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STATE OF THE CANADIAN SPACE SECTOR 2012

POLICY AND EXTERNAL RELATIONS

Canada

STATE OF THE CANADIAN SPACE SECTOR 2012

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MISSION STATEMENT

ABOUT THE AUTHORS

The Policy and External Relations Directorate (PER) at the Canadian Space Agency (CSA) is responsible for leading the development and implementation of space policies. The PER also manages the strategic relationships between the CSA and its domestic and international partners. Key mandates include the development and implementation of strategies relating to cooperative partnerships with domestic stakeholders (federal and provincial governments, industry and the academic community), international agencies, and foreign industries. The PER also plays a pivotal role in supporting the commercial initiatives of Canadian space companies in world markets—a core mandate for the CSA—and in providing stakeholders with strategic and timely information. As such, the PER has been conducting the CSA's annual space sector survey since 1996 in order to track the performance of the Canadian space sector.

ABOUT THIS REPORT

The *State of the Canadian Space Sector* provides insight for decision-makers in government and industry alike so that they can make informed, strategic choices for the future.

The strong data set is a solid source of longitudinal data on many performance indicators. The questionnaire follows a census model and is sent to approximately 200 organizations involved in space activities across Canada. The participants include small to medium enterprises, multinational space companies, not-for-profits, research centres and universities.

FOR MORE INFORMATION

For more information about the Canadian space sector, or for an electronic copy of this report, please go to **www.asc-csa.gc.ca**.

ACKNOWLEDGMENTS

The CSA wishes to acknowledge the contribution of both public and private-sector organizations, without which this report would simply not have been possible.

Credit: NASA

February 29, 2012 – Harper Government renews its commitment to the International Space Station

Credit: NASA

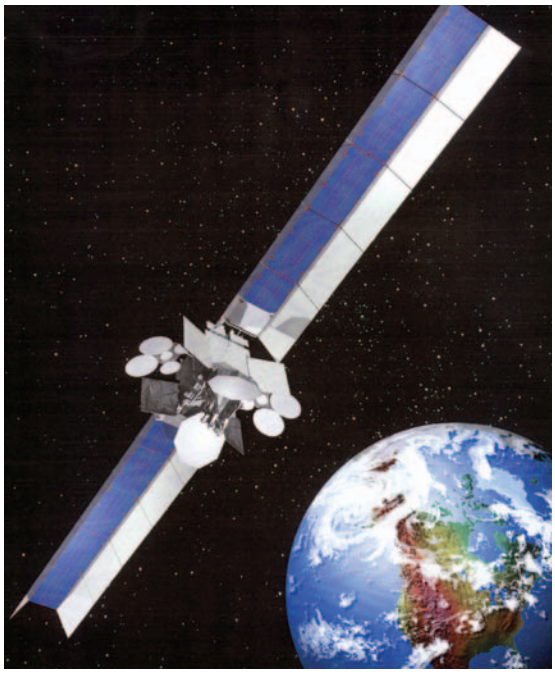
March 12, 2012 – Dextre, the Canadian Space Agency's robotic handyman on board the International Space Station, successfully concluded the initial phases of the Robotic Refueling Mission (RRM) with unprecedented precision.

Credit: Canadian Space Agency

June 15, 2012 – The Canadian Space Agency announced that its partnership with the French space agency (Centre national d'études spatiales) to launch space science balloons in Canada. The first series of tests were completed in September 2012 at the stratospheric balloon launch site in Timmins, Ontario.

Credit: NASA (via Neptec)

May 4, 2012 – The Canadian Astronautics and Space Institute (CASI) awarded Neptec the annual Alouette Award, intended to recognize an outstanding contribution to advancement in Canadian space technology, application, science or engineering. Neptec was awarded the prize for their ongoing work with space vision systems, as well as new efforts tied to 3Di, or Intelligent Three Dimensional Data Collection and Processing.



Credit: Boeing

June 27, 2012 – The Canadian Space Agency transfers the implementation of high speed interactive R&D broadband services in the far north to Telesat Canada.

MESSAGE FROM THE PRESIDENT

As President of the Canadian Space Agency (CSA), I am honored to present the ***State of the Canadian Space Sector Report***, conveying the 2012 national survey results. This annual assessment of the health of the Canadian space sector provides policy-makers and stakeholders alike with the information needed to monitor trends and make fact-based decisions about our future directions.

Canada's space workforce has increased since the last reporting period, gaining nearly 500 positions across the country. As well, 2012 marked several interesting developments and projects including, for example, our renewed commitment to the International Space Station until at least 2020, an exciting new opportunity for scientists and engineers to test payloads using stratospheric balloons, and a successful collaboration with NASA aboard the Mars Science Laboratory mission.

The results also show, however, that the space sector faced some challenges last year, as revenues were down on both the domestic and export domains. The decline in revenue was felt in numerous areas of activity, as well as across the respective regions surveyed. Overall, space sector revenues decreased nearly 4.5% between 2011 and 2012.

The results from the 2012 survey reveal a competitive and challenging landscape, but Canada's space actors have demonstrated time and time again that they are resilient, innovative, and ultimately successful. The CSA is committed to Canada's space industry and academic community; we are dedicated to providing the groundwork for our country's space sector to excel. In this regard, 2012 was also marked by the completion of the Government of Canada's mandated Aerospace and Space Review, otherwise known as the "Emerson Report." The report made several important observations and recommendations to enhance the space sector, which are under consideration at this time.

The information contained in this publication is made possible entirely by the generous collaboration and input of our partners, members of the Canadian space industry and academia. Thank you all who have taken the time to provide us with the data needed to perform this study.

General (Retired) Walter Natynczyk
Canadian Space Agency President

EXECUTIVE SUMMARY

In 2012, the Canadian space sector generated **total revenues** of $3.327B, which was a 4.5% decrease over 2011. Many organizations fared well in 2012, but their total gains were not enough to offset major losses across the sector, as several large space industry players and universities experienced a decrease in revenues.

Over the last five years, **total revenues** generated by the Canadian space sector have increased by 19% or $533M. The Compound Annual Growth Rate (CAGR) from 2008 to 2012 was 3.6%.

Domestic revenues amounted to $1.743B, a decrease of 4%. Non-governmental **sources of revenue**, at 80%, continued to make up the majority of domestic revenues. The remaining 20% of domestic revenues were derived from Canadian governments (federal, provincial and municipal), most of which is federal funding, notably from the CSA and the Department of National Defence.

Export revenues in 2012 decreased for the second year in a row, totalling $1.584B (a decrease of $81M over 2011). Ontario and the Prairies were the most affected by declining revenues in absolute dollar terms. However, Ontario continues to hold the majority of Canada's space export market with a 56% share of Canadian space-related export revenues.

The Canadian space sector **workforce** experienced 7% growth over the previous year, gaining 499 positions across the country and bringing the total space-related workforce to 7,993. Of the total workforce gain, the majority of positions were classified as highly qualified personnel (HQP): scientists, engineers and technicians.

With respect to the **sectors** surveyed, **earth observation** made considerable gains, amounting to 19%, or $52M, with the sector now attaining a total of $322M in revenues.

Satellite communication revenues were relatively flat, with a 2% decrease, with total revenues of $2.7B. **Navigation**, **space science** and **space exploration** all experienced declining revenues between 2011 and 2012: $53M (24%), $75M (59%) and $27M (22%) respectively.

Concerning the **categories** surveyed, **Applications and Services** and **Space Segment** revenues remained flat, totaling $2,200M and $754M, respectively. **Ground Segment** revenues decreased by 18%, or $72M, over the previous period, with total revenues at $337M; **Space Research** revenues decreased by 46%, or $31M, totaling $36M.

Revenues derived from **manufacturing** have increased by $11M over last year, currently amounting to $691M of total space-sector revenues.

Defence-related revenues increased by $64M in 2012. Defence revenues represented $200M of total revenues, of which $142M were export-related and $58M were domestic.

Space Research and Development expenditures totalled $165M in 2012, with 51 organizations currently undertaking space research and development projects.

