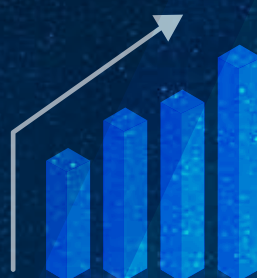




STATE OF THE CANADIAN SPACE SECTOR 2014



STATE OF THE CANADIAN SPACE SECTOR 2014

State of the Canadian Space Sector 2014

ISSN: 2369-6338
Catalogue no.: ST96-8E-PDF



TABLE OF CONTENTS

■	ABOUT THIS REPORT	2
	Objective.....	2
	New Features.....	2
	About the Authors.....	3
■	PRESIDENT'S MESSAGE	4
■	EXECUTIVE SUMMARY	5
■	METHODOLOGY.....	7
	Questionnaire.....	7
	Economic Impact Analysis	8
	Definition of Canada's Space Sector	9
	Definition of Space Value-Chain Categories.....	9
	Definition of Sectors of Activity	11
■	OVERALL RESULTS	12
	Total Revenues	12
	Revenues of Canada's Leading Space Organizations.....	12
	Small and Medium-Sized Enterprises (SMEs).....	13
	Universities and Research Centres.....	13
	Regional Distribution and Trends	14
■	MARKETS	19
	Market Share by Value-Chain Category.....	19
	Market Share by Sector of Activity	20
	Market Share by Customer Location.....	24
	Market Share by Customer Type	27
■	WORKFORCE	30
	Workforce Groups.....	31
	Workforce by Region	31
	Highly Qualified Personnel (HQP).....	32
■	INNOVATION	33
	Business Expenditures on R&D (BERD) (Companies Only)	33
	R&D Intensity Level (Companies Only).....	33
	Commercialization of Externally Funded R&D Projects (All Organizations).....	34
	Inventions and Patents (All Organizations)	34
■	ECONOMIC IMPACT ANALYSIS	35
	Economic Impact – Gross Domestic Product.....	35
	Economic Impact – Jobs Created	35
■	TEN-YEAR TREND: 2004–2014	36

ABOUT THIS REPORT

OBJECTIVE

The *State of the Canadian Space Sector Report* provides factual information about features of the Canadian space sector. This baseline includes the number of organizations active in the sector and their composition (e.g. share of SMEs, share of universities), the sectors of activity (Satellite Communication, Earth Observation, Exploration, Science, and Navigation), the Canadian space workforce and composition (e.g. share of HQP, regional distribution, types of jobs), research and development (R&D) and innovation.

The *State of the Canadian Space Sector Report* has been published since 1996 based on a questionnaire sent to organizations involved in space activities across Canada, including companies, not-for-profit organizations, research centres and universities. This report is based on data from 144 organizations. In this edition, data are reported for the 2004–2014 period. Readers should consult previous editions (available on the Canadian Space Agency website) for information regarding results prior to 2004.

The organization-specific information used to compile this report remains strictly confidential and will not be released in any manner other than aggregate form. Consequently, in certain circumstances, a detailed explanation or in-depth reporting of the results cannot be provided in order to protect the confidentiality of the respondents.

NEW FEATURES

Value-Chain Approach to Space Activities

This report uses a new methodology developed by the Organisation for Economic Co-operation and Development's Space Forum, of which the CSA is a participating member, to characterize Canadian space activities on the basis of a value-chain approach. The definitions of space sector categories have been updated, and report findings are presented on the basis of upstream and downstream segment activities. This re-categorization is intended to improve the measurement of the space sector and enable international comparisons.

Under this value-chain approach, data have been organized into categories that align with the stages of producing space goods and services: Research, Engineering and Consulting; Space Segment Manufacturing; Ground Segment Manufacturing; Satellite Operations; Products and Applications; and Services. This approach replaces the space categories used in the annual *State of the Canadian Space Sector Reports* from 1996–2013.

Note: As a result of redefining space sector activities, the CSA has incorporated data from organizations involved in downstream segment activities (mainly related to radio and satellite television broadcasting services) that were not included in previous reports. As a result, total space sector revenues and workforce have increased significantly from previous years' reporting. Detailed definitions of these categories are provided in the Methodology section of this report. Data in this report are reported using the new methodology unless specifically stated otherwise.



Bank of Canada, collectSPACE.com

Issued at the end of 2013, the new \$5 bill features the Canadian contribution to the ISS.

Economic Impact Analysis

A new section is included in this report that outlines the space sector's contribution to GDP and the impact on job creation in the wider economy based on macroeconomic modelling developed in collaboration with Innovation, Science and Economic Development Canada (ISED). A full description of the model is provided in the Methodology section of this report.

The economic impact analysis section is not an exhaustive description of the impacts and benefits of the Canadian space sector. In 2014, the CSA commissioned a comprehensive socio-economic impact assessment of the Canadian space sector that provides further details on socio-economic indicators that measure social impacts (e.g. connectivity), environmental impacts (e.g. improved natural resource management), strategic impacts (e.g. increased surveillance capabilities), and economic impacts (e.g. impact on GDP, stimulation of job creation in the economy). The socio-economic impact assessment is available on the CSA's website: www.asc-csa.gc.ca/eng/publications/2015-assessment-canadian-space-sector.asp.

ABOUT THE AUTHORS

Policy Branch

This report is produced by Economic Analysis and Research, Policy Branch, at the Canadian Space Agency.

Contact

David Haight, Chief Economist,
david.haight@canada.ca

Renée St-Amant, Senior Economic Analyst,
renee.st-amant@canada.ca

Please send media inquiries to CSA
Communications, 450-926-4370,
ASC.Medias-Media.CSA@canada.ca.

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/eng/publications.

ACKNOWLEDGMENTS

The CSA wishes to acknowledge all those who responded to the questionnaire. Without them, this report would not have been possible.

PRESIDENT'S MESSAGE



I am pleased to present the *State of the Canadian Space Sector Report*, covering the results from 2014.

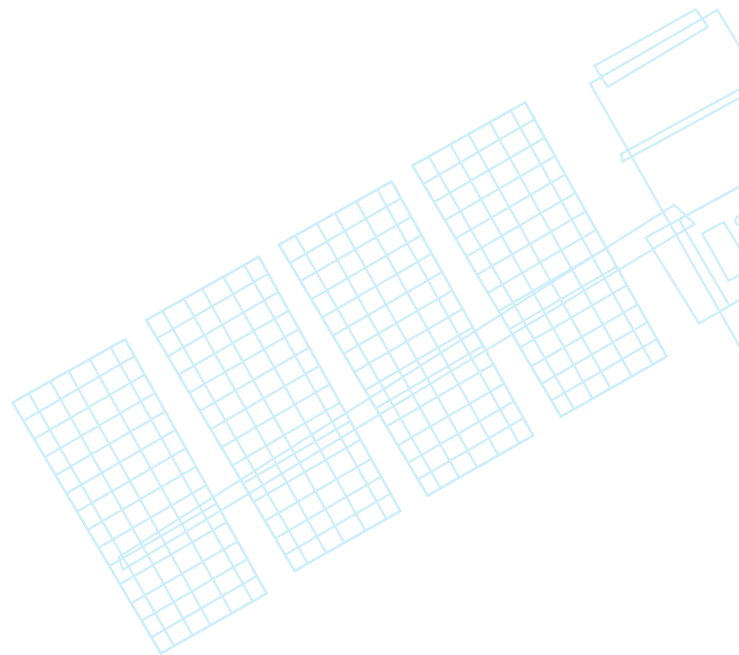
Based on information gathered from 144 organizations involved in space activities across Canada, including small businesses, multinational space companies, not-for-profit organizations, research centres and universities, this report provides comprehensive information on Canada's space sector. It details the economic activity generated in the space sector and illustrates the impact of space investments on the economy.

In this year's report, the Canadian Space Agency has improved the survey by modifying the scope and definitions used to categorize space activities in order to capture an expanded view of the Canadian space sector. The 2014 report also features several new sections, including expanded information on Innovation and Economic Impact.

The 2014 survey results indicate that the space sector has achieved revenues of \$5.4B and a workforce of over 10,000. Upstream segment activities related to research, engineering and manufacturing account for \$1B. Downstream segment operations, products and services account for \$4.4B, with Satellite Communication dominating the downstream segment. Domestic, and particularly commercial, sales emerged as the most important area for growth in 2014. At the same time, export markets experienced some contraction. Overall, the space sector contributed \$2.9B to gross domestic product (GDP) and helped maintain 25,000 jobs (direct, indirect and induced) in the wider Canadian economy.

The annual *State of the Canadian Space Sector Report* is a long-standing authority on the space sector dating back to 1996, and contributes to our understanding of the sector by enabling analysis of key trends over time.

I hope you find this publication informative. Let me convey my thanks to all those who contributed to the 2014 survey: without your support, it would be impossible to trace the profile of the Canadian space sector.



EXECUTIVE SUMMARY

In 2014, total revenues in the Canadian space sector totalled \$5.38B, a significant increase from \$3.49B in 2013 largely due to changes in methodology whereby downstream segment organizations were added to the survey population. With prior methodology, the space sector experienced real growth of 2% year over year, and an average compound annual growth rate of 3.3% over the last five years (2009–2014).¹

The significant increase in total revenues that resulted from the change in methodology can be seen in the domestic revenues, which amounted to \$3.8B. Non-governmental sources of revenue, at 88%, continued to make up the majority of domestic revenues. The remaining 12% 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 2014 decreased by 5%, or \$82M, totalling \$1.6B. These were not impacted by the change in methodology. Export revenues declined in Quebec, the Prairies and the Atlantic region. Ontario organizations accounted for 59% of Canadian space exports with a flat growth rate. B.C. organizations experienced positive growth in export revenues. Non-governmental customers are the most important market segment abroad, where commercial revenues account for 89% of upstream segment revenues and 91% of downstream segment revenues.

Defence-related revenues decreased by \$59M to \$152M. Defence-related revenues continue to be export driven with \$88M in exports and \$64M derived from domestic customers. Defence-related revenues were not impacted by methodological changes.

Due to the methodological changes discussed above, total employment in the space sector is now better understood, with a workforce totalling 10,012 space-related full-time equivalents (FTEs), of which 42% are highly qualified personnel (HQP). Without the methodological changes (using previous years' methodology), the workforce would show a slight growth over the previous years' reporting (1.3%) from 8,240 FTEs in 2013 to 8,351 FTEs in 2014.

Overall, workforce is evenly divided between upstream and downstream segment organizations with 51% and 49% of the total workforce, respectively. HQP is an important indicator which differentiates the profile of the workforce. In the upstream segment, 73% of the workforce are HQP, while in the downstream segment, 27% of workforce are HQP.

In terms of sectors of activity, space sector revenue growth in 2014 was driven by Satellite Communication (\$4.5B) and Earth Observation (\$516M).

The upstream segment, which was largely unaffected by methodological changes, accounted for \$1B in revenues, with revenues derived strictly from manufacturing activities increasing by 11% over 2013 results, totalling \$834M. The downstream segment accounted for the majority of revenues at \$4.4B in 2014. Of note, broadcasting services revenues were \$2.67B in 2014, representing a 61% share of the downstream segment.

¹ Calculated using Compound Annual Growth Rate (CAGR).

Ninety-one percent of Canadian space companies are small and medium-sized enterprises (SMEs), 57% of which are upstream segment companies and 43% are downstream segment companies. Together, SMEs account for 37% of Canadian space sector revenues and a quarter of all employees.

