canadian ecosystems and the cryosphere
	Use of Earth observation products and services by the general public	Number of geomatic databases available on-line to be increased by 25% annually
Highly qualified personnel are available to the public sector and the high-tech industry	Number of highly trained Canadian graduate students hired by Canadian firms, government and academia for space-related work	Grant of one scholarship for graduate studies in Earth observation over a one-year period Hiring of two young graduates as trainees over a one-year period

Space Technology

External Factors Influencing the Service Line

Canada's penetration of emerging space markets requires that the government actively support the development of the technological capabilities of our space industries, particularly high technology SMEs. With globalization and the entry of defence companies into the civilian market, competition is stiff. Considering the sustained world-wide trend for smaller, shorter and less expensive space programs, Canada needs to develop new technologies for small satellite missions.

New funds announced in Budget 1999 will sustain an ongoing R&D effort in strategic technological areas. The injection of additional funds will ensure the development of the niche technologies needed to support growth and competitiveness of the Canadian industry, establish partnerships with foreign firms and thereby benefit from technological transfer, and improve access to foreign markets.

Key Plans and Strategies for 1999-2000 to 2001-2002

The Space Technology service line provides the resources and the technical expertise needed to introduce new technologies to Canadian industrial products and services. The following strategies are designed to support the development of Canada's technological base:

- continuing to focus on leap frog technology development and demonstration on long-term needs and on the exploitation of selected market niches in robotics, Earth observation and Communications;
- increasing the participation of small- and medium-sized enterprises in the Space Technology Program;
- increasing the role of Canadian university Centres of Excellence in leapfrog technology developments; and,
- developing partnership arrangements to leverage funding.

Priorities for 1999-2002 include:

- developing new leapfrog technologies for Earth observation and new advanced communication missions;
- developing new materials, processes and tools for enhancing Canadian industrial capabilities;
- demonstrating technology through Canadian Smallsat and Microsat flights;
- increasing the participation of SMEs in technology development programs;
- increasing the commercialization of R&D through technology transfer and management of intellectual property;
- developing new applications and services for Canadians using space-based systems, in cooperation with the Canada Centre for Remote Sensing (CCRS) and the Communications Research Centre (CRC); and
- supporting employment of students and post-doctoral fellowships by the unit to train future space scientists and engineers

These priorities are intended to help Canadian high-technology industries enhance their R&D and manufacturing capability, and to benefit from the use and application of space science and technology. They also encourage economic development through technology transfers and spin-offs, and provide opportunities for students in space science and technology, thus encouraging a continuing supply of talented and qualified new people into this field.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
<p>Improved technical capabilities and economic benefits to Canadian industry from the use and application of space science and technology</p> <p>Participation of Canadian SMEs in all regions of Canada in space technology development programs and development by SMEs of technologies for space application</p>	<p>Numbers of new applications transferred to industrial or operational uses</p> <p>Numbers of new technologies brought to market</p>	<p>Dozens of technologies enhanced or demonstrated and proven over 3 years</p> <p>Over 30 scientific papers, textbooks and patents contributed yearly</p>
<p>Economic development deriving from the application of space technology and space-based research</p> <p>Benefits to the economy and society from the application of space technology and space-based research</p>	<p>Economic studies showing job attribution to spin-offs from space technologies</p>	<p>Over 3 years, \$2 million worth of contracts given to Canadian industry (SMEs) and research institutes</p>
<p>Highly qualified personnel are available to the public sector and the high-tech industry</p>	<p>Number of highly trained Canadian graduate students hired by Canadian firms, government and academia for space-related work</p>	<p>25 PH. D. and Master level students benefiting from financial support or from projects awarded to universities yearly through CSA/NSERC University-Industry Partnership Program</p>

Canadian Space Station Program

External Factors Influencing the Service Line

Design and schedule changes to the International Space Station are likely to produce requests for modifications to the Mobile Servicing System. Multi-element integration and testing of the MSS may reveal problems; the CSA is striving to minimise adverse effects on the schedule and costs

The Mobile Servicing System (MSS) has a risk of failures during on-orbit check-out or on-orbit operations which would result in a major slip in the assembly of the Space Station. In order to reduce the impact of such failures on ISS assembly and/or operations, some spares of critical components are made and stocked. The International Space Station will be realized through the assembly of more than 100 elements. Further delay to the Russian Service Module will impact the ISS Assembly Sequence, delaying the launch dates of the Canadian elements, and creating potential cost increases.

The CSA signed the SPDM Offset Arrangement, which became an implementing arrangement under the CSA/NASA MOU. This arrangement means that Canada may opt for taking additional responsibilities related to MSS Operations (Repairs and Overhaul Option) in exchange for offset of payload launch and retrieve costs, making ISS utilization more affordable over a longer timeframe. Funds announced in Budget 1999 would make it possible to ensure Canada's participation in the International Space Station program beyond 2003-04 and to take advantage of the Offset Arrangement referred to above. Finally, the CSA has initiated an International Space Station commercialization strategy in order to effect the generation of revenues from the Canadian rights to use and exploit ISS.

Key Plans and Strategies for 1999-2000 to 2001-2002

The Canadian Space Station Program service line will ensure that Canadians benefit from their investment in space robotics and from Canada's access to the International Space Station, and that the CSA meets its commitments to its international partners.

Strategies related to specific elements include the following:

- shift the primary CSSP focus in the CSA and in Canadian industry from the space segment development phase to the operations phase and, refine and finalize the MSS Operations strategic role for Canada;
- negotiate in-kind arrangements with international partners to keep down the cost of using Canada's share of Space Station resources, either directly between government agencies or through the commercialization of the Space Station assets; and
- negotiate in-kind arrangements with international partners to keep down the cost of operating the Mobile Servicing System.

Priorities for 1999-2002 include:

- complete integration and performance testing of the SSRMS for delivery to NASA in 1999;
- complete integration and performance testing of the MBS for delivery to NASA by 2000;
- manufacture, integrate and test the SPDM for delivery to NASA by 2002;
- support the development and implementation of a Canadian ISS utilization plan;
- develop a commercialization strategy; and
- perform on-orbit commissioning of all MSS elements, and delay the full implementation of the interim MSS Operations.