METHODOLOGY

OVERVIEW OF THE REPORT

In order to measure the changes taking place in Canada's space sector, the CSA conducts an annual survey and publishes the results in the *State of the Canadian Space Sector* report. This edition profiles the space sector over the course of 2012, with most organizations reporting on a calendar year from January 1 to December 31, 2012, and the remainder reporting on a fiscal year ending in March 2013. Data is provided in the following areas:

- Overall space revenues;
- Domestic vs. export revenues;
- Revenues of Canada's top 30 organizations developing and/or using space to generate revenues;
- Revenues by sectors of activity (Satellite Communications, Space Exploration, Earth Observation, Space Science and Satellite Navigation);
- Revenues by space categories (Space Segment, Ground Segment, Applications and Services, and Space Research);
- Revenues by region (British Columbia, Prairies, Ontario, Quebec and Atlantic Canada); and
- Workforce characteristics.

Credit: exactEarth

July 22 2012 – exactEarth launched their EV1Satellite, an Automatic Identification System (AIS) satellite built to utilize high-speed communications for vessel monitoring throughout the world's oceans.

Credit: CSA-COM DEV

July 30, 2012 – Delivery of the Canadian two-in-one instrument which will be integrated onboard the James Webb Space Telescope, the successor to the Hubble Space Telescope. Canada's contribution guarantees Canadian astronomers a share of observing time once the telescope launches, scheduled for 2018.

Credit: NASA/JPL-Caltech

August 6, 2012 – NASA's Mars Science Laboratory (MSL) touched down on the Red Planet, marking the second time a Canadian science instrument lands on Mars. The instrument (APXS) will probe the chemistry of rocks and soils on Mars to help determine if the planet ever was, or could still be today, an environment able to support microbial life.

Questionnaires were sent to approximately 200 private sector companies, research organizations and universities in Canada with a defined strategic interest in the space industry.

It is important to note that the organization-specific information used to compile this report remains strictly confidential and cannot be released in a manner other than in an aggregate form. Consequently, in certain circumstances, the authors are prevented from providing a more detailed explanation or in-depth analysis of the results.

The State of the Canadian Space Sector survey has been conducted since 1996. Comparative analyses of trends across time typically examine 5 or 10 year periods. Consequently, in this edition data are reported for the 2003-2012 period. Readers should consult previous editions (available on the CSA website) for information regarding results prior to 2003.

DEFINITION OF CANADA'S SPACE SECTOR

The Canadian space sector is defined as organizations (private, public and academic) whose activities rely on the development and use of space assets and/or space data.

Space Segment: Research and Development (R&D), manufacturing, testing, integration and launch of platforms (satellites, spacecraft, and robotic systems), complete systems, subsystems, and components.

Ground Segment: R&D, manufacturing, testing, and integration of facilities on Earth for controlling space based systems and satellites, linking satellites to operational terrestrial networks, and for processing satellite-derived data.

Applications and Services: Development and/or provision of services and value-added products and technologies that are derived from the use of space systems and/or data, and the provision of consulting and engineering services.

Fundamental Space Research: Primarily research related to non-commercial or pre-commercial space activities.

Credit: Canadian Space Agency

September 27, 2012 – Unveiling of the Next-Generation Canadarm project (NGC).

Credit: Space Concordia Team

September 29, 2012 – Space Concordia, a student-run astronautical engineering association based in the Faculty of Engineering and Computer Science at the Concordia University in Montreal, won the Canadian Satellite Design Challenge (CSDC). The CSDC is a Canada-wide competition for university student teams to design and build a low-cost satellite. The winning satellite is intended to be launched into orbit, for scientific research purposes.

Credit: Canadian Space Agency

September 29, 2012 – 50th anniversary of the launch of Canada's first satellite, Alouette-1, a technological feat that establishes Canada as a space faring nation, the third country to entirely design and build its own satellite.

RESULTS

OVERALL REVENUES

In 2012, total revenues for the Canadian space sector were $3.327B, which was a 4.5% decrease ($156M) over revenues in 2011. **Domestic revenues decreased** by 4.1% and **exports decreased** by 4.9%.

The long-series data show us that despite 2012 being a tough year for Canadian space organizations, total revenues generated by the Canadian space sector over the last five years have *increased* by 19%, or $533M. The **average growth rate** (calculated using Compound Annual Growth Rate[1]) for total revenues over the past five years is 3.6%: 4.7% for domestic revenues and 2.4% for exports.

REVENUES OF CANADA'S LEADING SPACE ORGANIZATIONS

In 2012, the top 30 Canadian space organizations generated 98% of the total space revenues and employed 88% of space sector workforce, a consistent pattern in previous survey results (regardless of changes in the composition or rank order of the top 30 organizations).

By comparison, the top 10 organizations account for 88% of total space revenues and 64% of workforce.

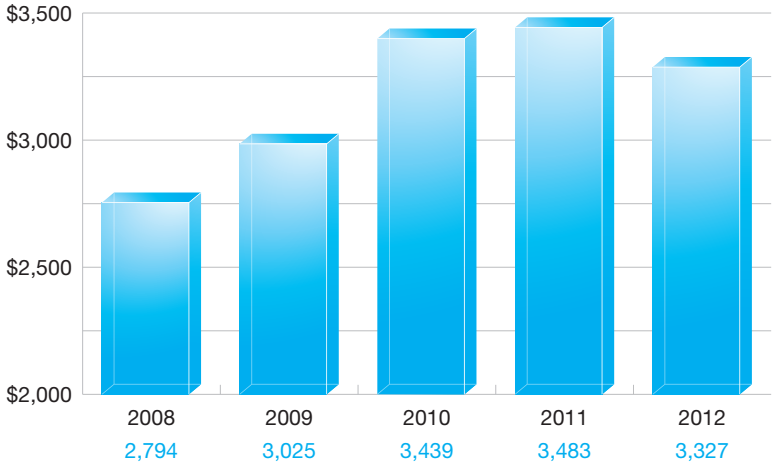
56 organizations reported revenues in excess of $1M during 2012, the same figure as last year.

UNIVERSITIES AND RESEARCH CENTERS

Universities and research centres are a subset of the organizations canvassed for this study; they vary substantially from the results of private-sector companies. For example, universities and research centres rely much more heavily on domestic sources of funds, whereas private industry has a more even split between domestic and export revenues.

[1] See Statistics Canada for CAGR formula: http://www.ic.gc.ca/eic/site/cis-sic.nsf/eng/h_00003.html

Total Space Revenues: 2008-2012 (C$m)



Credit: Canadian Space Agency

October 19, 2012 – Official unveiling and robotic demonstrations at the Canadian Space Agency's analogue testing terrain. These terrestrial rovers are bringing Canada one step closer to developing the next generation of rovers for space exploration.

In 2012, universities and research centres accounted for $79M of domestic revenues, securing most of their funding from government sources with $73M in public funds for space activities.

In 2012, universities and research centres continued to access foreign markets and institutions for business and research grants (although at a slower rate than in 2011) with $3M in revenues derived from foreign sources. The European Space Agency, the American government, and American companies are the biggest sources of foreign funding for space-related activities at Canadian universities.

DOMESTIC VS EXPORT REVENUES

The proportional share of domestic vs. export revenues remained the same as last year. Domestic space revenues were 52% of total space revenues, while exports represented 48% of the market.

When corrected for inflation, domestic revenues over the past ten years from 2003-2012 have experienced real growth of $321M, or 23%. By comparison, export revenues (corrected for inflation) have grown by $639M or 68%. See data tables on page 20 for more information regarding inflation-adjusted amounts.

DOMESTIC REVENUES

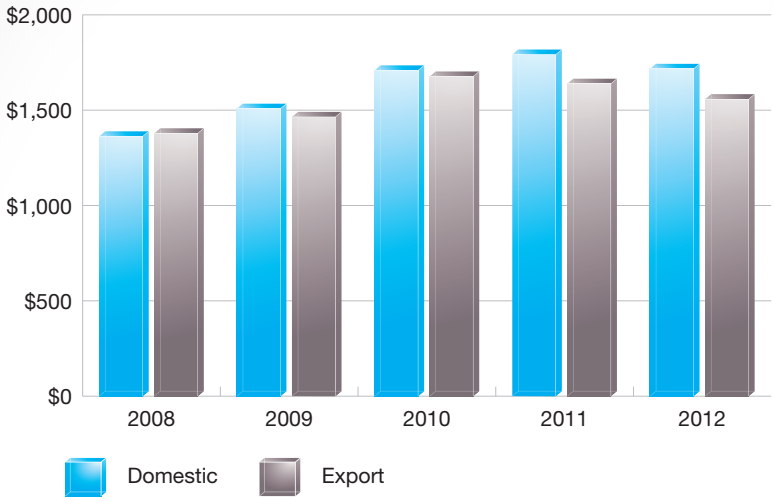
Domestic revenues declined by 4.1%, or $75M, between 2011 and 2012, and reached $1.743B in 2012.