Academic organizations contribute 19% of total space sector workforce with 1,930 full-time equivalents, of which 71% are HQP such as engineers, scientists and technicians.

Research and development (R&D) expenditures totalled \$146M in 2014, with 52 organizations undertaking space R&D projects. Upstream segment organizations were more R&D intensive, spending 65% of total space sector business expenditures on research and development (BERD). Upstream segment organizations also account for the majority of inventions and patents, with 71% of all inventions claimed and 79% of patents filed. R&D was not impacted by methodological changes.

In 2014, the space sector contributed \$2.8B to Canada's GDP and supported a total of 24,579 jobs in Canada's greater economy. This is the first year that these indicators are included in the report.



METHODOLOGY

QUESTIONNAIRE

In order to measure the changes taking place in Canada's space sector each year, the CSA uses a questionnaire to collect baseline data. Questionnaires are sent to private sector enterprises, not-for-profit organizations, research organizations and universities in Canada with a defined activity in space. The questionnaire follows a census model and therefore aims to be as inclusive and exhaustive as possible.

Most organizations that responded to the 2014 questionnaire reported on a calendar year from January 1 to December 31, 2014, with the remainder reporting on a fiscal year, generally ending March 31, 2015. As in previous years, the questionnaire had a high response rate of 62%, covering 144 organizations, including all major space players.

Additionally, the CSA performs quality control measures on the survey data to ensure the accuracy of the findings.

Attribution

Data are also added based on CSA transfer payments (Contracts, Grants, and Contributions) in cases where this information has not been included as part of the survey responses.

In addition, there are a limited number of cases where data are compiled from publicly disclosed reports (e.g. for publically traded companies) and verified through consultation with company officials.



Canada announced its participation in an innovative mapping system for the first-ever global surface water survey, the Surface Water and Ocean Topography (SWOT) mission, headed by NASA and CNES. (August 18, 2014).

ECONOMIC IMPACT ANALYSIS

As described in the OECD's *Handbook on Measuring the Space Economy*, measuring economic impacts in the space sector is a challenging task, as there is no single industrial classification for space activities. In order to overcome this difficulty, a model was developed jointly by the CSA and Innovation, Science and Economic Development Canada (ISED) to calculate the space sector's contribution to GDP (gross domestic product or value added) and employment by taking into account the various industrial classifications, weighing them and categorizing them using a value-chain approach, in order to develop a set of multipliers based on Statistics Canada's Input-Output tables. These multipliers are used to determine direct, indirect and induced impacts on GDP and employment.

Direct impacts include the contribution to GDP from space sector activities and employment at space sector organizations. Indirect impacts include GDP contribution and employment in the space sector's supplier industry. The induced impact includes the GDP contribution and employment created in the wider economy through the spending of wages earned by workers in the space sector and its supplier industry.

A detailed explanation of the Economic Impact Model follows:

1. North American Industry Classification System (NAICS) codes were retrieved for each space company through Canada's Business Register. This exercise generated a list of nine separate industrial classifications that covered all active Canadian space sector companies.
2. Canadian space companies were categorized into a value-chain model based on the goods and services they provide: Research, Engineering and Consulting Services; Manufacturing; Satellite Operations; Value-added Service Providers; and Broadcasting Services.
3. Universities, research centres and associations were grouped together under Research, Engineering and Consulting, as in most cases their space sector activities are related to R&D.
4. The grouping of NAICS codes in each of the value-chain categories were then weighted for their relative importance within that particular category. Weighting was established on the basis of workforce tied to each NAICS code. The more workforce associated with organizations in a particular NAICS code, the heavier that NAICS code was weighted relative to the grouping of NAICS codes in that value-chain category.



After studying the universe for over 10 years and exceeding its objectives, the Canadian Microvariability and Oscillation of Stars (MOST) mission came to an end.



Toronto hosted the International Astronautical Congress. Opening ceremony emceed by David Saint-Jacques and Jeremy Hansen. (September 22, 2014)

DEFINITION OF CANADA'S SPACE SECTOR

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

5. Customized economic multipliers were then built for each value-chain category based on Statistics Canada's input-output accounts for existing NAICS codes. These multipliers are at three levels: direct, indirect and induced impacts.
6. The multipliers were adjusted to account for supply-chain linkages within the space sector itself, as multiple companies supply each other with intermediate goods and services which would otherwise lead to an overestimate of the sector's impact.
7. Direct employment levels for each value-chain segment (collected directly from companies through the questionnaire) are entered into the Economic Impact Model. The customized economic multipliers are then applied to generate the space sector's total GDP and workforce impact numbers.

Note: Two types of primary inputs can be used in an input-output model: revenues or employment. Employment has been chosen here as it provides a more accurate portrait of the true level of economic activity being performed within Canada's borders. The results of this analysis can be considered a conservative estimate of Canada's space sector impact, particularly when compared to third-party studies or comparative international reports, which may use a different methodology.

The "multiplier effect" refers to the total impacts (direct, indirect, induced) divided by direct impact. This gives the reader an idea of the impact that one job or one dollar in the space sector has on the wider economy.

DEFINITION OF SPACE VALUE-CHAIN CATEGORIES

The activities of space organizations have been broken down into value-chain categories related to the type of work the organization is carrying out. The value-chain categories are broadly divided into upstream and downstream segment activities.

Upstream Segment

The upstream segment refers to the effort required to design, test, build, integrate, and launch² assets into space.

- > **Research, Engineering, Testing and Consulting:** Research and Development (R&D) related to non-commercial or pre-commercial activities; applied science; design and testing of spacecraft, satellites and payloads or components thereof; support services directed at enabling other space sector actors throughout the value chain, including outreach activities, legal services, insurance provision, market research, policy and management services.
- > **Manufacturing:** Building and integration of spacecraft, satellites, payloads or any component thereof. Building and integration of facilities and equipment on Earth for Satellite Operations, often known as “ground stations.”

Downstream Segment

The downstream segment refers to the effort required for the day-to-day operation of space assets, manufacturing of products and software applications that transform space data and signals into useful end products, and services provided to end-users.

- > **Satellite Operations:** Day-to-day management of satellites and spacecraft once they are in space, e.g. telemetry, tracking and command; monitoring, recovery operations and collision avoidance; mission planning for satellite passes; uplinks and downlinks for signal processing to reception facility; lease or sale of satellite capacity.
- > **Products and Applications:** Manufacturing/development of software or hardware that enable the transformation of space-derived resources into a usable/useful format, e.g. computer software applications, chipsets, Very Small Aperture Terminals and other terminals, antennas, satellite phones, video and audio receivers-decoders, and GPS devices. This category also includes publishing digital or print books, atlases and maps using space-based data.
- > **Services:** Provision of services which are dependent on space-based signals or data to various end-users (individual consumers, government departments, or businesses), e.g. subscriptions to satellite radio, phone, television or Internet services; engineering, architectural and environmental consulting based on the processing and analysis of Positioning, Navigation and Timing (PNT) or Earth Observation (EO) data; support services provided to users of space-based products and applications, such as provision of computer consulting and facilities management, data processing, Web hosting and portals, streaming services.

² Note that launch-related activities do not represent a significant area of activity in the Canadian space sector, hence why it is not included as a separate value-chain category in this report. Launch-related activities include the building and integration of space transportation vehicles (rockets), launch pads, space ports and related technologies, as well as launch service provision.



CSA

Strato Science 2014 stratospheric balloon campaign – seven Canadian payloads tested. (August–September 2014)

DEFINITION OF SECTORS OF ACTIVITY

The activities of space organizations can also be broken down, as has been done in previous reports, according to the ultimate use or purpose of the research carried out or the goods and services produced. Space sector activities can serve commercial, civil or military purposes, and refer to activities across the value chain:

- > **Navigation:** The development and use of satellites for localization, positioning and timing services. Navigation is used for air, maritime and land transport, or the localization of individuals and vehicles. It also provides a universal referential time and location standard for a number of systems.
- > **Satellite Communication:** The development and use of satellites to send signals to Earth for the purpose of fixed or mobile telecommunications services (voice, data, Internet, and multimedia) and broadcasting (TV and radio services, video services, Internet content).
- > **Earth Observation (EO):** The development and use of satellites to observe the Earth. EO helps measure and monitor the Earth's people, climate and environment for a number of purposes such as resource management, mineral exploration, disaster assessment, security and defence.
- > **Space Exploration:** The development and use of manned and unmanned spacecraft (space stations, rovers and probes) to investigate the reaches of the universe beyond Earth's atmosphere (e.g. the Moon, other planets, asteroids). The International Space Station and astronaut-related activities are considered in this sector.
- > **Space Science:** The various science fields that relate to space flight or any phenomena occurring in space or on other planets (e.g. astrophysics, planetary science, space-related life science).
- > **Other:** Generic technologies or components that are not destined for use on a specific space system or for a specific space application. This could be the case for early phase research, small off-the-shelf components used in various systems, or services based on integrated applications.

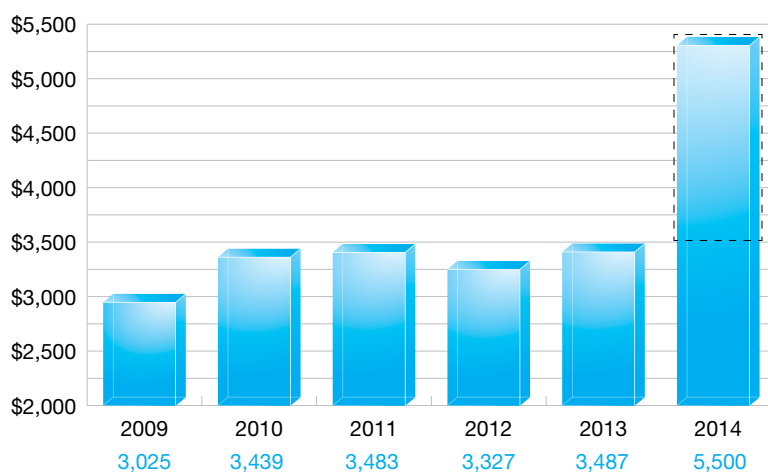
OVERALL RESULTS

TOTAL REVENUES

As a result of redefining the space sector using a value-chain approach, data from additional organizations involved in downstream segment activities, mainly related to broadcasting, have been included. Consequently, total revenues have increased significantly from previous years' reporting. Detailed definitions of these categories are provided in the Methodology section of this report.

In 2014, total revenues for the Canadian space sector were \$5.38B, compared to \$3.49B as reported in 2013. After accounting for the changes in methodology, space sector revenues experienced real growth of 2% year over year, 18% growth from 2009–2014, and an average growth rate calculated using a compound annual growth rate (CAGR) over the same period of 3.3%. A detailed analysis of the source of this growth can be found in the Markets section of this report.

Total Space Revenues: 2009–2014 (CAN\$M)



*The amount within the dotted lines corresponds to new revenues included in the annual report as a result of methodological changes.

REVENUES OF CANADA'S LEADING SPACE ORGANIZATIONS

In 2014, the top 30 Canadian space organizations generated 98% of total space revenues and 85% of space employment, a pattern consistent with previous years despite changes in the composition and rank of the top 30 space organizations. Most top 30 organizations are companies; however, a small number of academic organizations are also represented. Twelve of the top 30 are downstream segment companies.