These priorities ensure that Canada remains a full partner in the International Space Station Program, thus providing an efficient platform for space research and long term experimentation. They also contribute to the creation of employment and economic activity in the space robotics sector in Canada.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Participation of Canadian SMEs in all regions of Canada in space technology development programs and development by SMEs of technologies for space applications	Numbers of SMEs involved in the CSSP Number of new technologies brought to market and licenses negotiated	Continue the trend in technology development over the life of the program, in the fields of high reliability software, life critical software, artificial vision, expert systems, robotics, force moment sensors, object oriented software, other software and simulation
Participation of Canadian industry in S&T Programs on an international scale	Canadian companies involved in Mobile Servicing System Periodic analysis showing employment and regional distribution of industrial activity as a result of Canada's investment in space robotics	Maintain current level of participation in international programs
International recognition of Canada's leadership in space technology and research	Positive feedback from stakeholders	Successful on-orbit commissioning of SSRMS, MBS and Special Purpose Dexterous Manipulator with real-time support from the Mobile Servicing System Operations Complex
Maximized industrial benefits of the Canadian Space Program to all regions of Canada Economic development deriving from the application of space technology and space-based research	Economic studies showing the maintenance in the level of jobs and contracts	Current industrial benefits maintained Maintain the level of contracts to industry (\$880 million of contracts given to industry from 1988 to 1997) \$110 million of new contracts to industry
		Continue the trend in economic development by creation of spin-offs
Benefits to the economy and society from the application of space technology and space-based research	Economic studies showing gross domestic product increase from technology spin-offs Use of Space Station by Canadian scientists Access by Canadian scientists and industry to the <i>International Space Station</i> Industry and scientists benefit from payload operation and integration services	Continue the trend in economic development by creation of spin-offs
Highly qualified personnel available to the public sector and the high-tech industry	Number of highly trained Canadian graduate students hired by Canadian firms, government and academia for space-related work	Continue the trend of providing opportunity of employment in the high-tech industry

Satellite Communications

External Factors Influencing the Service Line

With the trend towards world-wide deregulation, space-based communications are expected to expand considerably to meet the growing demand for advanced multi-media and mobile personal services. Satellite Communications systems are moving in the direction of large multi-billion dollar constellations of satellites to serve global needs.

Globalization is pushing individual firms to amalgamate and create an industrial sector dominated by a few giants with end-to-end system capabilities serving global markets. In this context, it may prove difficult to safeguard Canadian manufacturing capabilities. Our industry must adjust and position itself to supply sub-systems and/or components to international consortia implementing global communications services. In that context, the new funding allocated to space in Budget 1999 would allow the government to offer programs to help Canadian companies position themselves as suppliers of innovative systems to international consortia.

Key Plans and Strategies 1999-2000 to 2001-2002

In partnership with the private sector, the Satellite Communications service line focuses on the development of satellite communications technologies and services required to meet Canadian needs while maintaining or expanding Canadian industry's share of the growing international market for satellite communications systems.

The overall strategy is to work in partnership with the Canadian telecommunications industry to foster the development of the technologies and systems required to give Canadians equal access to advanced communications services, as well as to help our industry develop export niches in international markets. Strategies related to program elements include:

- support sub-system development for the advanced communications satellite markets to provide access to a large satellite constellation market;
- provide low cost space flight opportunities to Canadian industrial products, to increase their marketability;
- optimize synergies between the CSA, universities, CRC and industry capability to maximize leverage of private/public funds; and
- establish cooperation with DND on communications technology and infrastructure development.

Priorities for 1999-2002 include:

- develop advanced technologies required to give all Canadians access to the new satellite-based multimedia services in partnership with Canadian satellite communications manufacturers and service providers;
- develop programs to demonstrate new Satellite Communication Technologies in Space
- demonstrate new service-driven communications and navigation applications;
- support university-based research in SatCom area;

- complete the five major contracts awarded in late 1997 under the Advanced SatCom Initiatives; and
- negotiate co-funded industry/Government projects valued at \$8M under the International Mobile SatCom Programs.

These priorities contribute to improved communications capabilities for Canadians and the world. They also ensure economic benefits to Canadians, helping Canadian firms to develop the expertise and technology they need to win places in international consortia. The resulting new technologies will increase the capability of satellites to handle the rapidly expanding market demands for high speed data communications within the financial reach of ordinary homeowners.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Improved technical capabilities and economic benefits to Canadian industry from the use and application of space science and technology	Numbers of new applications transferred to industrial or operational uses	Dozens of applications transferred to industrial or operational uses
Participation of Canadian SMEs in all regions of Canada in space technology development programs and development by SMEs of technologies for space application	Numbers of new technologies brought to market and licenses negotiated	Dozens of new technologies brought to market
Improved competitiveness, coordination and global relevance of the Canadian space industry	Periodic economic analysis showing increased employment and regional distribution of industrial activity as a result of Canada's investment in space Growth of the Canadian satellite communications systems sector in terms of total revenues, exports and employment	Increased employment, growth and better regional distribution of economic activity in satellite communications
Economic development deriving from the application of space technology and space-based research Benefits to the economy and society from the application of space technology and space-based research	Economic studies showing job attribution to spin-offs from space technologies	50% increase in revenues for Canadian Satcom industry Over \$160 million worth of technology development contracts in the next 3 years Participation by Canadian companies in international consortia

Space Qualification Services

External Factors Influencing the Service Line

David Florida Laboratory (DFL) is Canada's national facility for testing, assembling and integrating satellites and other space hardware. DFL is a critical component of CSA's infrastructure, supporting the Agency's priorities and serving the private sector in the development and qualification of their space products. Canadian industry relies on DFL for the completion of several space hardware programs such as the Mobile Servicing System, RADARSAT-2, CALTRAC Star Tracker as well as for conducting system, sub-system and component level testing for commercial and export sales.

The Budget 1999 announcement has secured the long-term future of DFL because it is likely to result in a significant amount of additional flight hardware requiring space qualification.

Key Plans and Strategies for 1999-2000 to 2001-2002

The objectives of the DFL for the planning period will be achieved through the following strategies:

- maintain and operate a national facility for spacecraft assembly, integration and testing in support of Canadian Space Program and industry;
- perform timely and accurate testing of satellites and other space-based and ground-segment hardware;
- market internationally its services for spacecraft assembly, integration and testing;
- continue to provide world-class test facilities; and
- acquire and develop test technologies to improve DFL's ability to meet customer technical requirements at a reasonable cost and on schedule.

Priorities for 1999-2002 include:

- continued efficient and effective management of the DFL Program;
- completion of environment testing of Special Purpose Dexterous Manipulator and RADARSAT-2;
- increased efforts to market DFL services internationally and to seek new partnerships;
- achieve ISO 9000 certification of DFL; and
- undertake facility preparations for responding to the qualification requirements of new flight hardware.

These priorities ensure that the DFL remains a key asset of the CSA and continues to meet Canada's needs to assemble, integrate and test spacecraft and space systems.

It also ensures its reputation internationally, thus allowing it to provide a return to the government through international business undertakings.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Improved competitiveness, coordination and global relevance of the Canadian space industry	Growth of the Canadian space sector in terms of total revenues, exports and employment	<p>Number and commercial value of tests performed at the DFL</p> <p>Number of client test requests meeting client specification and schedule</p> <p>Continued provision of solutions to the demands of space clients</p> <p>Provision of revenues to the Consolidated Revenue Fund</p> <p>DFL support provided to Canadian Space Program and LTSP III as requested</p>
International recognition of Canada's leadership in space technology and research	Positive feedback from stakeholders	Positive response to client satisfaction surveys
Improved relationships with governmental, academic and private sector space organizations throughout the world	Ongoing provision of world-class test facilities	<p>Satisfactory disclosure of new test capabilities</p> <p>DFL recognized as a world class facility, as demonstrated by client response</p> <p>Development of strategic partnerships</p> <p>Tours of the DFL as a Canadian high-tech show case</p>

External Relations

External Factors Influencing the Service Line

The mandate of the External Relations Directorate is carried out within a rapidly changing international and industrial context. Nationally and internationally, the importance of bilateral and multilateral cooperation is growing ever more important to the delivery of the Canadian Space Program, requiring greater collaboration. Industrially, rapid market expansion in many areas offers both opportunities and challenges to Canadian industry through growing markets, industrial restructuring, increasing commercialization and greater competition – which in turn places new demands on the External Relations Directorate in its efforts to support industry.