The majority of space sector revenues in 2012 were derived from private (non-governmental) sources. The overall share of private/public derived sources of domestic revenues yielded a ratio of 80%/20%.

In 2012, private (non-governmental) sources of revenue decreased 3% (from $1,450M to $1,404M).

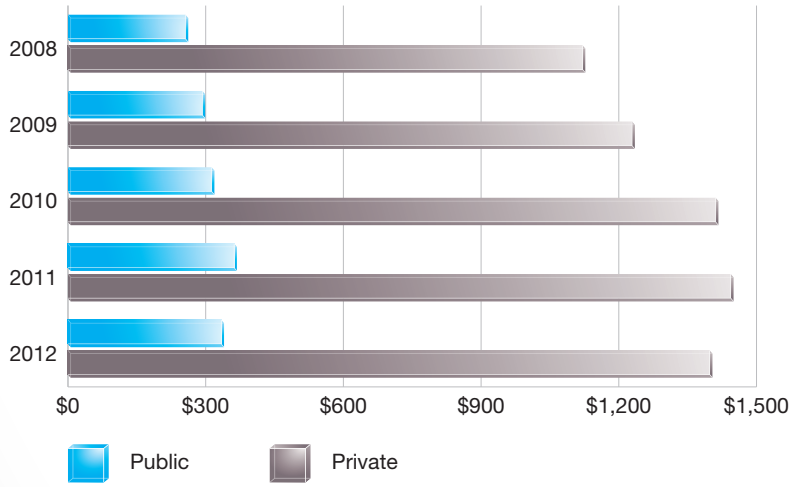
In 2012, public sources (government) decreased by 8% (from $368M to $340M), with the majority of funding coming from the Government of Canada. The CSA, Department of National Defence (DND), Natural Sciences and Engineering Research Council (NSERC), Canadian Foundation for Innovation (CFI) and Natural Resources Canada (NRCan) were the top five sources of federal government revenue reported by companies and universities in the annual survey.

Domestic v. Export Revenues:
2008-2012 (C$m)



	2008	2009	2010	2011	2012
Domestic	1389	1534	1735	1818	1743
Export	1405	1491	1703	1665	1584

Sources of Domestic Revenues
Public v. Private: 2008-2012 (C$m)



	2008	2009	2010	2011	2012
Public	262	299	319	368	340
Private	1127	1235	1417	1450	1404

EXPORT REVENUES

In 2012, export revenues declined by 4.9% or $81M, to $1.584B, which brought export revenues to pre-2010 levels. However, the longitudinal data show a strong export market for Canadian space-related goods and services with a CAGR (Compound Annual Growth Rate) over the past five years of 2.42%.

The strongest performing export markets for Canada's space organizations continue to be the U.S. and Europe, even though they were the only regions that experienced a decline in 2012. Exports to all other regions increased; in particular, space exports to Asia and South America have grown every year for the last five years in a row.

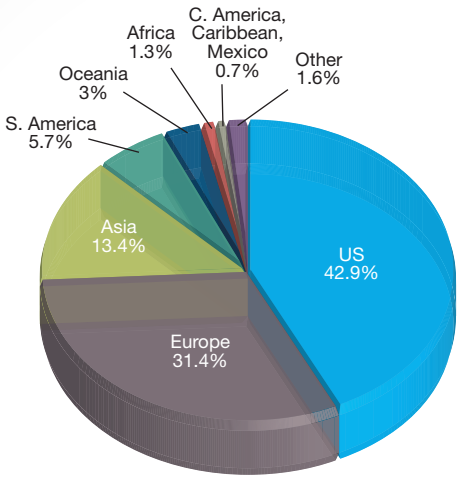
Of the $1.584B in total exports:

- The U.S. market represented 43% or $680M;
- The European market represented 31% or $497M;
- The Asian market represented 13% or $212M;
- The South American market represented 6% or $91M;
- Oceania represented 3% or $47M;
- Africa represented 1% or $21M;
- Central America, the Caribbean and Mexico amounted to 1% or $11M; and
- Undefined exports amounted to 2% or $25M of the total.

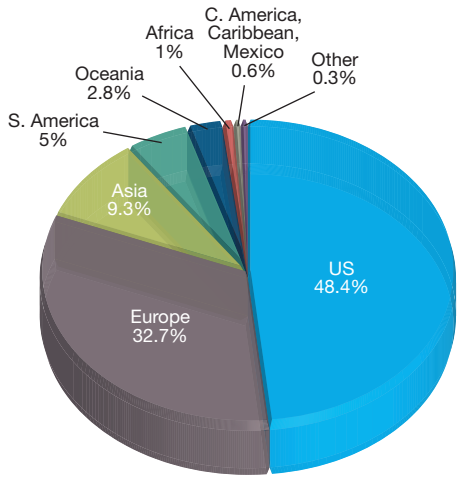
Although the **United States** lost 5 percentage points in proportional share to other regions this year, it remains the largest market for Canadian space exports, accounting for 43%, or $680M, of the $1.584B in total exports. The American market decreased by 16%, or $127M, from 2011 to 2012.

Exports to **Europe** declined by 9%, or $47M, from $544M in 2011 to $497M in 2012. Revenues derived from **Europe** account for 31% of total space exports.

Proportion of Export Revenues

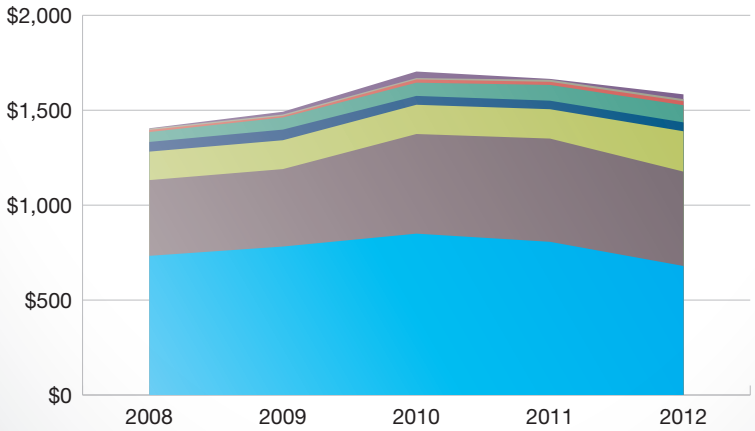


2012



2011

Sources of Export Revenues: 2008-2012 (C$m)



Revenues derived from exports to **Asia** grew substantially from $155M in 2011 to $212M in 2012, representing a 37% increase. In 2012, Asia accounted for 13% of total exports compared to the 11% share it had five years ago in 2008.

Total export revenues from **Oceania**, totalled $47M. The region saw exports gain 4% or $2M, between 2011 and 2012. Oceania accounted for 3% of total export revenues.

In 2012, the **South American** export market increased by 9%, or $8M, over 2011. The region accounted for 6% of total exports, and has experienced very strong growth over the last five years, with a CAGR of 11.7%.

Export revenues from **Africa** increased by $4M from $17M in 2011 to $21M in 2012. Generally speaking, growth in Africa has been uneven; years of strong growth have been followed by declines and vice versa. Africa accounted for 1% of total Canadian space export revenues.

REVENUES BY SPACE CATEGORIES

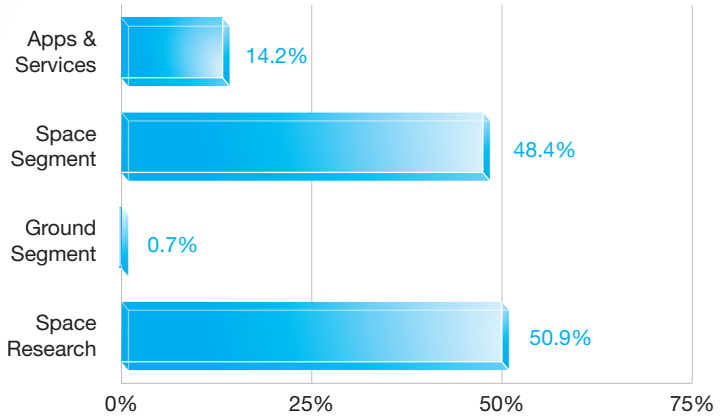
Space Segment: Revenues stalled at $754M in 2012, a slight decrease of 0.4% from the previous year. Space segment revenues in 2012 represented 23% of total space revenues.