By comparison, the top 10 organizations accounted for 90% of total space revenues and 65% of employment. There is slightly more concentration in the top 10 companies than last year, when those companies accounted for 83% of revenues and 61% of workforce. Seven of the top 10 are downstream segment companies.

62 organizations reported revenues in excess of \$1M during 2014, seven more than in 2013.

Space SMEs are highly innovative, corresponding to 48% of all space business R&D (BERD), and export-driven with 56% of SME sales reaching customers abroad.

Large companies, classified as having 500 employees or more, are rare in the space sector. Only nine companies were classified as large enterprises.

Sixty-two organizations reported space revenues in excess of \$1M during 2014, seven more than in 2013.

SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)

Ninety-one percent of Canadian space companies are SMEs, and indeed many of Canada's top space companies are SMEs (defined as employing 1 to 499 workers). SMEs are concentrated most heavily in research, engineering and consulting activities in the upstream segment and in the production of value-added products, applications and services in the downstream segment: 57% of SMEs in the space sector survey population are upstream segment companies, while 43% are downstream segment companies. Together SMEs account for 37% of Canadian space sector revenues and a quarter of all employees.

Space SMEs are highly innovative, corresponding to 48% of all space business R&D (BERD), and export-driven with 56% of SME sales reaching customers abroad. Upstream segment space SMEs are responsible for 13% of total BERD, while downstream segment SMEs account for 35% of total BERD in the space sector. Both upstream and downstream segment SMEs are export intensive with 80% and 54% worth of sales destined abroad, respectively.

The SME workforce is highly skilled and specialized with 53% of its workforce designated as HQP (compared to 28% of the workforce in large firms).

UNIVERSITIES AND RESEARCH CENTRES

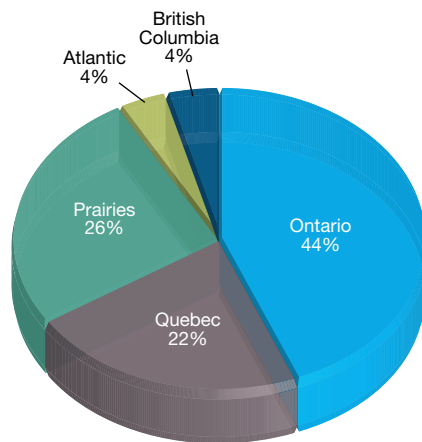
University and research centre revenues amounted to \$94M in 2014, representing 1.7% of total revenue, with four universities making it into Canada's top 30 space organizations. Universities and research centres received \$85M in domestic funds, mostly from government: \$67M from the federal government and \$8M from provincial governments. The remainder came from private foundations or companies.

In addition, universities and research centres continued to access foreign sources of funding, totalling \$8.8M. In 2014, the majority of funding came from organizations in Europe, totalling \$4.5M (the Norwegian Space Centre, the European Space Agency and the European Commission were among the top funders). American organizations were also an important source of support for space-related activities in Canadian universities and research centres, with funds totalling \$2.9M (Boeing, the National Radio Astronomy Observatory, the U.S. Department of Energy, the Gordon and Betty Moore Foundation, and NASA were among the top funders).

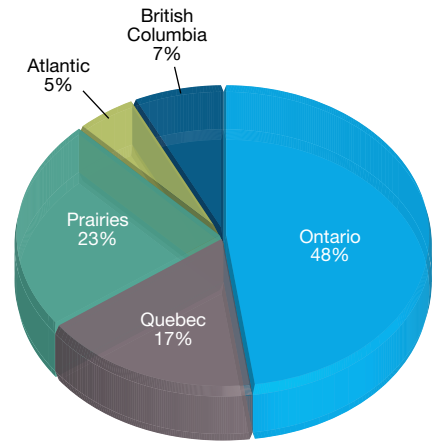
Academic organizations contribute 19% of the total space sector workforce with 1,930 full-time equivalents, of which 71% are highly qualified personnel (HQP) such as engineers, scientists and technicians. An additional 25% of the academic university and research centre workforce is comprised of students.

Regarding regional distribution, Ontario organizations capture 43% of space-related funding in this category and 48% of the workforce. Quebec and the Prairies account for similar amounts of space-related funding, 22% and 26% respectively, and workforce, 17% and 23% respectively, at universities and research centres. B.C. and Atlantic regions are also at similar rates of space research funding and workforce, capturing 4% each of funding and 7% and 5% of workforce, respectively. The pie charts below illustrate the regional distribution trends.

Regional distribution of space-related funding at universities and research centres



Regional distribution of workforce at universities and research centres



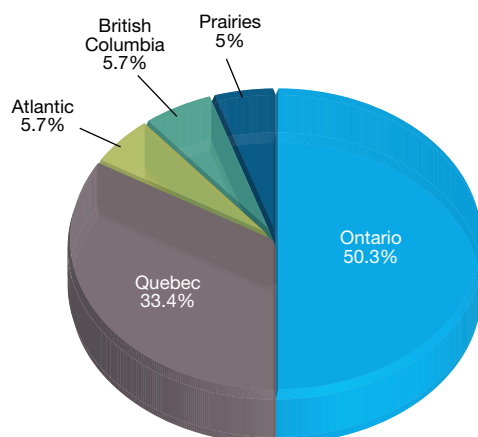
Of the 40 university and research centre respondents, 12 reported coming up with at least one space-related invention in 2014, five of which filed for one or more patents.

For the purposes of this report, funding for space-related activities performed at universities and research centres is consolidated with company revenues and reported as total space sector revenues for the year, which is \$5.4B in 2014. Because of the general nature of activities undertaken at universities and research centres, these organizations are categorized as part of the upstream segment of the value chain. It is important to note, however, that while universities and research centres are mostly engaged in research and engineering, some also participate in downstream segment activities, such as satellite operations and the development of software and algorithms to render space data useful.

REGIONAL DISTRIBUTION AND TRENDS

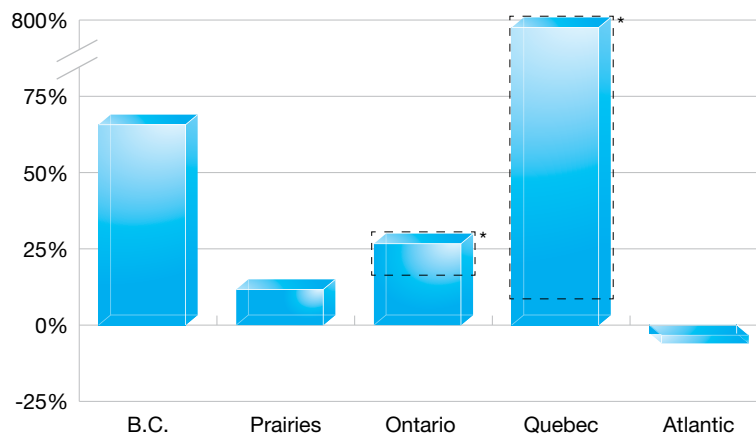
While the proportional share of total revenues by region has remained relatively stable from year to year, the inclusion of new downstream segment space sector firms in the 2014 results caused a shift in regional distribution in favour of Quebec.

Regional Proportion of Total Revenues: 2014



	2013		2014	
	Export	Domestic	Export	Domestic
B.C.	81	145	83	226
Prairies	167	61	167	101
Ontario	912	1,463	913	1,792
Quebec	313	89	238	1,559
Atlantic	165	91	156	148

Percentage Change of Total Revenues by Region Over the Last 5 Years (2009–2014)



*The amounts within the dotted lines correspond to the percentage change of total revenues by region over the last five years included in the annual report as a result of methodological changes.

British Columbia

In 2014, British Columbia had revenues of \$309M, representing an increase of 36% (\$82M) over 2013 revenues. Between 2009 and 2014, B.C.'s total revenues increased by 69% from \$183M to \$309M. This growth has been driven by domestic revenue sources, which have increased from \$89M to \$226M, while export revenues declined from \$94M to \$83M, or 12%, over the same period.

6% of Canadian space sector revenues can be attributed to B.C.

6% of Canadian space sector revenues can be attributed to B.C., where the number of upstream and downstream segment respondents is approximately equal. Similar to other regions, downstream segment organizations tend to generate more revenues than upstream segment organizations. In B.C., 22% of revenues are generated by upstream segment activities, while 78% of revenues are generated by downstream segment activities.

Prairies (Alberta, Saskatchewan and Manitoba)

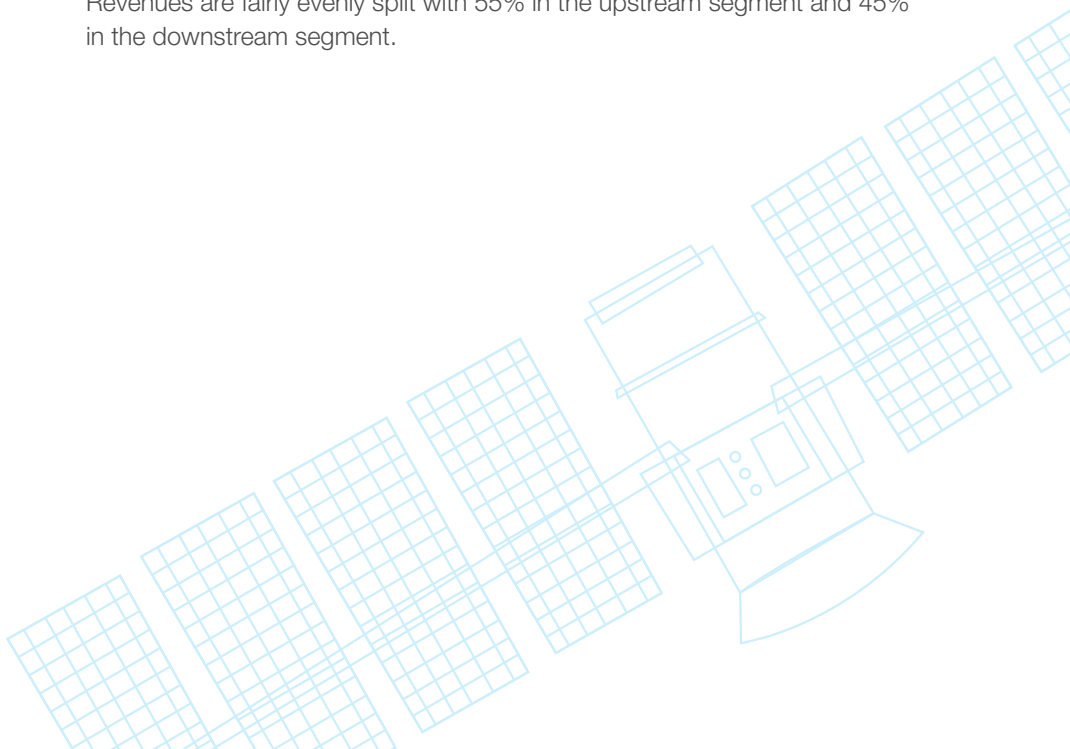
Revenues in the Prairies increased by 18%, or \$40M, over last year, reaching \$268M in 2014.

- > Alberta revenues increased by 3%, or \$4M, from \$138M to \$142M;
- > Saskatchewan revenues increased for a fifth consecutive year, with an increase of 11% (from \$57M to \$63M);
- > Manitoba revenues increased for the sixth consecutive year, with an increase of 90% over 2013, totalling \$63M.