Following the additional funding allocated to the CSA in Budget 1999 the development of new opportunities for international cooperation, industry positioning on global markets and bilateral initiatives with national partners is a priority; effort to support Canadian industry would also have to be intensified during the planning period covered by this Report.

Key Plans and Strategies for 1999-2000 to 2001-2002

This service line provides the Canadian Space Program with assistance and support in the areas of international cooperation, international marketing, federal-provincial relations, industrial policy, and regional development. Congruent with the S&T Strategy and the Growth agenda of the government, and in close cooperation with the Industry Portfolio and its stakeholders, specific strategies include:

- maintaining and promoting the CSA's relationships with foreign agencies and organizations to enhance its position in the international space community, as well as that of its partners, and support the marketing activities abroad of the space industry;
- forming partnerships with provincial governments to exchange industrial information, support space-related research activities, promote the Canadian space industry's products and services, implement jointly funded programs, and monitor the space industry and the regional distribution of space contracts; and
- developing industry-related strategies and policies for R&D, including industrial partnerships, technology transfer & commercialization, and sector road mapping.

Priorities for 1999-2002 include:

- develop international business development strategies and initiatives;
- support the Canadian space industry international marketing efforts (sales, strategic alliances);
- develop and maintain access to key established and emerging markets for industry;
- obtain and disseminate strategic market information and intelligence;
- broaden the export base of SMEs;
- develop industry-related strategies and policies for R&D; and
- develop strategic information tools designed to assist CSA executives and Canadian companies.

These priorities ensure that CSA pursues and manages strategic partnerships with other governmental organizations and foreign space agencies in support of the Canadian Space Program. They also assist Canadian space companies in their efforts to penetrate world markets.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Improved competitiveness, coordination and global relevance of the Canadian space industry	Growth of the Canadian space sector in terms of total revenues, exports and employment	Development and implementation of a marketing support strategy, structure and tools
Maximized industrial benefits of the Canadian Space Program to all regions of Canada	Distribution of Canadian Space Program contracts in accordance with regional distribution targets	Participation of organizations from all regions of Canada to planning processes and new programs and initiatives
Improved cooperation and relationships with governmental, academic and private sector space organizations throughout the world	Bilateral and multilateral initiatives implemented in accordance with External Relations priorities and objectives established	Development and implementation of bilateral and multilateral strategic international initiatives Positive feedback from stakeholders

Space Awareness

External Factors Influencing the Service Line

The Millennium offers unique advantages to create further awareness of Canada's role and achievements in space and the benefits derived from space, and to increase the interest of young people in S&T. Significant international initiatives such as *International Space Station* involving Canadian astronaut missions and technology will also be of great interest to Canadians. The demand for educational products, which has been growing steadily over the last few years, is expected to expand considerably as space becomes increasingly appealing to the general public. These factors will create demands that could be difficult to fulfill, particularly from an educational perspective.

Key Plans and Strategies for 1999-2000 to 2001-2002

This service line provides the Canadian Space Program with communications activities and builds awareness of the value and importance of space among Canadians.

Specific strategies for this service line include:

- develop and implement a Space Awareness Program and strategic communications framework to support government priorities, to increase the support for space from various segments of the public and to enhance S&T culture in Canada; and
- develop partnerships with the private sector and other government departments in order to facilitate greater involvement in space awareness activities.

Priorities for 1999-2002 include:

- implement and assess the Space Awareness Program and communications strategy in order to increase support from various segments of the public and to enhance S&T culture in Canada;
- implement new initiatives to inform Canadians of our space-related activities and milestones, and to demonstrate how the Canadian Space Program contributes to government objectives for S&T and economic development; and
- develop and implement product marketing initiatives to raise the visibility of the CSA and to increase funding for space awareness initiatives.

These priorities ensure Canadians know about their country's space-related achievements and the benefits they bring to Canada. They also increase the level of interest, participation and scientific literacy among Canadian youth.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Public awareness of the role of S&T in Canada's future	Surveys reporting on the usefulness of education material developed by the Agency and distributed to schools and resource centres	Youth and educators have found the education material useful where demands can be met
Youth involvement in S&T through increased interest in space activities	<p>Polls showing annual increases in the level of awareness of the Agency and its program among the public, especially youth, the media, stakeholders, and industry</p> <p>Number of requests for information about space and the number of hits on the Agency web-site (www.space.gc.ca)</p>	<p>6% increase in the level of awareness of CSA, its programs among the public, media, SMEs and stakeholders</p> <p>Positive feedback received on information provided from various target audiences (eg. media)</p> <p>20% increase in requests for information from educators, youth and the CSA across Canada, and access to the CSA website</p> <p>20% increase in the number of visits to the web site</p> <p>10% increase in the number of youth involved in space initiatives</p>

3.2.4 Management

(\$ millions)	<i>Forecast</i>	<i>Planned</i>	<i>Planned</i>	<i>Planned</i>
	<i>Spending</i>	<i>Spending</i>	<i>Spending</i>	<i>Spending</i>
	<i>1998-99</i>	<i>1999-00</i>	<i>2000-01</i>	<i>2001-02</i>
Business Line				
Management	22.3	19.0	19.1	19.2
Gross Total	22.3	19.0	19.1	19.2
Less : Revenue Credited to the Vote	0.0	0.0	0.0	0.0
Net Total	22.3	19.0	19.1	19.2
Nota: 1) Forecast Spending for 1998-99 reflects best forecast of total planned spending to the end of the fiscal year. 2) Planned Spending does not include new funds provided in the 1999 Budget.				

Objectives

To provide strategic direction, management and administrative support services to the CSA. To ensure the cohesion of all Canadian Space Program activities.

Description

This business line ensures that the Agency performs its role as the manager of the Canadian Space Program. It also includes management activities such as Human Resources, Corporate Management, Administration, Communications, and Audit and Evaluation. The Management business line articulates strategic direction for the Agency, furnishes management and administrative support services, and ensures the necessary integration of all program.

External Factors Influencing the Business Line

As a result of the allocation of new funds in Budget 1999, the CSA will submit a new Space Plan for government approval, early in Spring 1999. The implementation of a new set of programs will have a significant impact on this business line, and the management framework governing the CSP will be revised so as to fit with the new program requirements and funding regime.

CSA is in the midst of implementing the SAP R/3 financial management system; the Agency is also completing its reorganization. This has resulted in a need to fine-tune basic management systems and the level of resource allocation in this business line.

The implementation of the Universal Classification Standard within CSA during the current fiscal year has put additional stress on Human Resources personnel. The devolution of authorities and service delivery responsibilities from central agencies in the Human Resources area is creating some financial stress on the CSA. Official Languages and Equity will remain a priority area for CSA.

Key Plans and Strategies for 1999-2000 to 2001-2002

The Management business line supports the Canadian Space Program decision-making process and — in consultation with its stakeholders both inside and outside the federal government — develops, implements, coordinates and monitors strategies and plans to ensure the efficient implementation of the overall Canadian Space Program (and the Space Policy Framework).