Ground Segment: Revenues decreased by 18%, from $409M to $337M in 2012. Ground segment revenues totalled 10% of total space revenues.

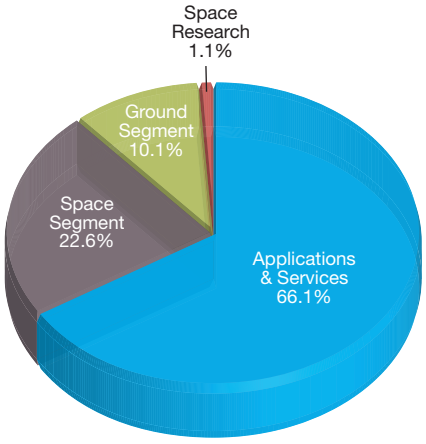
Applications and Services: Revenues in this category decreased at a rate of 2% in 2012, going from $2,251M in 2011 to $2,200M in 2012. Applications and Services represented 66% of total space revenues.

Space Research: The Space Research category also declined, returning to pre-2011 levels as funding for certain grants came to an end last year. The space research category is closely tied to activities at universities and research centres, which rely mostly on government sources of funding (as might be expected). Revenues in the space research category amounted to $36M in 2012. Space research represented 1% of total space sector revenues in 2012.

Percentage Change of Revenues by Space Categories over the last 5 years (2008-2012)



Proportion of revenues by Space Categories: 2012



REVENUES BY SECTOR OF ACTIVITY

As in 2011, growth in the space sector in 2012 was driven by Earth Observation activities. Other sectors did not fare as well and, as has been reported elsewhere in the report, total revenues declined by 4.5% between 2011 and 2012.

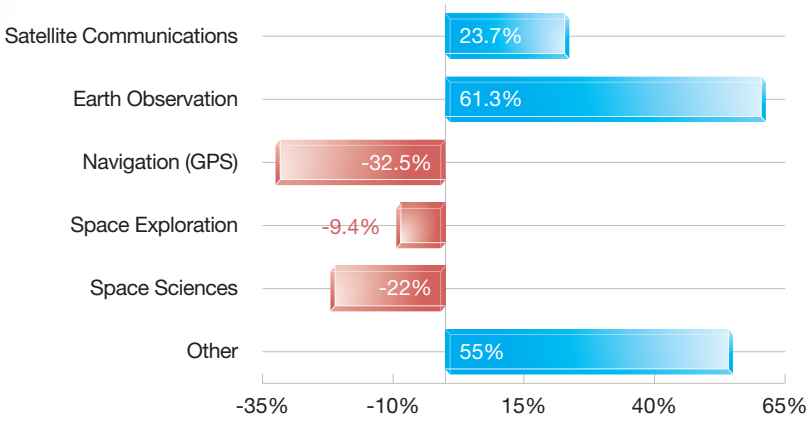
Satellite Communications: In 2012, Satellite Communications revenues were $2.655B, amounting to a decrease of 2% or $48M. Despite this decrease, it should be noted that Satellite Communications has held on to the bulk of the impressive gains that were made in 2009 and 2010, (combined growth of $583M). The Satellite Communications sector represented 80% of total space sector revenues in 2012.

Of the $2.655B in Satellite Communications revenue, $1.941B (73%) was derived from activities in Applications and Services. Of the remaining 27%, the breakdown was as follows:

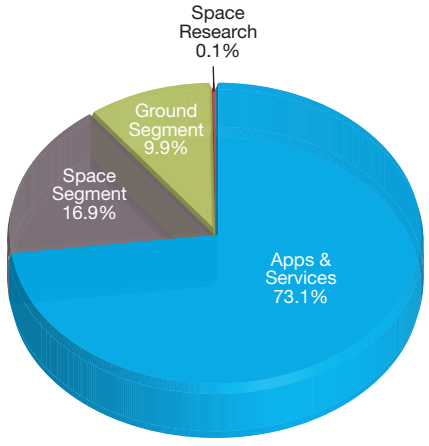
- $262M from Ground Segment activities;
- $449M from Space Segment; and
- $2.5M from Space Research.

Over the last 5 years, Satellite Communications revenues have increased 24% or $510M.

Percentage Change of Revenues by Space Sector of Activity over the last 5 years (2008-2012)



Breakdown of Satellite Communications Revenues: 2012



2012

Earth Observation: This sector increased 19% or $52M in 2012 and represented 10% of total space sector revenues. Over the past five years, Earth Observation revenues have increased by 61%, or $123M reaching a total of $322M.

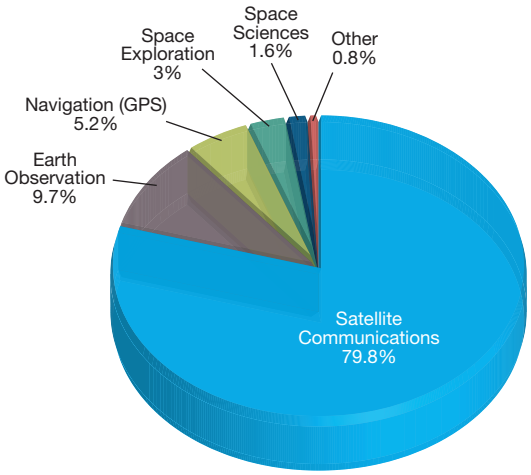
Space Exploration: Revenues decreased by 22% or $27M, from $127M to $99M, amounting to 3% of total space sector revenues. Since 2008, revenues from this sector have decreased by $10M or 9%.

Navigation: Revenues from navigation were weak this year, decreasing by 24% ($53M, from $225M to $172M), which amounted to 5% of total space sector revenues. Over the last five years, revenues from navigation have decreased by 33% or $83M, between 2008 and 2012.

Space Sciences: Revenues more or less returned to 2010 levels, decreasing from the 2011 all-time high when a few large government grants were awarded for space projects at universities, and a few key universities enlarged their categorization of space related activities. Revenues were nearly $53M in 2012. Space sciences represent 2% of total space sector revenues, the same as five years ago; however, space science revenues are 22%, or $15M, less than in 2008.

Other: Revenues from this sector decreased by 13% or $4M, from $29M to $25M, which was less than 1% of total space sector revenues. Activities that fall into the "other" sector are by nature changeable and open to re-categorization; therefore, changes in this sector may be less cause for concern than in the traditional sectors noted above.

Proportion of Revenues by Space Activity: 2012



2012

Credit: NASA & Canadian Space Agency

December 19, 2012 – Canadian Space Agency Astronaut Chris Hadfield launched to the International Space Station. Expedition 34/35 is Canada's second long-duration mission.

REVENUES BY REGION

British Columbia: In 2012, British Columbia's revenues totalled $237M, amounting to an increase of 13% ($27M) and accounting for the majority of space sector gains in 2012. For the second year in a row, the majority of British Columbia's gains were made on the domestic side, which increased 26%, or $28M, and totalled $137M. Exports decreased slightly by 0.5%, for a total of $100M in export revenues.

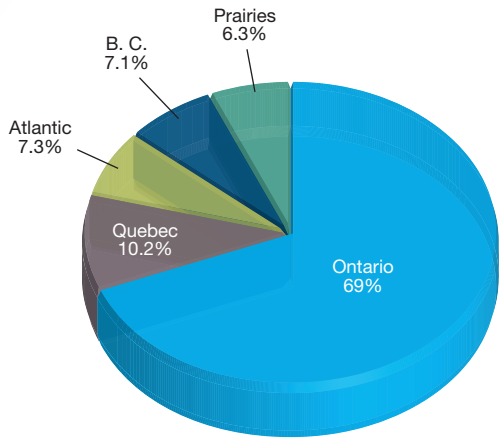
The proportional share of total revenues by province remains relatively stable from one year to the next, with gradual changes to the distribution emerging in the longer trend analysis. In 2012, British Columbia increased its proportional share slightly, amounting to 7% ($237M) of total space revenues in Canada. The province now has 2% more of total revenues than five years ago. Between 2008 and 2012, B.C.'s total revenues increased by 57% (from $151M to $237M). This increase has been powered by domestic revenues, which have grown by 141% since 2008 (from $57M to $137M). Export revenues grew by 7% over the last five years (from $94M to $100M).