5% of Canadian space sector revenues can be attributed to the Prairies.

Over the past five years, total revenues have increased by 15%. Revenues totalled \$232M in 2009 compared to \$268M in 2014. Domestic revenues grew from \$42M in 2009 to \$101M in 2014, while exports decreased from \$190M to \$167M in the same period.

5% of Canadian space sector revenues can be attributed to the Prairies. Revenues are fairly evenly split with 55% in the upstream segment and 45% in the downstream segment.



Ontario

Revenues in Ontario increased by 14%, or \$330M, reaching \$2.7B in 2014.

Domestic revenues increased by 23%, or \$329M, from \$1.5B in 2013 to \$1.8B in 2014; exports revenues remained flat with 0.1% growth, from \$912M in 2013 to \$913M in 2014. Over the past five years, domestic revenues in Ontario have increased by 42%, or \$530M, and exports have increased by 12% (\$816M to \$913M).

50% of Canadian space sector revenues can be attributed to Ontario.

50% of Canadian space sector revenues can be attributed to Ontario, declining from 69% in 2009. This decline vis-à-vis other provinces is a result of a slower growth rate compared to other regions and also a reflection of changes to the methodology in 2014, which added significant revenues from broadcasting to the Quebec region, shifting the portrait of regional distribution.

There are more than twice as many upstream segment companies than downstream segment companies represented in the survey for the Ontario region. However, downstream segment companies account for 87% of revenues in the province due to significant revenue in satellite operations, manufacturing of Satellite Communication hardware and broadcasting services.

Quebec

The addition of broadcasting companies as part of the methodology change has vastly increased Quebec's reported share of Canadian space revenues. Whereas the previous methodology would have reported a decline in revenue of \$122M (or 30%), the new methodology reports revenues in 2014 of \$1.8B compared to \$402M in 2013.

One-third (33%) of Canadian space sector revenues can be attributed to Quebec.

The addition of downstream segment companies significantly increased reported domestic revenues, but had no impact on exports for the region. Domestic revenues were reported at \$1.6B compared to \$89M in 2013. Exports, which were not impacted by methodological changes, declined from \$313M in 2013 to \$234M in 2014. Since 2009, Quebec's exports have increased by \$71M, or 43%, from \$167M to \$238M.

One-third (33%) of Canadian space sector revenues can be attributed to Quebec. Quebec's profile is similar to Ontario's in that there are twice as many upstream segment companies as downstream segment companies, and revenues are heavily concentrated in the downstream (87%). In Quebec, the addition of a major broadcasting service provider has contributed to shifting the province's overall profile more heavily towards the downstream segment.

Atlantic Canada (New Brunswick, Newfoundland, Nova Scotia and PEI)

In 2014, the Atlantic region saw revenues increase by 19%, or \$49M. As with every other region this year, domestic revenues drove growth, in this case increasing \$57M (from \$91M to \$148M), while exports decreased for the third year in a row, from \$165M to \$156M.

6% of Canadian space sector revenues can be attributed to the Atlantic region.

- > As was the case last year, revenues in New Brunswick accounted for the domestic revenue growth in the region, with growth of 45% year over year and total revenues of \$120M.
- > Revenues in Newfoundland saw an increase after three years of falling regional share. Total revenues in Newfoundland are \$178M.
- > Revenues in Nova Scotia increased by 15%, reaching \$6M.

Looking at the five-year trend analysis, total revenues in the Atlantic region have decreased 3%, or \$10M. While domestic revenues have grown, exports have been dragging down overall revenue growth. Exports decreased by 30%, or \$67M, during the same five-year period.

6% of Canadian space sector revenues can be attributed to the Atlantic region. In Atlantic Canada, there are a few small to medium upstream segment players, which are mainly academic players, and a handful of downstream segment companies. The downstream segment companies account for 98% of revenues.



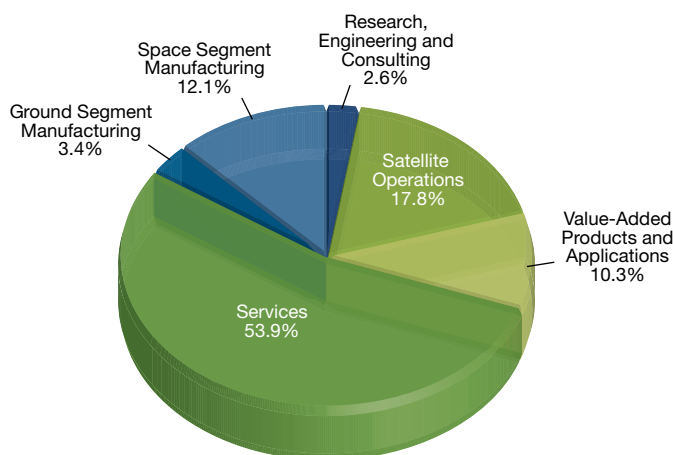
MARKETS

MARKET SHARE BY VALUE-CHAIN CATEGORY

Revenues accruing to space organizations can be broken down into value-chain categories. The categories relate to the type of work that the organization is carrying out in order to produce goods and services and are broadly divided into upstream and downstream segment activities. The upstream segment in Canada – comprised of R&D, engineering, consulting, space and ground segment manufacturing – was worth roughly \$1B in 2014. The downstream segment – comprised of satellite operations, manufacturing of products (e.g. terminals), development of software applications, and the provision of services (e.g. broadcasting) – was worth \$4.4B in 2014. A detailed description of the value-chain categorization is provided in the Methodology section of this report. A breakdown of revenues in each category is as follows:

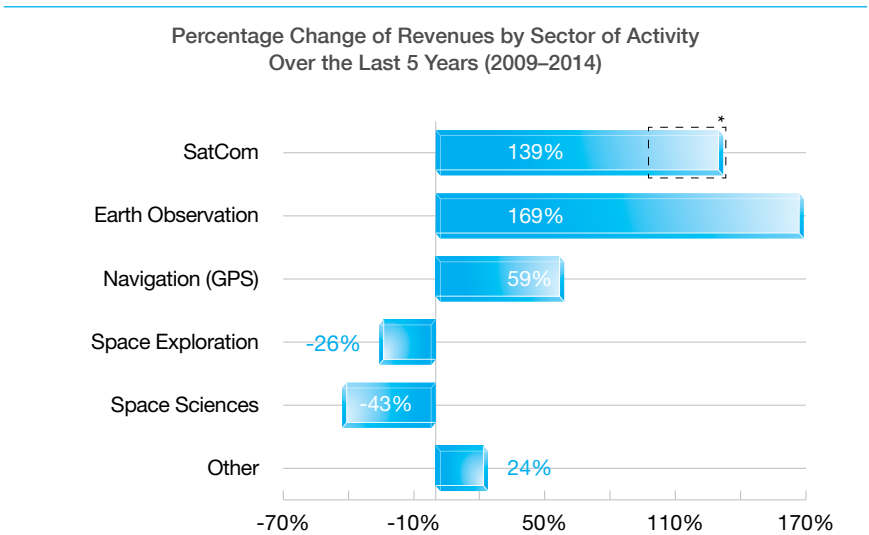
- > Research, Engineering and Consulting amounted to \$140M in 2014 and account for 3% of total revenues.
- > Ground Segment Manufacturing amounted to \$181M in 2014 and accounts for 3% of total revenues.
- > Space Segment Manufacturing amounted to \$653M in 2014 and accounts for 12% of total revenues.
- > Satellite Operations amounted to \$956M in 2014 and account for 18% of total revenues.
- > Products and Applications amounted to \$554M in 2014 and account for 10% of total revenues.
- > Services amounted to \$2.9B in 2014 and account for 54% of total revenues.

Proportion of Revenues by Space Category: 2014

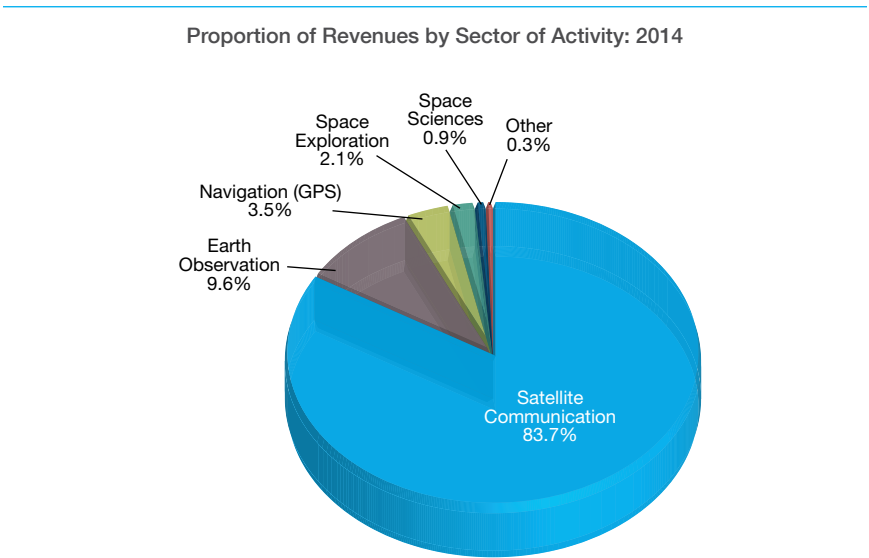


MARKET SHARE BY SECTOR OF ACTIVITY

Growth in 2014 was driven by increased revenues in Satellite Communication and Earth Observation. Navigation grew moderately, while Space Exploration and Science are experiencing minimal growth year over year. Considering the impact of modest inflation, these later two sectors of activity have experienced declining revenues in real terms compared to 10 years ago. Trends for the last five-year period are detailed below. As with findings presented throughout this report, the breakdown is provided at current market prices, in other words unadjusted for inflation. Note that methodological changes have had an impact on the analysis for the Satellite Communication sector; however, other sectors of activity were unaffected.



*The amount within the dotted lines corresponds to the percentage change of revenues by sector of activity over the last five years included in the annual report as a result of methodological changes.



Satellite Communication

In 2014, Satellite Communication revenues were \$4.5B. This is a significant increase over the revenue reported in the 2013 report, due mostly to changes in methodology which resulted in the inclusion of new downstream segment actors. The Satellite Communication sector represented 84% of total space revenues in 2014.

Of the \$4.5B in Satellite Communication revenues, the vast majority (91%) was derived from activities in the downstream segment, broken down as follows:

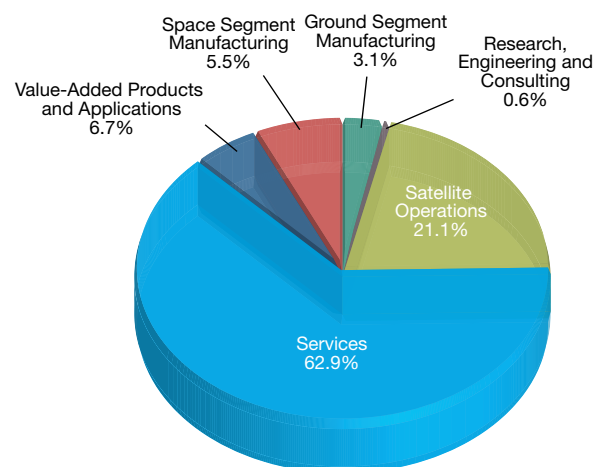
- > Satellite Operations: \$949M
- > Applications and Products (e.g. antennas): \$303M
- > Broadcasting Services: \$2.67B
- > All other telecommunication services: \$167M

The remainder of Satellite Communication revenues was related to upstream segment activities:

- > Research, Engineering and Consulting: \$28M
- > Space Segment Manufacturing: \$249M
- > Ground Segment Manufacturing: \$140M

Ignoring the methodological changes, Satellite Communication revenues grew by 39%, or \$744M, at an average annual growth rate of 6.7% over the last five years (2009–2014).