Congruent with the S&T Strategy and the Growth agenda of the government, and in close cooperation with the Industry Portfolio and its stakeholders, specific strategies for this business line include:

- setting up the organizational structure and management processes to implement the new Space Plan;
- providing overall direction and administrative support to the CSA and ensuring the necessary cohesion of all Canadian Space Program activities;
- using the existing CSA performance and accountability structure to monitor CSA performance with respect to the efficient and effective implementation of its programs; and
- ensuring that the Canadian public and stakeholders are better informed about Canadian Space Program activities.

Priorities for 1999-2002 include:

- manage LTSP II in a cost-effective manner;
- prepare the necessary submissions to the government for the new Space Plan;
- complete the implementation of a new performance and accountability structure for CSA;
- continue the Management Development Program for the CSA management team;
- complete the implementation of the SAP R/3 financial system responding to CSA needs;

- implement systems, policies and practices deriving from the Agency-wide reorganization and the implementation of the Quality Performance Framework;
- implement a computerized archiving system:
- implement the Universal Classification Standard; and
- complete the implementation of the Y2K solution.

These priorities ensure the CSA manages its portfolio of projects and programs to meet the expectations of the Government of Canada and the Canadian space community, as specified in the LTSP II.

Expected Results

Result Statement	Indicator	Targets for 1999-2002
Cost-effective management of the Canadian Space Program and the Long Term Space Plans II	Continuing support for the Long Term Space Plans of the Agency	Parliamentarians and senior officials are satisfied with the results of the LTSP II Approval and implementation of the new Space Plan
CSA employees have the appropriate knowledge, tools, processes, and systems to do their jobs	Feedback from employees on level of satisfaction with management activities and communications effort	CSA executives use performance assessment framework to make decisions and allocate resources
Effective results-based, open, and transparent relations between the Agency and stakeholders	Feedback from internal and external stakeholders	Implementation of new information and consultation mechanisms with stakeholders as an alternative to SPOC (Space Program Overview Committee) Positive feedback from 80% of stakeholders on the state of CSA relations
Effective communications strategies, plans, and public awareness activities that satisfy the needs of the Agency, departments in the Industry portfolio, and space stakeholders		Positive feedback from internal and external stakeholders Increased public knowledge and support for the Canadian Space Program, as measured by a survey of opinion
A representative, motivated, capable, innovative and productive work force	Independent review of components for a supportive workplace High employee morale	Implementation by managers of CSA values

3.3

3.3 Consolidated Reporting - Year 2000 Initiative

The CSA has been addressing the Year 2000 computer issue (Y2K) since September 1997. In addition to potential Y2K problems in software, embedded systems in control, testing and laboratory equipment are under consideration. In order to better coordinate the activities of all areas of CSA in addressing this issue, avoid duplication and ensure that all aspects, including legal and contractual issues, are being considered, a Y2K Challenge Task Force was formed in April 1998. Key individuals from all branches of the CSA participate in the Task Force.

3.3.1 Strategy

The Task Force's strategy covers the requirements for internal compliance, i.e. CSA's internal systems and equipment, as well as external activities. It is promoting the importance of the Y2K issue to the private sector businesses, following the lead of the Minister of Industry.

During 1999, the Task Force will complete the testing of mission critical systems and replacement of non Y2K compliant systems and equipment.

However, the main activity will continue to be the development of contingency plans and business contingency plans.

Compliance of the CSA building infrastructure and supporting systems and machinery is also being addressed and tests are planned for February 1999.

The Y2K Task Force initiative is supported by an internal communications plan to raise and maintain awareness of the issue and its importance for CSA.

3.3.2 Current Status

The Canadian Space Agency's activities are divided into five main areas:

- Administration of space industry related business development

The CSA uses common Office Automation software and systems such as IFMS (SAP R/3), TIPS (Transport Canada's human resources system), RIMS and some Oracle-based in-house developed applications for which compliance has been confirmed. No mission-critical legacy systems have been identified.

- *International Space Station* Training and Ground Segment Facilities

In this Major Crown project, the Space Systems branch works with contractors, e.g. Spar and CAE, to build and deliver flight segment systems (remote manipulator arm and special purpose dexterous manipulator), as well as training and mission control facilities. Compliance of the robotics portion has been certified by Spar. Verification of the ground segment components is scheduled to be completed in May 1999.

- **RADARSAT Satellite Operations**

Compliance of all systems is currently being confirmed with the suppliers and an end-to-end test of RADARSAT operations is scheduled for April 1999. Satellite operations are not at risk, but the focus is on the supporting systems and especially commercial systems. CSA is also monitoring the efforts of its partners (RSI and CCRS).

- **David Florida Laboratory Spacecraft Testing Facilities**

Concern is focused on existing instrumentation used for testing spacecraft components. Actions have been initiated to verify compliance and to modify data acquisition and analysis systems.

- **Research and Development**

CSA is involved in a number of joint scientific projects with ESA, NASA and partners from academia. Y2K compliance of onboard and ground systems is being addressed for projects that will cross Year 2000. Legal issues are being considered. Laboratory and supporting systems for internal R&D have been inventoried and are being tested in view of replacing or upgrading the equipment.

3.3.3 Resource Requirements

Replacement and repair expenditures will be absorbed within the operating budgets of the Agency.

Table 1: Spending Authorities - Extract from the Ministry Summary
Table in Part II

Personnel Information

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Table 2.2: Planned Full Time Equivalents (FTEs) by Program
and Business Line

Capital Projects Information

Table 3.1: Capital Spending by Business Line
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Abbreviations and Acronyms

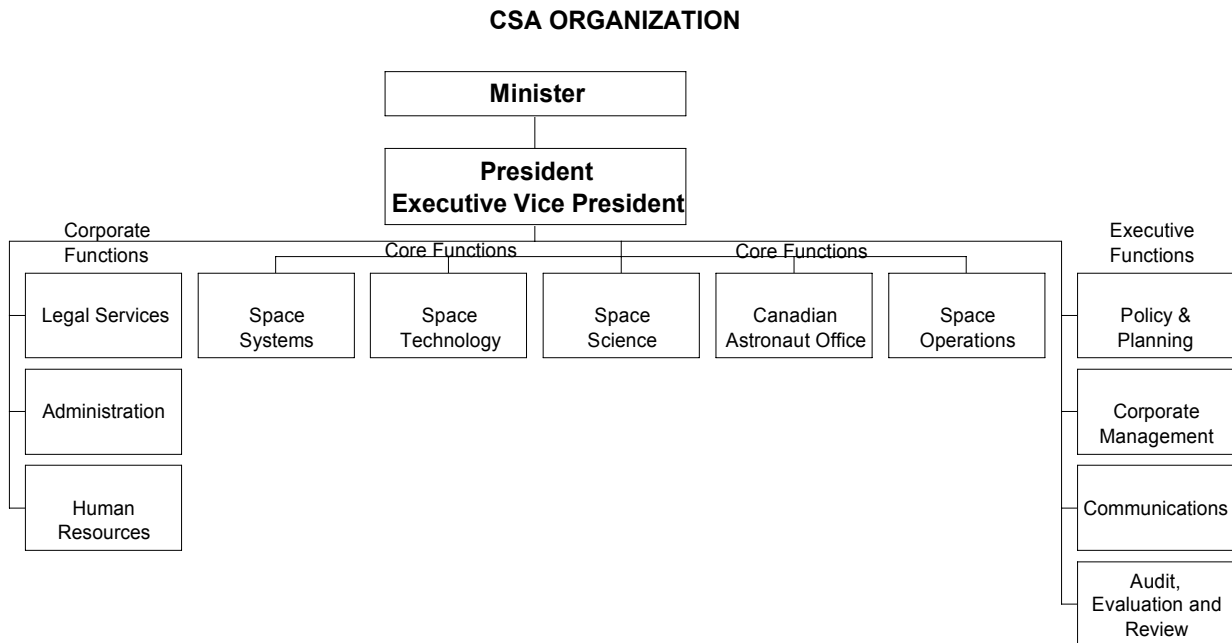
**Table 1 Spending Authorities – Extract from the Ministry
Summary Table in Part II**