Prairies (Alberta, Saskatchewan, and Manitoba): In 2012, revenues in the Prairies were less overall than they were in the previous period, which can be partially attributed to the sale of a major Albertan company to foreign investors. The loss in revenues has masked gains made elsewhere in the province or in the region. As a result, revenues in the Prairies showed a decrease of 23% in 2012 (from $274M to $211M). The proportion of revenues derived from organizations operating in the Prairies as compared to the rest of Canada declined by 2% since 2011, now accounting for 6% of total Canadian space revenues.

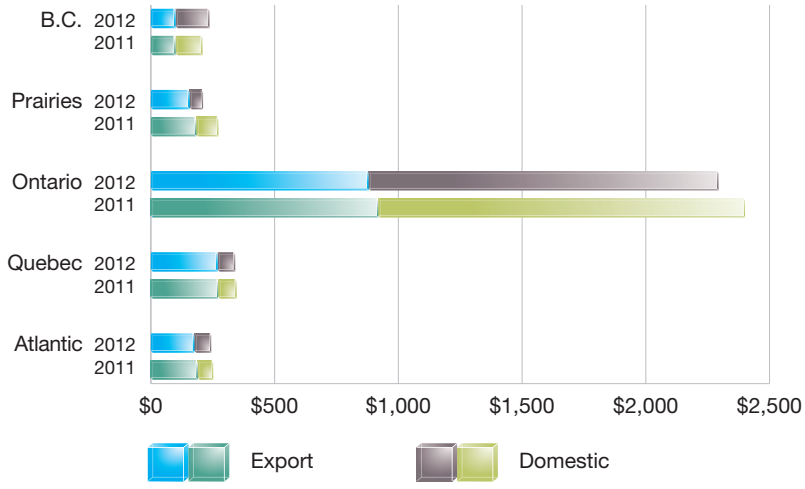
In 2012:

- In Alberta, revenues decreased by 41%, or $89M, from $216M to $127M;
- In Saskatchewan, total revenues increased for a third year in a row with gains of 38% (from $39M to $54M);
- In Manitoba, total revenues increased for the fourth year in a row with gains of 63% over 2011, and now total $29M.

Regional Proportion of Total Revenues: 2012



Domestic v. Export Revenues by Region: 2011-2012 (C$m)



	2011		2012	
	Export	Domestic	Export	Domestic
BC	100	109	100	137
Prairies	184	89	157	54
Ontario	919	1482	880	1414
Quebec	272	75	270	71
Atlantic	190	62	176	68

Compared to five years ago, the Prairie region has experienced a decline in revenues of 10% (from $234M in 2008 to $211M in 2012). This loss is closely related to the sale of the aforementioned Albertan company, with the biggest impact being on export figures. Domestic revenues went from $46M in 2008 to $54M in 2012. Exports have decreased 16% over the same five-year period, declining by $31M (from $188M to $157M).

Ontario: Revenues in Ontario decreased by 4% or $106M, in 2012, accounting for the majority of the total space sector decline this year. The province's share of Canadian earnings, now 69%, has declined slightly compared to five years ago when 73% of Canadian space-related revenues were concentrated there. However, total revenues for Ontario continued to generate the majority of Canadian space sector revenues in 2012, totalling $2.295B.

Domestic revenues decreased by 5%, or $68M (from $1.482B in 2011 to $1.414B in 2012); exports in Ontario decreased by 4%, or $38M (from $919M in 2011 to $880M in 2012).

Despite the slowed growth in 2012 and the decreased proportional share in relation to other provinces, Ontario's revenues have generally increased steadily year over year as the province is home to the largest number of space-related companies in Canada. Compared to 5 years ago, domestic revenues in Ontario have increased by 17% or $209M; exports have increased by 6% or $51M; and total revenues have increased by 13% or $260M.

Quebec: After three years of strong and consistent growth, revenues stalled in Quebec in 2012. Both domestic and export revenues declined slightly. Domestic revenues decreased by 6%, or $5M, and export revenues decreased by 1% or $3M. Total space-related revenues in the province were $340M in 2012.

Quebec has continued to gain steadily in relation to other regions and now has 10% of total space-sector revenues, second only to Ontario.

Over the past five years, total revenues in Quebec have increased 98% (from $172M to $340M); domestic revenues have increased by 60% (from $44M to $71M); and exports have more than doubled (from $128M to $270M).

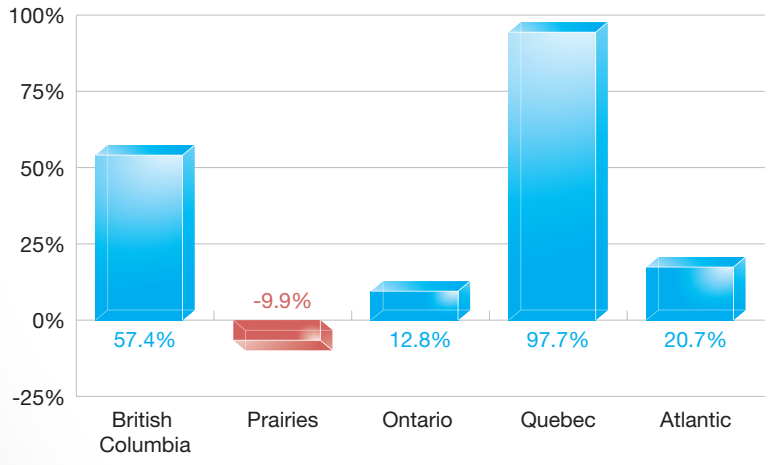
Atlantic Canada (New Brunswick, Newfoundland, Nova Scotia, PEI): In 2012, the Atlantic region saw revenues decrease by 3%, or $8M. Domestic revenues increased 9%, or $6M (from $62M to $68M), while exports decreased by 7%, or $13M (from $190M to $176M).

Revenues in New Brunswick accounted for the positive domestic revenue growth in the region, with total revenues of $60M. Revenues in Newfoundland continued to decrease for the second year in a row, dropping by 6%, or $12M, and accounted for the majority of losses on the export side in the region, with total revenues of $180M. Revenues in Nova Scotia increased by 2.5%, amounting to a total of $4M.

Atlantic Canada's revenues in relation to other regions remained the same in 2011 as they were 2012, accounting for 7% of total space sector revenues in Canada.

Looking at the five year trend analysis, total revenues in the Atlantic region have increased 21% or $42M. Of this amount, domestic revenues have increased 88%, or $32M, and exports have increased 6% or $10M.

Percentage Change of Total Revenues by Region over the last 5 years (2008-2012)



SPACE SECTOR WORK-FORCE

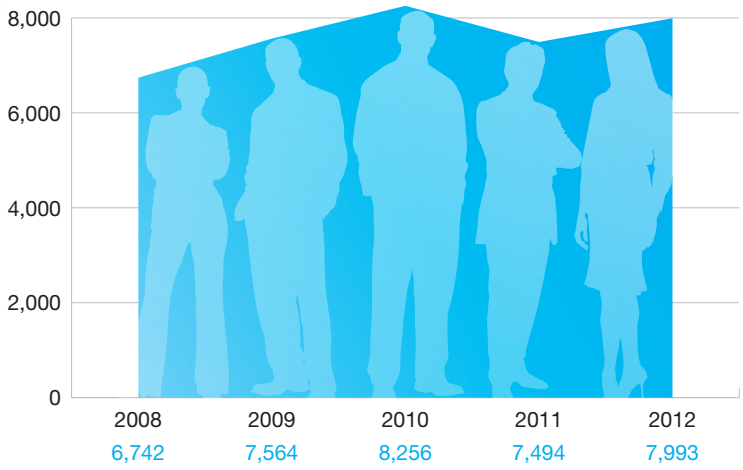
Interestingly, while space sector revenues were not as strong in 2012, the Canadian space sector **workforce** experienced a significant increase. Canada's space workforce increased by 499 positions, or 7%, across the country for a total of 7,993 space-related employees.