Breakdown of Satellite Communication Revenues: 2014



Earth Observation (EO)

EO revenues increased by 39%, or \$146M, from 2013 to 2014, and account for 10% of total space revenues.

The majority of revenues were in the upstream segment:

- > Research, Engineering and Consulting: \$20M
- > Space Segment Manufacturing: \$332M
- > Ground Segment Manufacturing: \$37M

The remainder of revenues was related to activities in the downstream segment:

- > Satellite Operations: \$5M
- > Applications and Products: \$96M
- > Services: \$27M

Over the past five years, EO revenues have more than doubled from \$192M in 2009 to \$516M in 2014, growing on average 22% annually.

Space Exploration

In 2014, Space Exploration revenues increased by 31%, or \$27M, from \$86M to \$113M, representing 2% of total space revenues.

This sector of activity is almost exclusive to the upstream segment with 99% of revenues, as follows:

- > Research, Engineering and Consulting: \$59M
- > Space Segment Manufacturing: \$51M
- > Ground Segment Manufacturing: \$3M

The remainder of activities, which relate to the downstream segment, amount to less than \$1M as part of products or applications using exploration themes or data. There are no services associated with Exploration.

Since 2009, revenues from this sector have decreased by \$40M, or 26%.

Navigation

Revenues increased by 5%, from \$182M to \$190M, which amounted to 4% of total space revenues.

Navigation is almost exclusively in the downstream segment in Canada. Products, Applications and Services are driven by consumer, business and government end-user demand. The downstream segment is 94% of the Navigation market, broken down as follows:

- > Products and Applications: \$146M
- > Services: \$33M

The remainder is broken down as follows:

- > Research, Engineering and Consulting: \$2M
- > Space Segment Manufacturing: \$8M
- > Ground Segment Manufacturing: <\$1M

Over the last five years (2009–2014), revenues from Navigation have increased by 59%, or \$70M. This represents an annual growth rate of 9.6%.

Space Sciences

Revenues decreased by 16%, or \$9M, from \$56M in 2013 to \$48M in 2014. Space sciences represent less than 1% of total space revenues.

The market for space science is split in favour of upstream segment activities:

- > Research, Engineering and Consulting: \$29M
- > Space Segment Manufacturing: \$5M
- > Ground Segment Manufacturing: \$1M

With the remainder in the downstream segment:

- > Satellite Operations: \$2M
- > Products and Applications: \$6M
- > Services: \$4M

Over the last five years (2009–2014), revenues from Space Science have decreased by 43%, or \$37M.

Other Revenues

From 2013 to 2014, other revenues decreased by 37%, from \$22M to \$14M, which was less than 1% of total space revenues. Activities that fall into the “Other” sector are by nature variable and subject to re-categorization; therefore, changes in this sector may be less statistically relevant than in the sectors noted elsewhere.

MARKET SHARE BY CUSTOMER LOCATION

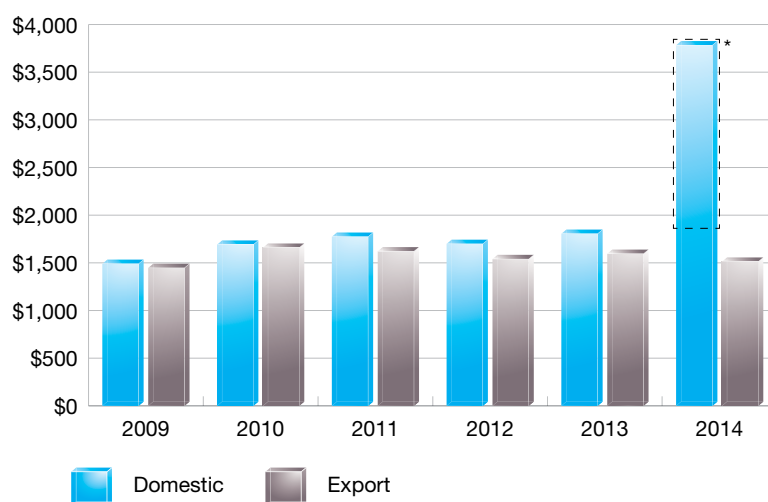
Domestic vs. Export Revenues

In 2014, total revenues for the Canadian space sector were \$5.4B. Domestic revenues accounted for 71% of total space revenues, while exports represented 29%.

After accounting for changes in methodology from the previous year, domestic revenues drove growth while exports declined. The longitudinal data show that total revenues generated by the Canadian space sector over the last five years increased by 18%, or \$537M. Using prior methodology, the average growth rate calculated using Compound Annual Growth Rate (CAGR) over the past five years was the following: 3.3% for the total space sector; 5.5% for domestic revenues; and 0.9% for exports.

See the data tables on page 37 for more information regarding inflation-adjusted amounts.

Domestic vs. Export Revenues: 2009–2014 (CAN\$M)



	2009	2010	2011	2012	2013	2014
Domestic	1,534	1,735	1,818	1,743	1,849	3,826
Export	1,491	1,703	1,665	1,584	1,639	1,557

*The amount within the dotted lines corresponds to domestic revenues included in the annual report as a result of methodological changes.

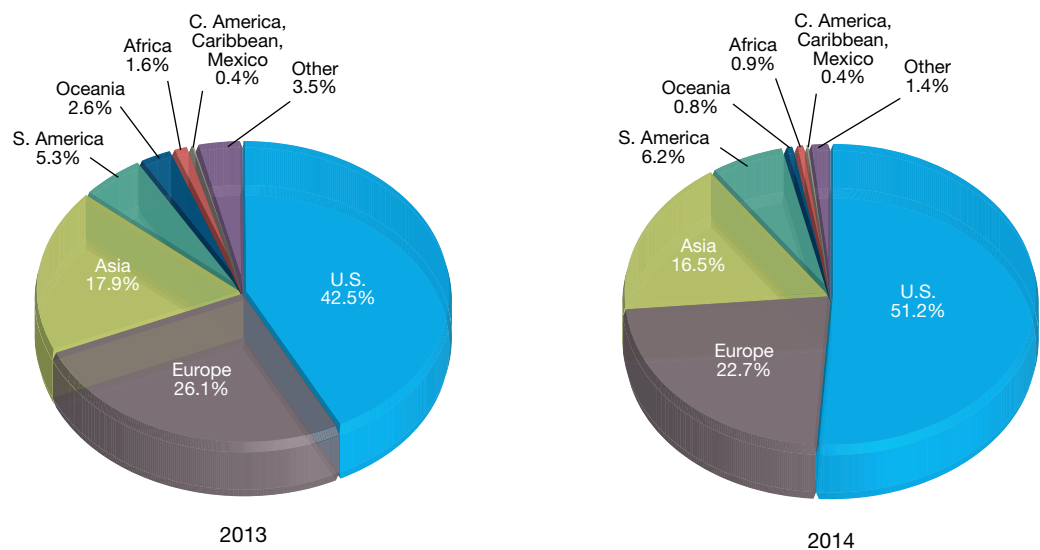
Export Regions

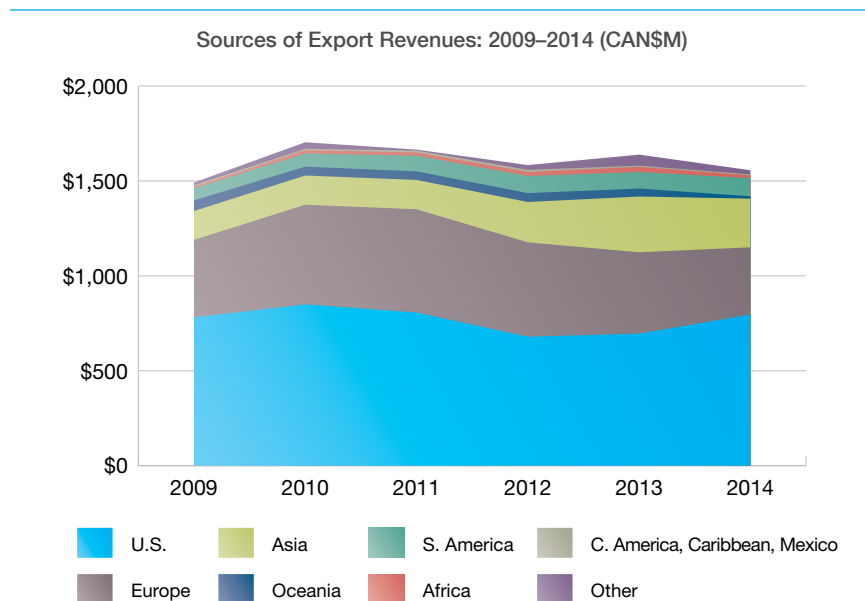
In 2014, export revenues decreased by 5%, or \$82M, to \$1.56B and were not affected by methodological changes. Generally the longitudinal data show a growing export market for Canadian space-related goods and services; however, growth in the export market over the last five years has slowed, with a CAGR of 0.9% from 2009–2014.

Segmentation of the \$1.56B in total exports for 2014 is as follows:

- > U.S.: 51%, or \$797M;
- > Europe: 23%, or \$354M;
- > Asia: 17%, or \$256M;
- > South America: 6%, or \$96M;
- > Africa: <1%, or \$14M;
- > Oceania: <1%, or \$12M;
- > Central America, the Caribbean and Mexico: <1%, or \$6M; and
- > Unallocated exports: 1%, or \$22M.

Proportion of Export Revenues





The best performing export market for Canada's space organizations continues to be the **United States** in terms of revenues. Exports to the U.S. grew 15%, or \$101M, from last year.

Europe continued to decline for a third year, decreasing 18%, or \$75M, from \$428M in 2013 to \$354M in 2014. Revenues derived from Europe account for 23% of total exports.

Revenues derived from exports to **Asia** declined by 13%, or \$38M, from \$294M in 2013 to \$256M in 2014. Asia accounted for 17% of total exports compared to the 8% share it had 10 years ago in 2004.

In 2014, exports to **South America** increased by 10%, or \$9M, over 2013. The region accounted for 6% of total exports, with \$96M.

Export revenues from **Africa** decreased by \$13M from \$27M in 2013 to \$14M in 2014. Generally speaking, growth in Africa has been uneven; years of strong growth have been followed by declines and vice versa. Africa accounted for less than 1% of total Canadian space export revenues.

Exports to **Oceania** totalled \$12M, decreasing by 72%, or \$30M, over 2013. Oceania accounted for less than 1% of total export revenues.

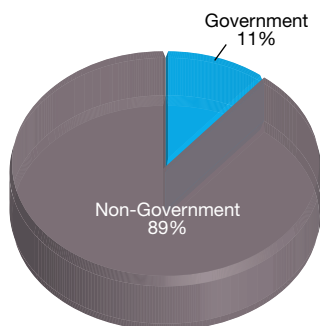
MARKET SHARE BY CUSTOMER TYPE

Customers are classified as either government or non-government. Government customers include domestic government (municipal, provincial, federal civil, federal defence) and foreign government (foreign civil and foreign defence). Non-government customers include businesses, individual consumers and non-profit organizations or foundations (both domestic and foreign).