<i>Vote</i>	<i>(thousands of dollars)</i>	<i>1999-00</i>	<i>1998-99</i>
		<i>Main Estimates</i>	<i>Main Estimates</i>
	Canadian Space Agency		
30	Operating expenditures	63,686	72,934
35	Capital expenditures	216,854	172,364
40	Grants and contributions	18,886	22,988
(S)	Contributions to employee benefit plans	4,600	4,751
	Total Agency	304,026	273,037

Nota: This table does not include new funds provided in the 1999 Budget

Personnel Information

Table 2.1 Organization Structure



Financial Crosswalk Table

Business Lines	Accountability						Total
	President	DG Space Systems	DG Space Technologies	DG Space Science	DG Canadian Astronaut Office	DG Space Operations	
Space Sciences	0.0	0.7	0.0	21.4	3.5	0.0	25.5
Space Applications and Industry Development	2.2	191.8	53.9	0.0	0.0	16.3	264.3
Management	19.0	0.0	0.0	0.0	0.0	0.0	19.0
Total	21.2	192.4	53.9	21.4	3.5	16.3	308.8

Nota: 1) This table does not include new funds of \$41M provided in the 1999 Budget.
 2) Due to rounding, figures may not add to totals shown.

Table 2.2 **Planned Full Time Equivalents (FTEs)**
by Business Line

	<i>Forecast</i> <i>1998-99</i>	<i>Planned</i> <i>1999-00</i>	<i>Planned</i> <i>2000-01</i>	<i>Planned</i> <i>2001-02</i>
Business Lines				
Space Sciences	40	39	39	39
Space Applications and Industry Development	184	201	189	139
Management	155	122	122	122
Total	379	363	351	300

Nota: This table does not reflect the impact of the new funds provided in the 1999 Budget.

Capital Projects Information

Table 3.1 **Capital Spending by Business Line**

<i>(\$ millions)</i>	<i>Forecast</i> <i>Spending</i> <i>1998-99</i>	<i>Planned</i> <i>Spending</i> <i>1999-00</i>	<i>Planned</i> <i>Spending</i> <i>2000-01</i>	<i>Planned</i> <i>Spending</i> <i>2001-02</i>
Business Lines				
Space Sciences	20.2	18.6	15.5	11.1
Space Applications and Industry Development	223.9	208.0	115.2	29.0
Management	0.0	0.0	0.0	0.0
Gross Total	244.1	226.6	130.7	40.1
Less : Revenue Credited to the Vote	2.1	4.1	7.0	0.0
Net Total	242.0	222.5	123.7	40.1

Nota: 1) Space Applications and Industry Development business line includes contributions to Employee Benefit Plans for the Canadian Space Station and RADARSAT Major Crown Projects.
2) Planned Spending does not include new funds provided in the 1999 Budget.
3) Due to rounding, figures may not add to totals shown.

Table 3.2 Capital Projects by Business Line

(\$ millions)	Forecast					
	Current	Spending to	Planned	Planned	Planned	Future Year
	Estimated	March 31,	Spending	Spending	Spending	Spending
	Total Cost	1999	1999-00	2000-01	2001-02	Requirement
Space Sciences						
Space Science projects			18.6	15.5	11.1	
Total - Space Sciences			18.6	15.5	11.1	
Space Applications and Industry Development						
Canadian Space Station Program	1,394.0	1,251.0	102.4	51.6	9.3	0.9
RADARSAT-1 Major Crown Project	621.9	597.5	14.0	10.4	0.0	0.0
RADARSAT-2 Major Crown Project	242.1	83.6	82.4	52.1	19.7	4.3
Earth Observation Support Program			6.1	0.0	0.0	
STEAR Program			1.5	0.0	0.0	
Miscellaneous capital projects			1.5	1.1	0.0	
Total - Space Applications and Industry Development			208.0	115.2	29.0	
Management						
Miscellaneous capital projects			0.0	0.0	0.0	
Total - Management			0.0	0.0	0.0	
Total Gross Capital Expenditures			226.6	130.7	40.1	
Less: Revenue Credited to the Vote			4.1	7.0	0.0	
Total Net Capital Expenditures			222.5	123.7	40.1	
Nota: 1) For the Major Crown Projects, the sums include contributions to Employee Benefit Plans. 2) Planned Spending does not include new funds provided in the 1999 Budget. 3) Due to rounding, figures may not add to totals shown.						

Table 3.3 Status of Major Crown Projects

Canadian Space Station Program

1. Overview

On January 25, 1984, the President of the United States directed NASA to develop and place into orbit a permanently staffed space station. Friends and allies of the United States were invited to participate in its development and use, to share the benefits, and to promote peace, prosperity and freedom through this cooperative venture. In September 1988, Canada signed a formal agreement with the governments of the United States, member states of the European Space Agency, and Japan to participate in the International Space Station Program. Canada's contribution includes the design, construction, and operation of the Mobile Servicing System, plus responsibilities for the operations and use of the Space Station.

The Canadian Space Station Program received Effective Project Approval from Treasury Board in February, 1990. The program defines all the activities necessary to discharge Canada's obligations, including completion of the on-orbit testing and commissioning of Mobile Servicing System, and its operation and utilization for the life of the *International Space Station*.

2. Lead and Participating Departments

Lead Authority:
Canadian Space Agency

Contracting Authority:
Public Works and Government Services Canada

Participating Departments:
None

3. Prime and Major Sub-Contractors

Prime	
Spar Aerospace	Toronto, Ontario
Sub-Contractors	
Cal Corp.	Ottawa, Ontario
MDA	Richmond, British Columbia
SED Systems Inc.	Saskatoon, Saskatchewan
IMP	Halifax, Nova Scotia
CAE	St-Laurent, Québec
Calian	Kanata, Ontario

4. Major Milestones

The following table outlines the key milestones of Canada's participation in the International Space Station Program:

<i>Event</i>	<i>Date</i>
Initiation of CSA's development and design phase of Mobile Servicing System	Jul 1987
First Space Station elements launch	Nov 1998
First Mobile Servicing System elements delivery to NASA	Mar 1999
First Mobile Servicing System element launch (SSRMS)	Apr 2000
Second Mobile Servicing System element launch (MBS)	Mar 2001
Third Mobile Servicing System element launch (Special Purpose Dexterous Manipulator)	Nov 2002
Permanently manned capability	2004

5. Progress Report and Explanations of Variances

The acceptance review of the Space Station Remote Manipulator System (SSRMS) was performed in October 1997. By the end of March 1999, the SSRMS (flight element) will be delivered to NASA. Acceptance Review for the Mobile Base System (MBS) is scheduled for August 1999. MBS Integration and test activities are underway. Activities to be carried out after the Acceptance Review of MSS flight elements and delivery to NASA, such as the system level end-to-end tests, have begun, leading to a multi-element integration test and software integration at NASA in the summer of 1999.