WORKFORCE GROUPS

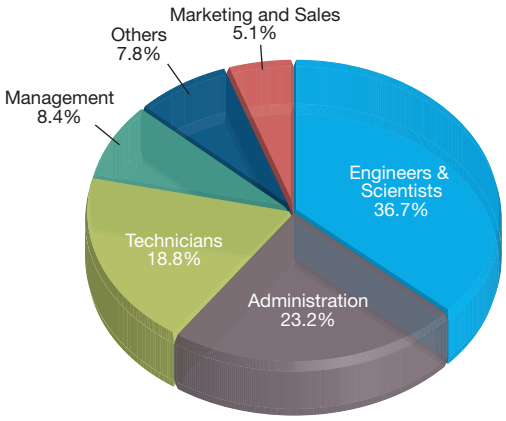
Engineers and Scientists continued to comprise the largest category of employment in 2012, with 2,932 employees, amounting to 37% of the total space sector workforce. Workers in **Administration** made up the second largest group, with 1,857 individuals or 23% of the total workforce. Technicians come in third with 1,503 individuals or 19% of the total workforce. Management, marketing and sales, and other employees made up the remainder.

The following charts and graphs provide a breakdown of the workforce by space employment categories and the distribution of employment groups working in the Canadian space sector in 2012.

Workforce (2008-2012)



Workforce by Space Employment Categories: 2012



WORKFORCE BY REGION FOR 2012

British Columbia: 7% (534 individuals) of Canada's space workforce, an increase of 14%, or 64 employees, over last year.

The Prairies: 9% (689 individuals), an increase of 3% (19 employees).

Ontario: 57% (4,571 individuals), a decrease of 3% (122 employees).

Quebec: 19% (1,508 individuals), an increase of 43% (452 employees).

Atlantic Canada: 9% (692 individuals), an increase of 14% (86 employees).

HIGHLY QUALIFIED PERSONNEL (HQP)

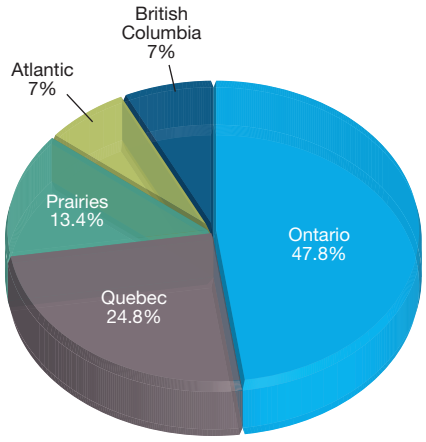
The following table reports the percentage of Highly Qualified Personnel (HQP) in relation to each Canadian region, and relative to the national workforce. The HQP measurement consists of tracking the number of employed engineers, scientists, and technicians in the Canadian space sector. In 2012, growth in HQP positions drove overall Canadian space workforce numbers, with an increase of 14.5% and 4,434 total positions.

- 7% of Canada's total space sector HQP work in **B.C.** while 58% of B.C.'s space sector workforce are HQP;
- 13% of Canada's total space sector HQP work in the **Prairies** while 86% of the Prairies space sector workforce are HQP;
- 48% of Canada's total space sector HQP work in Ontario while 46% of **Ontario**'s space sector workforce are HQP;
- 25% of Canada's total space sector HQP work in **Quebec** while 73% of Quebec's space sector workforce are HQP;
- 7% of Canada's total space sector HQP work in **Atlantic Canada** while 45% of Atlantic Canada's space sector workforce are HQP.

Worforce Group by Region: 2012

	Management	Engineers & Scientists	Technicians	Marketing and Sales	Administration	Other	Total
B.C.	35	232	79	43	62	83	**534 6.7%**
Prairies	42	457	135	3	12	40	**689 8.6%**
Ontario	411	1,290	832	257	1,428	354	**4,571 57.2%**
Quebec	166	829	270	48	187	8	**1,508 18.9%**
Atlantic	20	124	187	57	168	136	**692 8.7%**
Total	**674**	**2,932**	**1,503**	**407**	**1,857**	**621**	**7,993**

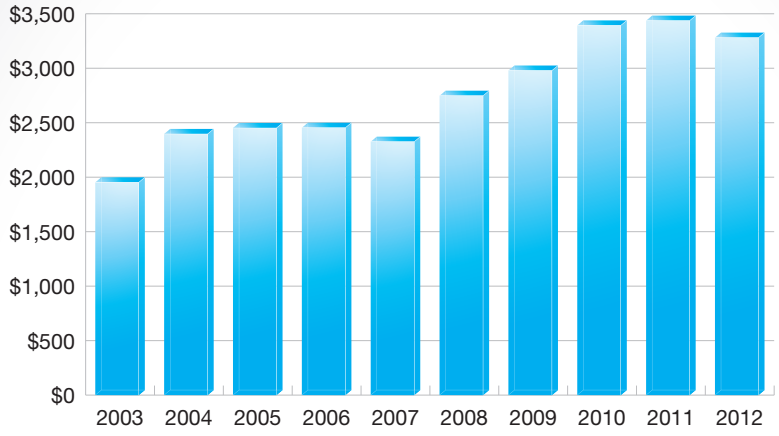
Highly Qualified Personnel
Space Workforce in Canada: 2012



TEN YEAR TREND: 2003-2012

OVERALL RESULTS: 2003-2012*

Total Space Revenues 2003-2012 (C$m): 10 Year Trend

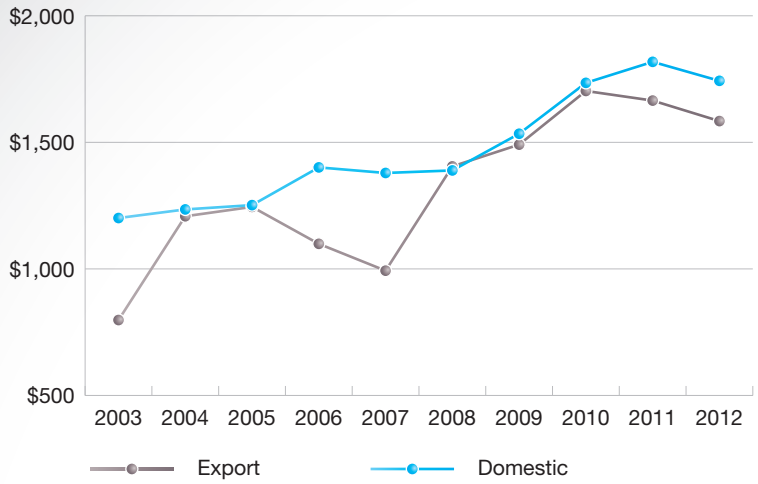


Year	Overall Revenues	Domestic Revenues		Export Revenues		Workforce
	(C$m)	(C$m)	%	(C$m)	%	n
2012	***$3,326,974,904***	***$1,743,304,247***	***52***	***$1,583,670,656***	***48***	***7,993***
2011	$3,483,148,034	$1,818,014,849	52	$1,665,133,185	48	7,494
2010	$3,438,260,107	$1,735,256,380	50	$1,703,325,725	50	8,256
2009	$3,024,814,669	$1,533,689,499	51	$1,491,152,468	49	7,564
2008	$2,793,722,219	$1,388,532,603	50	$1,405,189,616	50	6,742
2007	$2,372,145,807	$1,379,400,092	58	$992,745,715	42	6,481
2006	$2,500,364,235	$1,400,914,765	56	$1,099,449,470	44	6,678
2005	$2,497,711,781	$1,252,251,094	50	$1,245,460,687	50	6,710
2004	$2,442,685,155	$1,234,981,072	51	$1,207,704,083	49	7,179
2003	$1,999,433,240	$1,201,312,758	60	$798,120,482	40	6,122