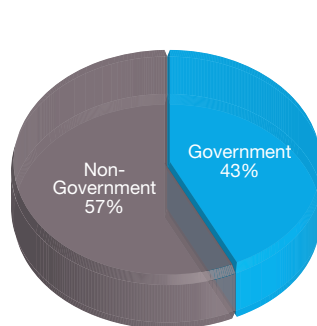
Overall, 11% of the space revenues in 2014 were derived from government sources and 89% from commercial sources. It is important to note that government customers make up the majority of market share in some sectors, such as Exploration and Science, whereas Satellite Communication customers are primarily non-government. Changes in methodology this year have contributed to increasing the non-government portion of revenues compared to government-derived revenues. This is because of the organizations that were added as a result of expanding the space sector activities in the downstream segment, mainly in broadcasting.

When comparing upstream and downstream segments, upstream segment organizations are much more reliant on government funding than downstream segment organizations, which derive their revenues almost exclusively from commercial clients. The upstream segment is 57% commercial, whereas the downstream segment is 96% commercial. It is worth noting that there are a number of downstream segment SMEs that are also heavily reliant on government as an anchor client, such as value-adding players in the Earth Observation sector. In that respect, they face similar drivers and challenges to SMEs in the upstream segment.

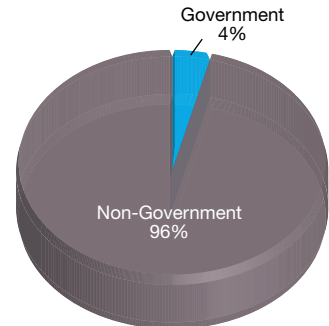
Market share by customer type
in the Canadian space sector



Market share by customer type
in the upstream segment



Market share by customer type
in the downstream segment



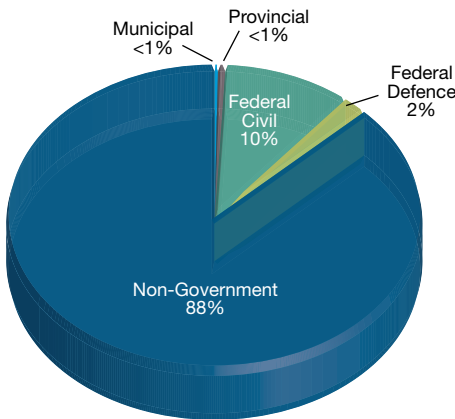
Domestic Customer Breakdown by Type

In 2014, non-governmental revenues were the most significant part of the domestic market at 88% of revenues. Non-government customers can be individuals, as is the case with subscribers to television and radio broadcasting – the largest component of domestic space-related activity. Other non-government customers include businesses, where space-derived information products are integrated into business operations (e.g. Navigation). A small portion of non-government revenues is tied to financing or sales to non-profit organizations and foundations.

Government customers make up the remainder of the domestic market and were focused in two areas: in the upstream for research, engineering and manufacturing of space assets, such as the Canadarm on the International Space Station or the RADARSAT suite of Earth Observation satellites; and in the downstream segment to ensure day-to-day government operations and services to the public (e.g. purchase of Earth Observation data to enable the Canadian Ice Service to improve ice monitoring activities).

Government customers represent the majority of upstream revenue, where they constitute 78% of revenues and commercial revenues constitute the remaining 22%. In the downstream, the situation is reversed as government customers account for only 2% of domestic revenues. The majority of funding comes from federal sources: the CSA, the Department of National Defence (DND), the Natural Sciences and Engineering Research Council (NSERC), the Canadian Broadcasting Corporation (CBC) and the Canada Foundation for Innovation (CFI) were the top five sources of federal government revenue reported by companies and universities in 2014.

Proportion of Revenues by Domestic Customer: 2014



Foreign Customer Breakdown by Type

Non-government customers make up 90%, or \$1.4B, of export revenues.

Non-government customers are, therefore, the largest market segment abroad, just as they are domestically. This is equally true for both the upstream and downstream segments, where commercial revenues account for 89% and 91% of revenues, respectively.

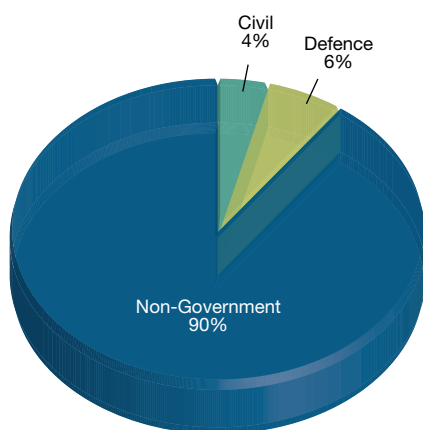
Non-governmental customers make up 90%, or \$1.4B, of export revenues.

Non-government exports are strong in three main areas of the value chain: Manufacturing, Satellite Operations, and Products and Applications. Regarding manufacturing, several companies are producing components and parts for foreign prime companies through global value chains, with very occasional sales related to manufacturing of complete end-to-end space systems. Satellite Operations include non-government exports, as well as downstream segment products, which are mostly related to the sale of antennas, receivers and other ground equipment. Both Navigation-related and Satellite Communication-related non-government exports for Earth Observation are limited, but a small market does exist for data, software applications and services.

There is also a small portion of non-government organizations, mainly foundations, which provide funding to Canadian universities and research centres. This is a relatively small amount and it is categorized as export revenue in the consolidated analysis of the Canadian space sector.

Government clients make up 10%, or \$151M, of exports. The vast majority of government clients are civil-related. Only a very small portion, less than 1%, of Canadian space exports is purchased by foreign governments for defence purposes.

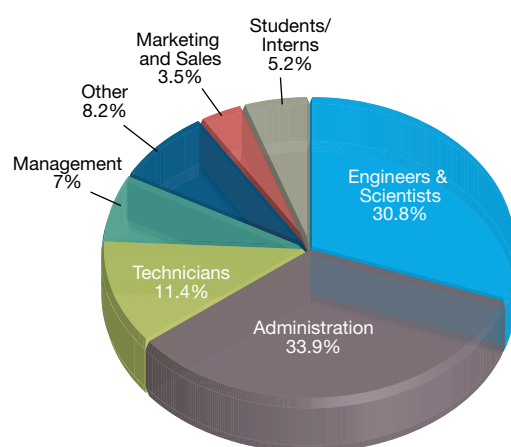
Proportion of Revenues by Foreign Customer: 2014



WORKFORCE

Note that as a result of redefining the space sector using a value-chain approach, the CSA has incorporated additional organizations involved in downstream segment activities, mainly related to broadcasting. As a result, total workforce has increased significantly from previous years' reporting. Detailed definitions of these categories are provided in the Methodology section of this report. The Canadian space workforce totals 10,012 space-related full-time equivalents (FTEs). Overall, the space sector workforce is evenly divided between upstream and downstream segment organizations with 51% and 49% of the total workforce, respectively. Note that workforce data does not include government employees.

Workforce by Space Employment Category: 2014



Workforce Group by Region: 2014

	Management	Engineers & Scientists	Technicians	Marketing and Sales	Administration	Other	Students/Interns	Total	
B.C.	78	261	116	31	47	24	57	614	6.1%
Prairies	17	633	87	2	9	42	68	858	8.6%
Ontario	347	1,227	508	167	1,745	475	352	4,820	48.1%
Quebec	239	826	294	91	1,514	131	31	3,126	31.2%
Atlantic	19	141	133	61	76	148	17	595	5.9%
Total	699	3,088	1,138	351	3,391	820	525	10,012	

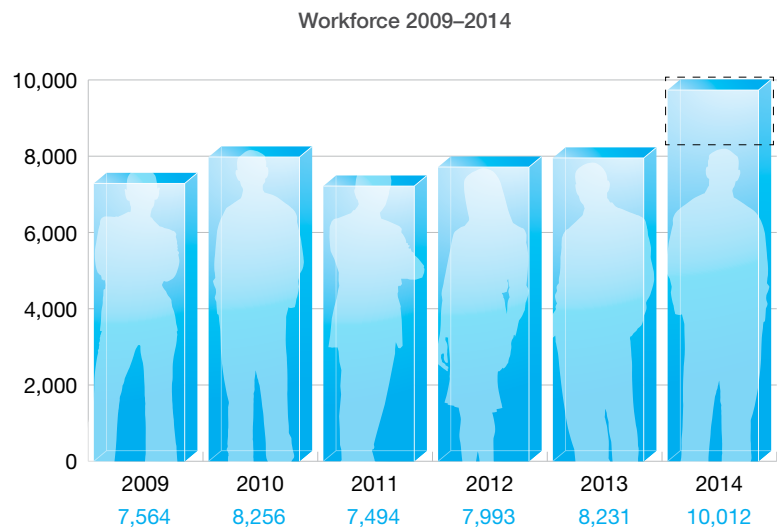
WORKFORCE GROUPS

In 2014, employees in the administration category represent the largest category of employment with 3,391 FTEs resulting from the change in methodology, representing 34% of the total space workforce. Engineers and scientists make up the second largest group with 3,088 FTEs and 31% of the total workforce. Technicians come third with 1,138 FTEs and 11% of the total workforce. Management, marketing and sales, and other employees make up the remainder.

The charts and graphs below provide a breakdown of the space sector workforce employment category in 2014.

WORKFORCE BY REGION

- > **British Columbia:** 6% (614 FTEs) of Canada's space workforce, an increase of 57%, or 223 employees, over last year.
- > **Prairies:** 9% (858 FTEs), an increase of 2% (19 employees).
- > **Ontario:** 48% (4,820 FTEs), an increase of 1% (27 employees).
- > **Quebec:** 31% (3,126 FTEs). Direct comparisons to the previous year are not possible due to changes in methodology.
- > **Atlantic Canada:** 6% (595 FTEs), a decrease of 2% (13 employees).



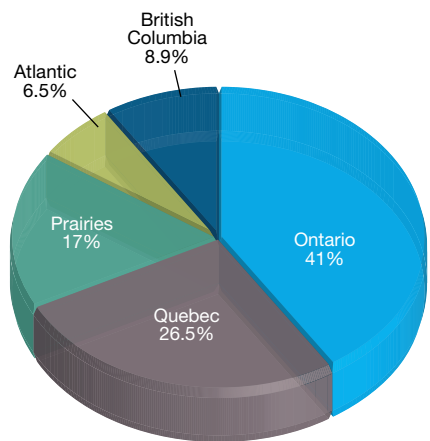
*The number within the dotted lines corresponds to workforce included in the annual report as a result of methodological changes.

HIGHLY QUALIFIED PERSONNEL (HQP)

The table below reports the percentage of HQP in relation to each Canadian region, and relative to the national workforce. The HQP measurement tracks the number of engineers, scientists and technicians employed in the space sector. In 2014, HQP positions decreased slightly by 3%, totalling 4,226 FTEs. HQP represent 42% of the total Canadian space workforce. In terms of upstream and downstream segments, the share of HQP is an important indicator that differentiates the profile of the workforce. In the upstream segment, 73% of the workforce are HQP, while in the downstream segment 27% of the workforce are HQP.