The Canadian Space Vision System (CSVS) passed Acceptance Review in December 1997. The space vision system was tested and validated on mission STS-88 in December 1998, and will undergo more qualification tests on future shuttle missions.

Astronauts and Cosmonauts of Expedition 2 and 4 have underwent training in the MSS Operations Complex (MOC) at the CSA in February and March 1999.

The Special Purpose Dexterous Manipulator (SPDM) completed its Critical Design Review (CDR) in December 1998. SPDM is on schedule.

6. Industrial Benefits

Since 1984, the program has issued about \$900 million worth of contracts to industry, with expenditures benefiting all regions of the country.

7. Summary of Costs

The non-recurring costs associated with the approved project are:

(\$ millions)	Forecast					
	Current	Spending to	Planned	Planned	Planned	Future Year
	Estimated	March 31,	Spending	Spending	Spending	Spending
Total Cost	1999	1999-00	2000-01	2001-02	Requirement	
Canadian Space Station Program	1,398.7	1,255.7	102.4	51.6	9.3	0.9

Nota: 1) The sums include contributions to Employee Benefit Plans.
2) Planned Spending does not include new funds provided in the 1999 Budget

RADARSAT-1

1. Overview

RADARSAT-1 is a Canadian-led project involving the private sector, several of the provinces, and the United States. This sophisticated remote sensing satellite, carrying a Synthetic Aperture Radar, was launched in November 1995 and was designed to operate for about five years. Its data acquisition capability covers most of Canada every 72 hours, the Arctic every 24 hours. *RADARSAT-1* can gather the data needed for more efficient resource management as well as ice, ocean and environmental monitoring, disaster management and Arctic and offshore surveillance.

RADARSAT-1 also supports fishing, shipping, oil exploration, offshore drilling, and ocean research. The development and operation of this system are expected to provide more than \$1 billion in benefits to the Canadian private and public sectors. In addition a total of \$84.1 million is expected in provincial contributions and revenues to support the development and operations of *RADARSAT-1*. This includes \$16.6 million in royalties on world-wide sales of *RADARSAT-1* data, \$10.0 million from *RADARSAT* International Inc. for data processing, and \$57.5 million from provincial governments for work related to satellite construction.

2. Lead and Participating Departments

Lead Authority:
The Canadian Space Agency

Contracting Authority:
Public Works & Government Services

Participating Departments:
Environment Canada
Natural Resources Canada

3. Prime and Major Sub-Contractors

Prime	
Spar Aerospace	Toronto, Ontario
Sub-Contractors	
SED Systems Inc.	Saskatoon, Saskatchewan
Lockheed Martin	Montréal, Québec
Cal Corp.	Kanata, Ontario
MDA	Richmond, British Columbia
Comdev	Cambridge, Ontario
RSI	Richmond, British Columbia
Ball Aerospace	Boulder, Colorado, USA

4. Major Milestones

Major Milestones		
Phase	Description	Date
A	Preliminary studies	Completed
B	Feasibility and concept definition	Completed
C1	Systems requirement and preliminary design	Completed
C2	Development and testing up to Qualification Test Review	Completed
D1	Manufacture of the proto flight subsystems up to acceptance testing of the subsystems	Completed
D2	Assembly and integration of the subsystems up to Flight Readiness Review, plus post-launch and commissioning activities up to System Acceptance	Completed
E	Operations	April 1996 to March 2001
	First Antarctic mission	Completed

5. Progress Report and Explanation of Variances

Effective Program Approval was obtained for RADARSAT-1 in March 1991. The Preliminary Design Review was held in July 1991, marking the end of the C1 phase. A contract for phase C2 to D1 was awarded to the primary contractor in July 1991, with an amendment to cover all the contractors' activities until completion of phase D2. In 1994-95, the manufacturing, assembly, integration and testing were done on all the major subsystems, and contracts were awarded for all the significant subsystems of the ground segment. During 1995-96, the spacecraft was assembled and tested and the full Space-Ground System was qualified. RADARSAT-1 was launched in November 1995 and began operations in April 1996. The initial system included receiving stations for Synthetic Aperture Radar data in Prince Albert (Saskatchewan), Gatineau (Québec) and Fairbanks (Alaska). CSA and RADARSAT International Inc. have since signed agreements with network stations in Norway, the United Kingdom, Singapore, Australia, SIE/Eagle Vision, South Korea, China and Japan for the direct reception of the RADARSAT data.

Commercial operations of *RADARSAT-1* commenced in April 1996, following a commissioning period. During its first two years of operations, *RADARSAT-1* has supplied timely and high quality data to *RADARSAT International Inc.*, the private sector company that sells *RADARSAT* data world-wide, and to the program partners (federal and provincial government departments, NASA and the National Oceanic and Atmospheric Agency). *RADARSAT* has fulfilled a total of 30,250 user requests. An estimated 68,000 minutes of data from over 12,500 orbits have been acquired. From April 1, 1997 to March 31, 1998, more than 9,000 images were delivered to clients, including 1,500 products in near-real time. The world-wide client base includes more than 400 commercial and government users from 41 countries.

The *RADARSAT* system was designed to provide four-hour turnaround in the electronic delivery of images to the Canadian Ice Service for producing ice charts for the Canadian Coast Guard. In operation, delivery time is averaging 12 hours from the time the image is acquired by the satellite, and it is often completed within one hour. During 1997, the Canadian Ice Service used over 3,300 images of *RADARSAT* data and supplied more than 32,000 image products and 8,000 charts to its 300 clients. It has been estimated that *RADARSAT* is saving more than \$6 million per year in data acquisition costs to the Canadian Ice Service.

RADARSAT is archiving substantial volumes of images for future use. The *RADARSAT* Background Mission continues to achieve some exciting firsts. *RADARSAT* has provided the first SAR coverage of the world's continents, their continental shelves and the polar caps, as well as some islands and their surrounding oceanographic features. *RADARSAT* is creating an archive of global multi-mode and multi-season SAR data. The Background Mission is also supplying a global stereo data set of the world's land mass. Nearly 75% of North America and Western Europe has been covered, providing data suitable for mapping a wide range of terrain conditions.

Between September 9, 1997 and October 20, 1997 *RADARSAT* undertook the Antarctic 1 Mapping Mission, supplying the first high-resolution radar mapping of the entire Antarctic continent, an area which contains 70% of the world's water supply. It has been a resounding success, far exceeding NASA's expectation both in completeness of coverage and quality of the images. *RADARSAT* acquired a total of 8,000 images, 2,000 more than originally planned. The data will be used to study the effects of climatological, glaciological, geological, and human activity processes on the Antarctic continent. The Antarctic Mapping Mission fulfills a CSA commitment to NASA and NOAA in return for launching *RADARSAT-1* in 1995.