** This chart reflects values not inflation-adjusted.*

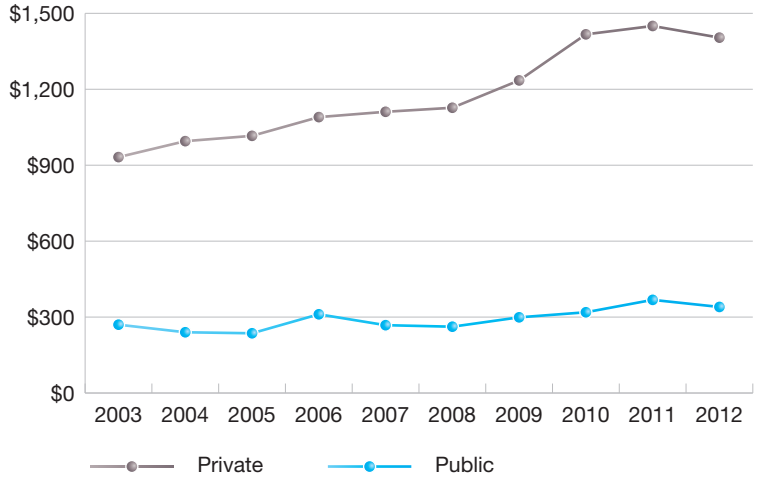
Inflation-Adjusted Revenues: 2003-2012			
Year	Overall Revenues (C$m)	Domestic Revenues (C$m)	Export Revenues (C$m)
2012	***3,326,974,904***	***1,743,304,247***	***1,583,670,656***
2011	3,535,482,479	1,845,330,598	1,690,151,881
2010	3,598,425,170	1,815,896,522	1,782,528,649
2009	3,195,765,178	1,620,300,982	1,575,464,195
2008	2,943,818,213	1,463,133,141	1,480,685,072
2007	2,573,354,603	1,496,402,778	1,076,951,825
2006	2,771,845,388	1,553,021,386	1,218,824,002
2005	2,833,538,575	1,420,620,989	1,412,917,586
2004	2,826,535,679	1,429,049,526	1,397,486,153
2003	2,367,749,889	1,422,607,213	945,142,676

Domestic v. Export Revenues: 2003-2012 (C$m)



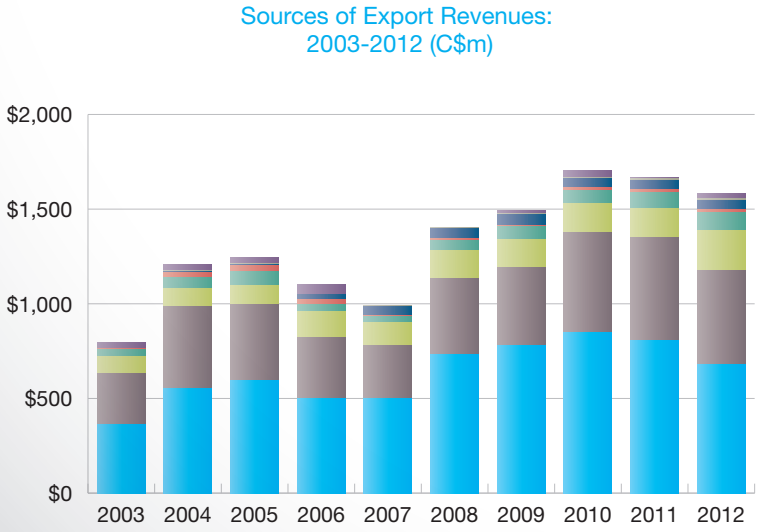
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Domestic	1,201	1,235	1,252	1,401	1,379	1,389	1,534	1,735	1,818	1,743
Export	798	1,208	1,245	1,099	993	1,405	1,491	1,703	1,665	1,584

Sources of Domestic Revenues Public v. Private: 2003-2012 (C$m)



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Public	270	240	236	311	268	262	299	319	368	340
Private	932	995	1,016	1,090	1,111	1,127	1,235	1,417	1,450	1,404

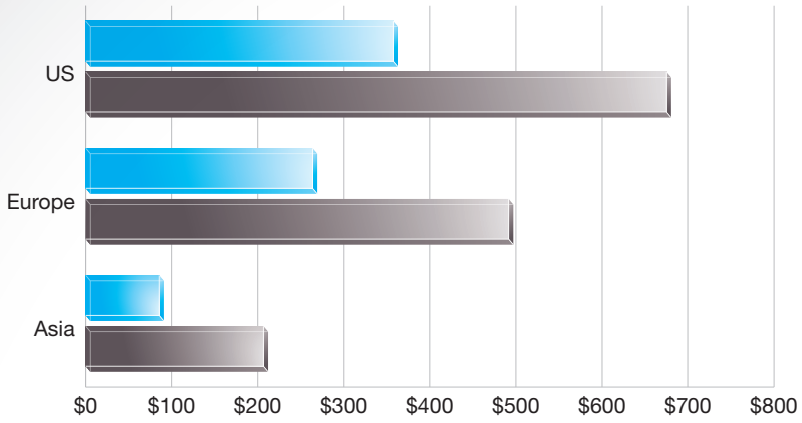
Sources of Export Revenues: 2003-2012 (C$m)



US
Europe
Asia
S. America
Africa
Oceania
C. America, Caribbean, Mexico
Other

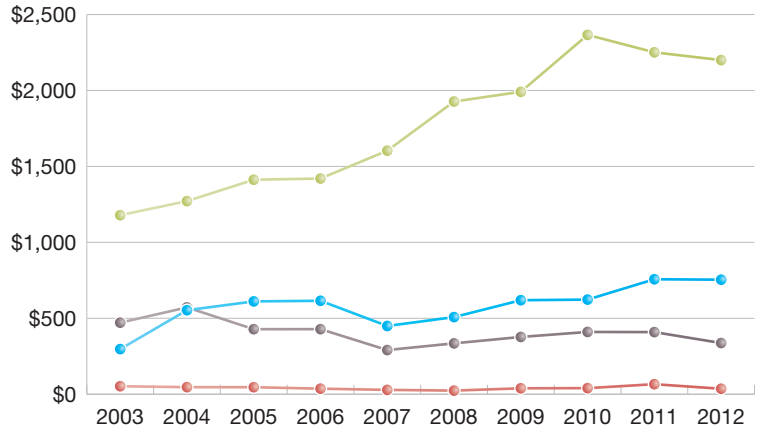
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
United States	363	552	593	499	499	733	782	850	807	680
Europe	269	432	401	323	283	399	408	525	544	497
Asia	91	97	100	134	120	150	152	154	155	212
South America	37	60	79	40	32	52	64	70	83	91
Africa	1	25	30	26	6	11	8	17	17	21
Oceania	2	4	6	24	48	51	56	46	45	47
C. Amer., Caribbean, Mex.	3	6	4	4	5	7	8	7	11	11
Other	32	33	33	48	0	2	14	34	5	25

Sources of Export Revenues: 2003-2012 (C$m)



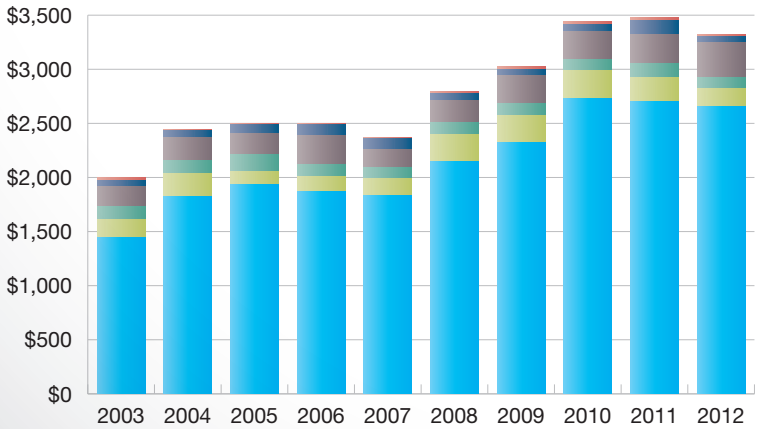
	2003	2012
US	363	680
Europe	269	497
Asia	91	212

Total Revenues by Space Category: 2003-2012 (C$m)



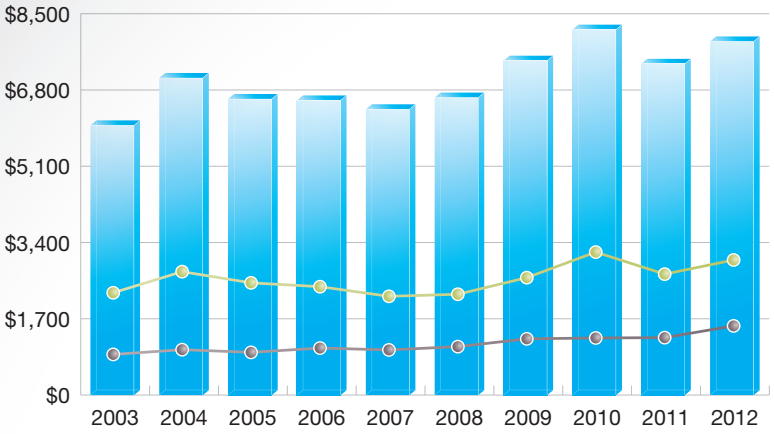
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Apps & Services	1,179	1,271	1,412	1,420	1,603	1,927	1,991	2,366	2,251	2,200
Space Segment	297	553	611	615	449	508	619	623	757	754
Ground Segment	471	572	428	428	291	335	377	410	409	337
Space Research	53	46	46	37	29	24	39	40	66	36