- > 41% of Canada's total space HQP work in **Ontario** while 36% of Ontario's space workforce are HQP;
- > 26% of Canada's total space HQP work in **Quebec** while 36% of Quebec's space workforce are HQP;
- > 17% of Canada's total space HQP work in the **Prairies** while 84% of the Prairies' space workforce are HQP;
- > 9% of Canada's total space HQP work in **B.C.** while 62% of B.C.'s space workforce are HQP;
- > 7% of Canada's total space HQP work in **Atlantic** Canada while 46% of Atlantic Canada's space workforce are HQP.

Highly Qualified Personnel Space Workforce in Canada: 2014



Highly Qualified Personnel Space Workforce in Canada: 2014				
	Total # Workforce	Total # of HQP	% of HQP Relative to its Own Region	% of HQP Relative to National HQP
B.C.	614	377	61.5%	8.9%
Prairies	858	720	83.9%	17%
Ontario	4,820	1,735	36%	41%
Quebec	3,126	1,120	35.8%	26.5%
Atlantic	595	274	46%	6.5%
Total	10,012	4,226		

INNOVATION

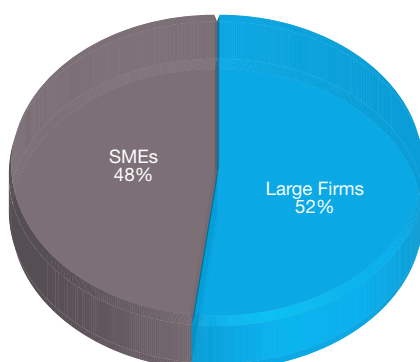
In this study, four indicators related to innovation were tabulated. Note that none of them were impacted by methodology changes.

BUSINESS EXPENDITURES ON R&D (BERD) (COMPANIES ONLY)

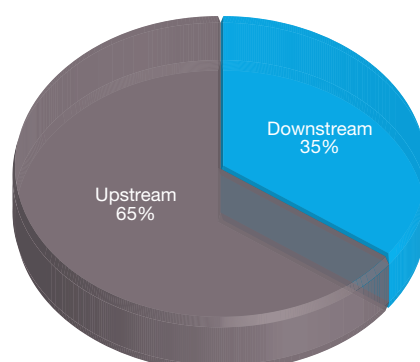
In 2014, there were 52 companies engaged in R&D activities. Total spending was \$146M, a decrease of 19% over R&D spending reported in 2013 (\$180M). Upstream organizations were more R&D intensive, spending 65% of total space sector BERD.

R&D spending was financed through internal sources (e.g. company profits reinvested in R&D) or through external funding sources (e.g. government grants and contributions). Internally funded R&D represented the larger portion of spending at \$80.4M or 55% of BERD in 2014. Externally funded R&D represented 45% or \$65.5M of BERD in 2014.

Business Expenditures on R&D
by Firm Size



Business Expenditures on R&D
by Market Segment



R&D INTENSITY LEVEL (COMPANIES ONLY)

R&D intensity is the proportion of BERD compared to the direct GDP contribution of the sector. It serves as an indicator of the level of effort and investment by a company (or by an industry as a whole in this case) in innovative activities, for example, to create new products, services, technologies or to improve business functions, such as production techniques. Overall, space sector R&D intensity is 10%. If we consider only the manufacturing segment, R&D intensity is 23%. This is six times higher than the average for manufacturing in Canada.

COMMERCIALIZATION OF EXTERNALLY FUNDED R&D PROJECTS (ALL ORGANIZATIONS)

Organizations report on the level of commercialization of projects that were initially funded by public monies (externally funded R&D). In 2014, revenues derived through commercialization of Externally Funded R&D projects were \$83M. The vast majority of commercialization takes place through companies (97.6%), with the remainder of commercialization taking place through universities and research centres. In 2014, \$2M of the total \$83M was attributable to universities / research centres.

INVENTIONS AND PATENTS (ALL ORGANIZATIONS)

In 2014, 58 organizations reported having made an invention. During the same period, 29 organizations registered a patent. Universities are responsible for 20% of registered patents. Upstream organizations account for the majority of inventions and patents, with 71% of all inventions reported and 79% of patents filed.

The rate of patents and inventions has remained relatively the same over the past 10 years. Most organizations involved in inventing and patenting make on average 1 to 5 inventions per year and file for 1 to 5 patents per year.



ECONOMIC IMPACT ANALYSIS

The methodology used for the following economic impact analysis, reported for the first time this year, is detailed in the Methodology section of this report. Results for 2014 are discussed below:

ECONOMIC IMPACT – GROSS DOMESTIC PRODUCT

In 2014, the space sector contributed \$2.8B to Canada's GDP, which represents the value of all *final* goods and services produced by the space sector *within* Canada. Total GDP contribution was broken down into the following:

- > \$1.5B in Direct Impacts (space sector contribution);
- > \$0.7B in Indirect Impacts (supplier industry contribution); and
- > \$0.6B in Induced Impacts (wages re-spent in the economy by workforce involved in Direct and Indirect activities).

The space sector creates benefits in the larger economy and has a GDP multiplier of 1.85 (Total GDP Impact / Direct GDP Impact). In other words, every dollar that the space sector contributes to the GDP generates another \$0.85 in GDP contribution from other organizations in the economy.

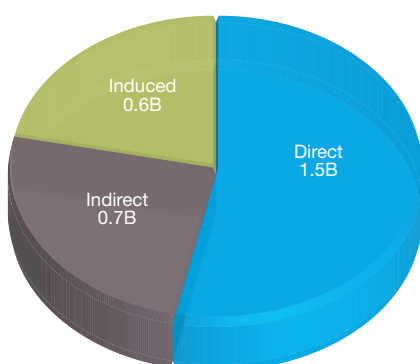
ECONOMIC IMPACT – JOBS CREATED

In 2014, the space sector supported a total of 24,579 jobs in Canada. The total workforce contribution was broken down into the following:

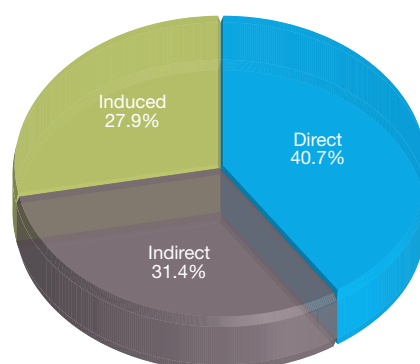
- > 10,012 Direct Jobs (space sector jobs);
- > 7,718 Indirect Jobs (supplier industry jobs); and
- > 6,849 Induced Jobs (jobs created and supported as a result of wages re-spent in the economy by workforce involved in Direct and Indirect activities).

The space sector therefore creates jobs in the larger economy and has a workforce multiplier of 2.5 (Total Workforce Impact / Direct Workforce Impact). In other words, every job in the space sector supports another 1.5 jobs in the economy.

Total GDP Impact (\$B in 2014)

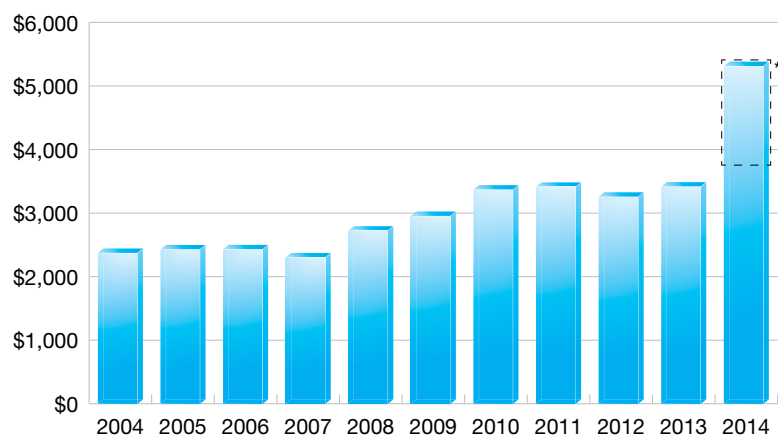


Total Workforce Impact (FTEs in 2014)



TEN-YEAR TREND: 2004–2014

TOTAL SPACE REVENUES 2004–2014 (CAN\$M): 10-YEAR TREND

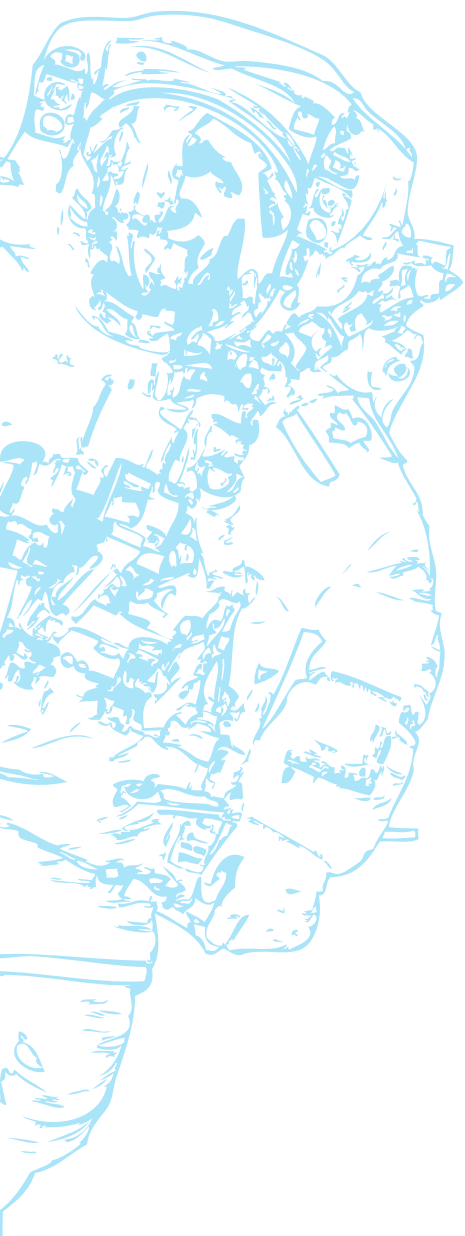


*The amount within the dotted lines corresponds to total space revenues included in the annual report as a result of methodological changes.

Year	Overall Revenues	Domestic Revenues		Export Revenues		Workforce
	(CAN\$)	(CAN\$)	%	(CAN\$)	%	#
2014	\$5,383,048,299	\$3,826,446,289	71	\$1,556,602,010	29	10,012
2013	\$3,487,279,616	\$1,848,563,816	53	\$1,638,715,800	47	8,231
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	\$3,438,626,684	\$1,735,256,380	50	\$1,703,370,304	50	8,256
2009	\$3,024,938,914	\$1,533,689,499	51	\$1,491,249,415	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	\$1,379,399,092	58	\$992,845,715	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

*This chart reflects values that are not adjusted for inflation.