In 1997, sales of *RADARSAT* data have increased by more than 120% over the previous year. Responding to client needs, *RADARSAT International* is using the Internet to improve access and delivery of products. To open new markets, new products and services have been introduced: *RADARMaps*, large area mosaics, emergency response subscription service, per sq km pricing, monitoring services and *RADARSAT*-derived DEM's.

6. Industrial Benefits

SPAR and its Canadian subcontractors created over 2,000 high technology person-years of employment during the construction phase of *RADARSAT-1*. Ongoing *RADARSAT* mission operations employ 50 people at CSA and 15 at the ground stations in Prince Albert and Gatineau. *RADARSAT International* has over 80 employees and has generated approximately \$10.6M of *RADARSAT* data sales in the first 10 months of 1998, representing a 18% increase over all of 1997. There are now 170 Canadian companies selling value-added services for an estimate of \$300M annually. Employment and revenues in this business are growing at a sustained rate of 20% yearly.

RADARSAT data appeal to a wide range of user groups. Requests to date have involved, among others, oil and gas exploration in Texas and South America, forest management in Indonesia, flood-disaster assessment in Oregon and Manitoba, oil spill monitoring off the coast of Wales and in the Sea of Japan, rice crop monitoring in China and sea ice monitoring for navigation in Canada's North. *RADARSAT International* has hired specialists with marine, geology, land-use, mapping and defence experience to ensure that the company has the after-sale support expertise.

The RADARSAT User Development Program has supported 38 industrial project proposals worth more than \$11.3 million for the development of new applications using SAR data. A workshop will take place in early 1999 to evaluate the resulting benefits. To date, this investment has helped bring 16 products and services to market resulting in over \$14.5 million in revenues and leveraging an estimated \$2.6 million in RADARSAT data sales. Since 1995, the User Education and Training Initiative has funded 30 projects to develop and market educational and training Earth observation materials. The Earth Observation Pilot Projects Program has supported 21 projects to transfer Earth observation technology to a broader base of industrial and operational users.

7. Summary of Cost

The non-recurring costs associated with the project are:

(\$ millions)	Forecast					
	Current	Spending to	Planned	Planned	Planned	Future Year
	Estimated	March 31,	Spending	Spending	Spending	Spending
Total Cost	1999	1999-00	2000-01	2001-02	Requirement	
RADARSAT-1 Major Crown Project	621.9	597.5	14.0	10.4	0.0	0.0
Less: Revenue Credited to the Vote			4.1	7.0	0.0	
Total Net Capital Expenditures			9.9	3.4	0.0	

Nota: 1) The sums include contributions to Employee Benefit Plans.
2) Planned Spending does not include new funds provided in the 1999 Budget.

Additional Financial Information

Table 4 Agency Summary of Standard Objects by Expenditure

(\$ millions)	<i>Forecast Spending 1998-99</i>	<i>Planned Spending 1999-00</i>	<i>Planned Spending 2000-01</i>	<i>Planned Spending 2001-02</i>
Personnel				
Salaries and wages	23.9	23.0	22.2	18.9
Contributions to employee benefit plans	4.8	4.6	4.4	3.8
	28.6	27.6	26.7	22.7
Goods and Services				
Transportation and communications	5.1	4.1	3.8	2.9
Information	1.2	1.0	0.9	0.8
Professional and special services	54.7	44.3	24.8	19.6
Rentals	0.6	0.5	0.5	0.4
Purchased repair & maintenance	0.9	0.9	1.1	0.6
Utilities, materials and supplies	2.5	1.6	2.5	1.7
Other subsidies and payments	3.5	2.7	2.4	2.3
	68.5	55.1	35.9	28.4
Capital	223.7	211.3	117.7	31.8
Transfer Payments				
Grants	0.9	2.0	1.1	0.5
Contributions	22.3	16.9	8.9	4.5
	23.2	18.9	10.0	5.0
Gross budgetary expenditures	344.0	312.9	190.3	87.9
<i>Less: Revenue Credited to the Vote</i>	2.1	4.1	7.0	0.0
Net budgetary expenditures	341.9	308.8	183.3	87.9
Non-budgetary (LIAs)	0.0	0.0	0.0	0.0
Total	341.9	308.8	183.3	87.9

Nota: 1) This table does not include new funds provided in the 1999 Budget.
2) Due to rounding, figures may not add to totals shown.

Table 5 Program Resources by Business Line for the Estimates Year

	Budgétaire							Dépenses nettes prévues
	ÉTP	Fonctionnement	Immobilisations	Paiements de transfert	Dépenses prévues	Non-budgétaire Prêts Investissements et avances	Dépenses brutes prévues	
Secteur d'activités								
Sciences spatiales	39	6.1	18.6	0.8	25.5	0.0	25.5	0.0
Applications spatiales et développement industriel	201	42.3	208.0	18.1	268.4	0.0	268.4	4.1
Gestion	122	19.0	0.0	0.0	19.0	0.0	19.0	0.0
Total	363	67.4	226.6	18.9	312.9	0.0	312.9	4.1

Nota: 1) Ce tableau n'inclut pas les nouveaux fonds octroyés dans le budget de 1999;
2) Les chiffres étant arrondis, ils peuvent ne pas correspondre au total indiqué.

Table 6 Transfer Payments by Business Line

(\$ dollars)	<i>Forecast Spending 1998-99</i>	<i>Planned Spending 1999-00</i>	<i>Planned Spending 2000-01</i>	<i>Planned Spending 2001-02</i>
GRANTS				
Space Applications and Industry Development				
Grants for Space Research Partnerships	286,000	1,540,000	640,000	0
Grants for Scholarships for space-related research	180,000	150,000	150,000	150,000
Grants for postdoctoral Fellowships	165,000	100,000	100,000	100,000
International Space University	175,000	175,000	175,000	175,000
Grants for the Youth Awareness Program	65,000	50,000	50,000	50,000
Total grants	871,000	2,015,000	1,115,000	475,000
CONTRIBUTIONS				
Space Sciences				
Space Science Enhancement Program	200,000	800,000	500,000	500,000
	200,000	800,000	500,000	500,000
Space Applications and Industry Development				
Contribution to the Earth Observation Preparatory Program of ESA (EOPP)	1,793,691	0	0	0
Contribution to the European Remote Sensing Satellite Program II of ESA (ERS-02)	1,947,050	1,777,000	219,000	0
Contribution to the Preparatory Program of the First Polar Orbit Earth Observation Mission Program of ESA (POEM/ENVISAT)	6,689,708	8,092,000	5,071,000	3,860,000
Contribution to Data Relay and Technology Mission Program of ESA (DRTM)	212,855	320,000	184,000	0
Contribution to the Advanced Systems and Technology Program of ESA (ASTP-4)	6,227	0	0	0
Contribution to the Advanced Research in the Telecom. Systems Program of ESA (ARTES)	4,546,332	4,702,000	2,480,000	0
Contribution to the General Support Technology Program of ESA (GSTP)	634,567	0	0	0
Contribution to the general budget of the European Space Agency (ESA)	5,714,570	735,000	0	0
Contributions for the Youth Awareness Program	572,000	445,000	436,000	146,000
	22,117,000	16,071,000	8,390,000	4,006,000
Total contributions	22,317,000	16,871,000	8,890,000	4,506,000
Total grants and contributions	23,188,000	18,886,000	10,005,000	4,981,000

Nota: This table does not include new funds provided in the 1999 Budget.