Revenues by Sectors of Activity: 2003-2012 (C$m)



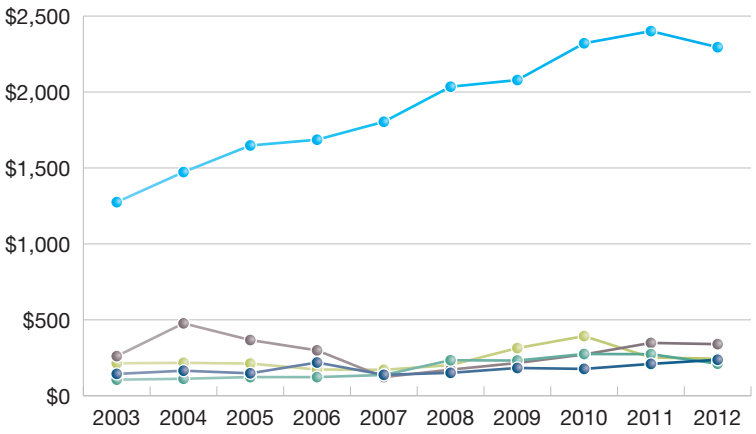
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SatCom	1,447	1,827	1,938	1,874	1,832	2,146	2,326	2,729	2,703	2,655
Navigation (GPS)	165	212	120	132	155	254	243	260	225	172
Space Exploration	116	122	153	113	103	110	114	106	127	99
Earth Observation	184	211	192	269	168	200	258	256	271	322
Space Sciences	62	61	84	100	102	68	61	62	128	53
Other	26	9	11	12	13	16	24	25	29	25

Workforce by Type of Employment: 2003-2012



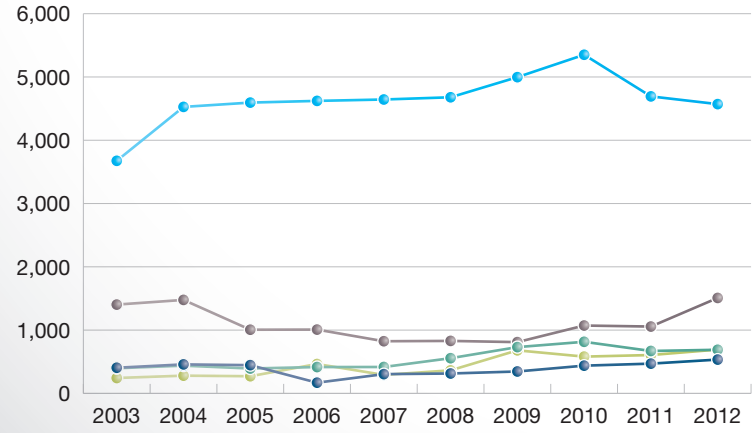
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Workforce	**6,122**	**7,179**	**6,710**	**6,678**	**6,481**	**6,742**	**7,564**	**8,256**	**7,494**	**7,993**
Engineers & Scientists	2,221	2,679	2,436	2,353	2,144	2,189	2,549	3,103	2,625	2,932
Technicians	884	987	929	1,022	982	1,053	1,222	1,241	1,248	1,503

Revenues by Canadian Region: 2003-2012 (C$m)

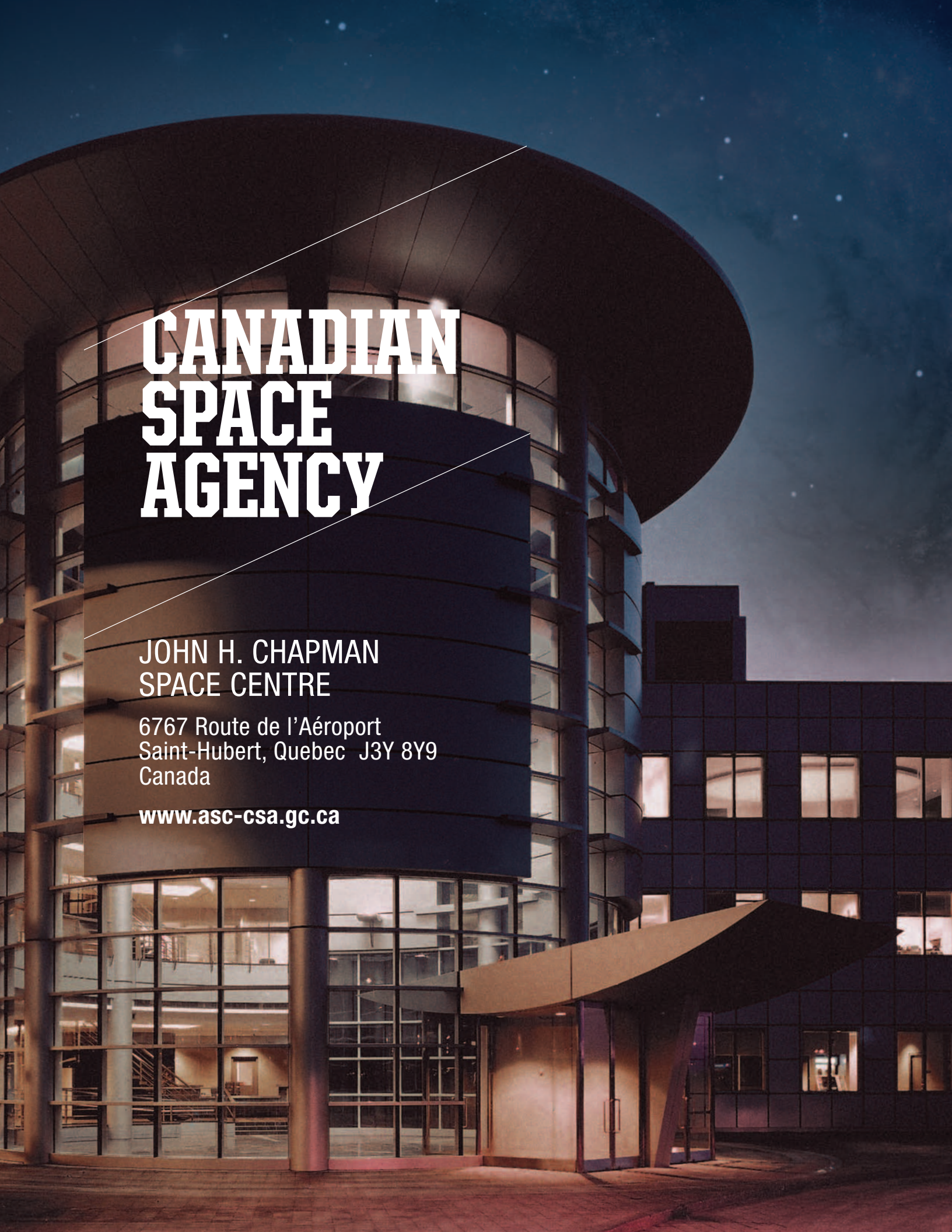


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BC	144	165	148	219	138	151	183	177	210	237
Prairies	106	112	123	123	137	234	232	275	274	211
Ontario	1,275	1,473	1,648	1,686	1,804	2,035	2,079	2,327	2,401	2,295
Quebec	261	477	367	299	123	172	216	267	348	340
Atlantic	214	217	212	173	171	202	314	393	252	244

Workforce by Canadian Region: 2003-2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BC	405	458	446	169	303	314	346	438	470	534
Prairies	397	438	393	416	419	557	731	815	670	689
Ontario	3,672	4,525	4,595	4,622	4,644	4,679	4,997	5,415	4,693	4,571
Quebec	1,406	1,479	1,006	1,008	824	829	810	1,008	1,056	1,508
Atlantic	243	280	271	464	291	364	680	581	606	692
Total	**6,122**	**7,179**	**6,710**	**6,678**	**6,481**	**6,742**	**7,564**	**8,256**	**7,494**	**7,993**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