Table 7 Revenue by Program

<i>(\$ millions)</i>	<i>Forecast Revenue 1998-99</i>	<i>Planned Revenue 1999-00</i>	<i>Planned Revenue 2000-01</i>	<i>Planned Revenue 2001-02</i>
<u>Revenue Credited to the Vote</u>				
Canadian Space Program				
Royalties from RADARSAT International	2.1	4.1	7.0	0.0
Total Credited to the Vote	2.1	4.1	7.0	0.0
<u>Revenue Credited to the Consolidated Revenue Fund (CRF)</u>				
Canadian Space Program				
DFL testing service fees	0.4	0.4	0.5	0.5
Rental fees and miscellaneous	0.0	0.0	0.0	0.0
Total Credited to the CRF	0.4	0.5	0.5	0.5
Total Revenues	2.6	4.6	7.5	0.5
Nota: 1) Due to rounding, figures may not add to totals shown.				
2) This table does not include new funds provided in the 1999 Budget.				

Table 8 Net Cost of Program for the Estimates Year

(\$ millions)	Canadian Space Program
Gross Planned Spending	312.9
Plus:	
Services Received without Charge	
Accommodation provided by Public Works and Government Services Canada (PWGSC)	0.1
Contributions covering employees' share of insurance premiums and costs paid by TBS	1.5
Employee compensation payments provided by Human Resources Canada	0.0
Salary and associated costs of legal services provided by Justice Canada	0.0
Total - Services Received without Charge	1.6
Total Cost of the Program	314.5
Less:	
Revenue Credited to the Vote	4.1
Revenue Credited to the CRF	0.5
Total Revenue	4.6
1999-00 Estimated Net Program Cost	309.9
Nota: 1) This table does not include new funds provided in the 1999 Budget.	
2) Due to rounding, figures may not add to totals shown.	

Table 9.1 Revolving Fund - Statement of Operations

The Canadian Space Agency does not have revolving funds.

Table 9.2 Revolving Fund - Statement of Changes in Financial Position

The Canadian Space Agency does not have revolving funds.

Table 9.3 Revolving Fund - Projected Use of Authority

The Canadian Space Agency does not have revolving funds.

Table 10 Loans, Investments and Advances by Business Line

The Canadian Space Agency does not have loans and investments.

Table 11 Tax Expenditures

The Canadian Space Agency does not have tax incentives.

Table 12 Crosswalk from Old Structure for 1999-00 Main Estimates

(\$ millions)		Old Business Lines						
New Business Lines	Earth Observation	Satellite Communications	Canadian Space Station Program	Canadian Astronaut Program	Space Science	Space Technology	Executive & Horizontal Coordination	Total
Space Sciences	0.0	0.0	0.0	3.5	22.0	0.0	0.0	25.5
Space Applications and Industry Development	109.4	32.2	109.4	0.1	0.1	10.3	2.8	264.3
Management	0.0	0.0	0.0	0.0	0.0	0.0	19.0	19.0
Total	109.4	32.2	109.4	3.6	22.1	10.3	21.8	308.8

Nota: 1) This table does not include new funds of \$41M provided in the 1999 Budget.
2) Due to rounding, figures may not add to totals shown.

Other Information

Table 13 Listing of Statutes and Regulations

Canadian Space Agency Act (S.C. 1990, c. 13)

Table 14 References

Earth Observation

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Abbreviations and Acronyms

ACOA	Atlantic Canada Opportunities Agency
ACTORS	Atlantic Canada Thin-film Organic Semiconductors
AI&T	Assembly, integration and testing
ARF	Aquatic Research Facility
ARTES	Advance Research in the Telecommunications Systems Program
ASTP	Advance Systems and Technology Program
ASVS	Advanced Space Vision System
CCRS	Canada Centre for Remote Sensing
CEONet	Canadian Earth Observation Net
CFZF	Commercial Float Zone Furnace
CNES	Centre national d'études spatiales (France)
CPA	Cold Plasma Analyser
CRC	Communications Research Centre
CSA	Canadian Space Agency
CSP	Canadian Space Program
CSVS	Canadian Space Vision System
DA	Departmental approval
DFL	David Florida Laboratory
DND	Department of National Defence
DUP	Data User Program
EMC	Electromagnetic Compatibility
EOPP	Earth Observation Preparatory Program
EPA	Effective Program Approval
ERS	European Remote Sensing
ESA	European Space Agency
ESD	Electrostatic Discharge
FBI	Federal Building Initiative
FTE	Full Time Equivalent
FUSE	Far Ultraviolet Spectroscopic Explorer
GSTP	General Support Technology Program
IGA	Intergovernmental Agreement
IML	International Microgravity Laboratories
JPL	Jet Propulsion Laboratory
LMS	Life and Microgravity Spacelab
LTSP	Long Term Space Plan
MBS	Mobile Base System
MCP	Major Crown Project
MIM	Microgravity Isolation Mount
MMLC	Multimedia Learning Centre
MOPITT	Measurement of Pollution in the Troposphere
MOTS	Mobile Operations Training Simulator
MOU	Memorandum of Understanding
MRC	Medical Research Council of Canada
MSAT	Mobile Satellite
MSS	Mobile Servicing System
MSTP	European Manned Space Program
NASA	National Aeronautics and Space Administration (United States)
NASDA	National Space Development Agency (Japan)
NRC	National Research Council of Canada
NSERC	Natural Sciences and Engineering Research Council of Canada
NOAA	National Oceanic & Atmospheric Administration (United States)
OSIRIS	Optical Spectrograph and Infrared Imaging System
PAS	Program Activity Structure
PIM	Passive Intermodulation Measurement
POEM/ENVISAT	Polar Orbit Earth Observation Mission
PPA	Preliminary Project Approval
PRAB	Program Review Approval Board
PRAS	Planning and Reporting Accountability Structure

PSDE	Payload and Spacecraft Development and Experimentation
PWGSC	Public Works and Government Services Canada
QUELD	Queen's University Experiment on Liquid Diffusion
RF	Radio Frequency
RSI	RADARSAT International Inc.
SAR	Synthetic aperture radar
SIFAC	Space Industry Forum in Atlantic Canada
SME	Small and Medium Sized Enterprise
SMS	Supra thermal Ion Mass Spectrometer
SOSC	Space Operations Support Centre
SPDM	Special Purpose Dexterous Manipulator
SRMS	Space Remote Manipulator Simulator
SSRMS	Space Station Remote Manipulator System
STACI	Space Technology Atlantic Canada Initiative
STEAR	Strategic Technologies for Automation and Robotics
STS	Space Transportation System
SVS	Space Vision System
TMI	Telesat Mobile International
TPA	Thermal Plasma Analyzer
TRE	Torso Rotation Experiment
UARS	Upper Atmospheric Research Satellite
VCF	Visual Coordination Facility
VOTE	Virtual Operations Training Environment
VSOP	Very Long Baseline Interferometry Space Observatory Project
WED	Western Economic Diversification
WINDII	Wind Imaging Interferomete