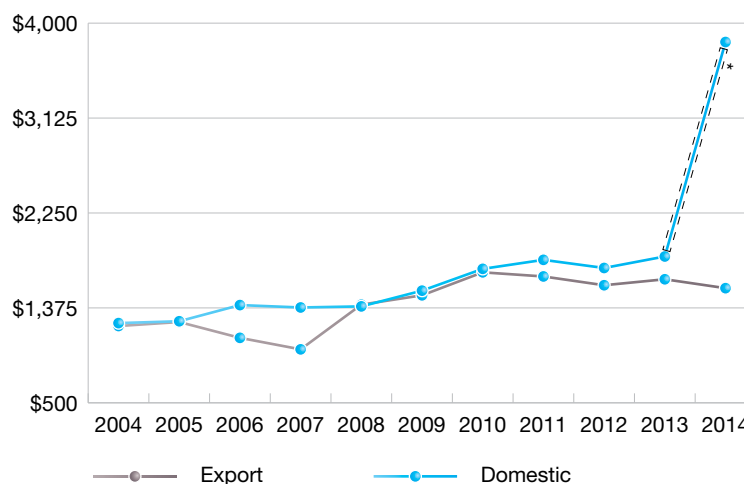




Inflation-Adjusted Revenues: 2004–2014			
Year	Overall Revenues (CAN\$)	Domestic Revenues (CAN\$)	Export Revenues (CAN\$)
2014	\$5,383,048,299	\$3,826,446,289	\$1,556,602,010
2013	\$3,558,332,583	\$1,886,228,115	\$1,672,104,467
2012	\$3,408,651,866	\$1,786,102,224	\$1,622,549,641
2011	\$3,640,151,368	\$1,899,962,096	\$1,740,189,272
2010	\$3,711,345,352	\$1,872,880,162	\$1,838,465,190
2009	\$3,495,628,461	\$1,772,336,174	\$1,723,292,286
2008	\$3,211,669,957	\$1,596,260,507	\$1,615,409,450
2007	\$2,895,311,390	\$1,683,620,284	\$1,211,691,106
2006	\$3,186,989,355	\$1,785,620,023	\$1,401,369,332
2005	\$3,337,160,960	\$1,673,116,768	\$1,664,044,192
2004	\$3,385,926,184	\$1,711,868,081	\$1,674,058,103

Bank of Canada Rates of Inflation-Adjusted Revenues (Consumer Price Index data)

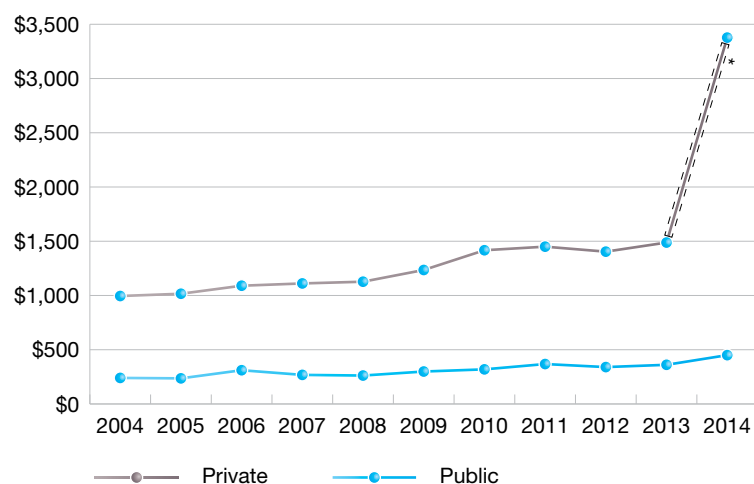
DOMESTIC VS. EXPORT REVENUES: 2004–2014 (CAN\$M)



*The amount within the dotted lines corresponds to domestic revenues included in the annual report as a result of methodological changes.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Domestic	1,235	1,252	1,401	1,379	1,389	1,534	1,735	1,818	1,743	1,849	3,826
Export	1,208	1,245	1,099	993	1,405	1,491	1,703	1,665	1,584	1,639	1,557

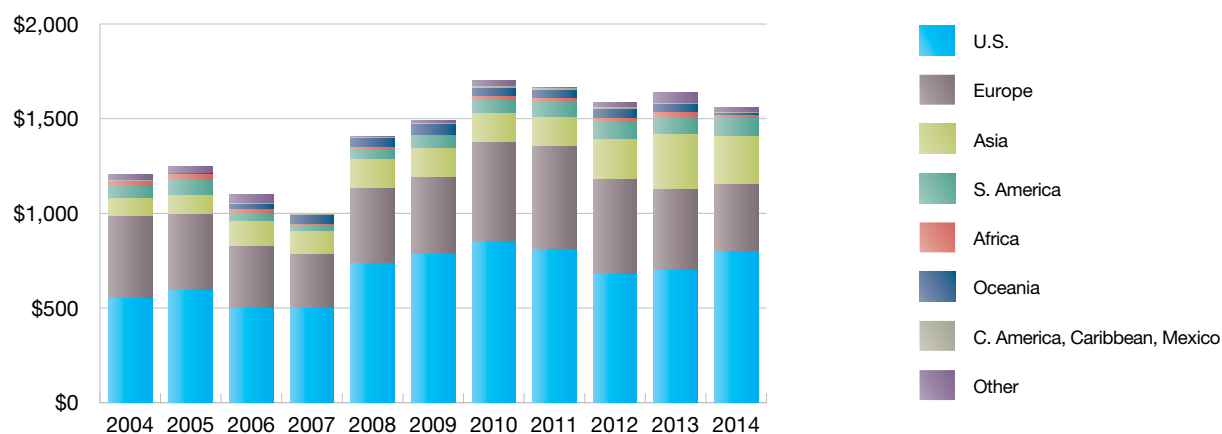
SOURCES OF DOMESTIC REVENUES PUBLIC VS. PRIVATE: 2004–2014 (CAN\$M)



*The amount within the dotted lines corresponds to private sources of domestic revenues included in the annual report as a result of methodological changes.

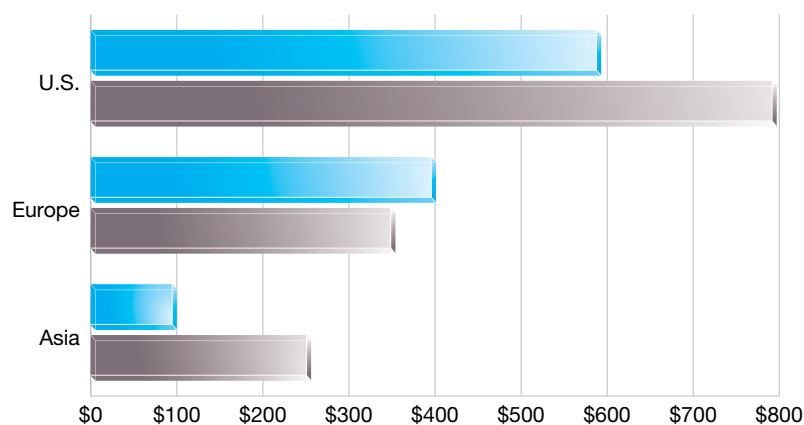
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Public	240	236	311	268	262	299	319	368	340	361	450
Private	995	1,016	1,090	1,111	1,127	1,235	1,417	1,450	1,404	1,488	3,377

SOURCES OF EXPORT REVENUES: 2004–2014 (CAN\$M)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
United States	552	593	499	499	733	782	850	807	680	696	797
Europe	432	401	323	283	399	408	525	544	497	428	354
Asia	97	100	134	120	150	152	154	155	212	294	256
South America	60	79	40	32	52	64	70	83	91	87	96
Africa	25	30	26	6	11	8	17	17	21	27	14
Oceania	4	6	24	48	51	56	46	45	47	42	12
C. Amer., Caribbean, Mex.	6	4	4	5	7	8	7	11	11	6	6
Other	33	33	48	0	2	14	34	5	25	58	22

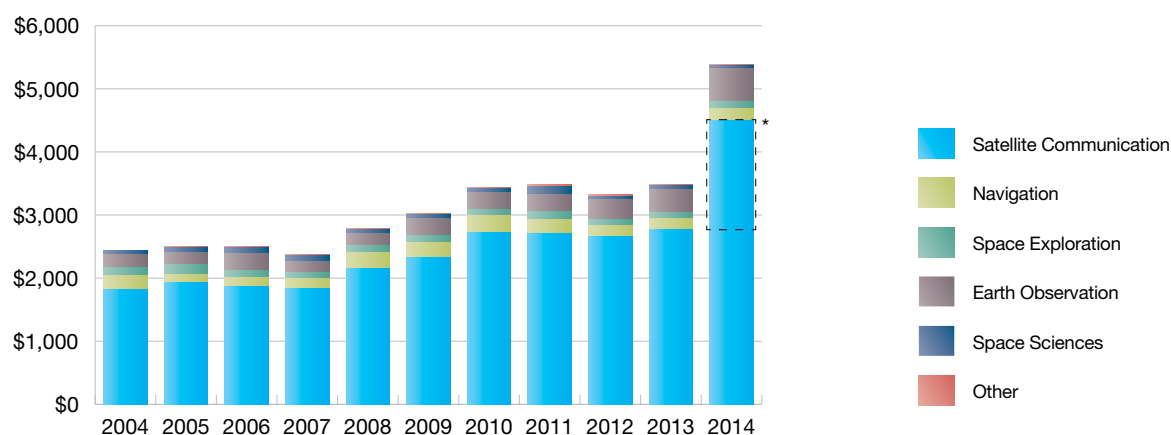
SOURCES OF EXPORT REVENUES: 2004–2014 (CAN\$M)



2005 2014

	2005	2014
U.S.	593	797
Europe	401	354
Asia	100	256

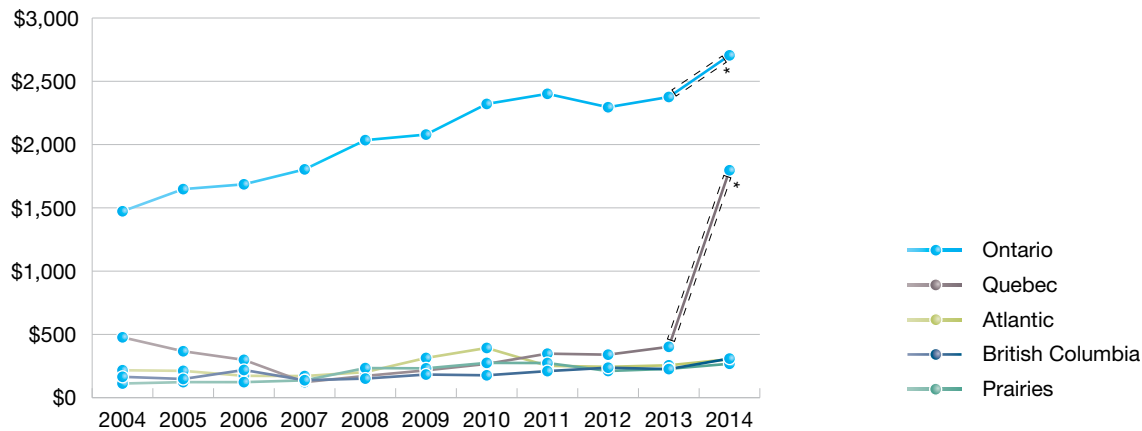
REVENUES BY SECTOR OF ACTIVITY: 2004–2014 (CAN\$M)



*The amount within the dotted lines corresponds to Satellite Communication activities included in the annual report as a result of methodological changes.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SatCom	1,827	1,938	1,874	1,832	2,146	2,326	2,729	2,703	2,655	2,769	4,503
Navigation (GPS)	212	120	132	155	254	243	260	225	172	182	190
Space Exploration	122	153	113	103	110	114	106	127	99	86	113
Earth Observation	211	192	269	168	200	258	256	271	322	370	516
Space Sciences	61	84	100	102	68	61	62	128	53	56	48
Other	9	11	12	13	16	24	25	29	25	22	14

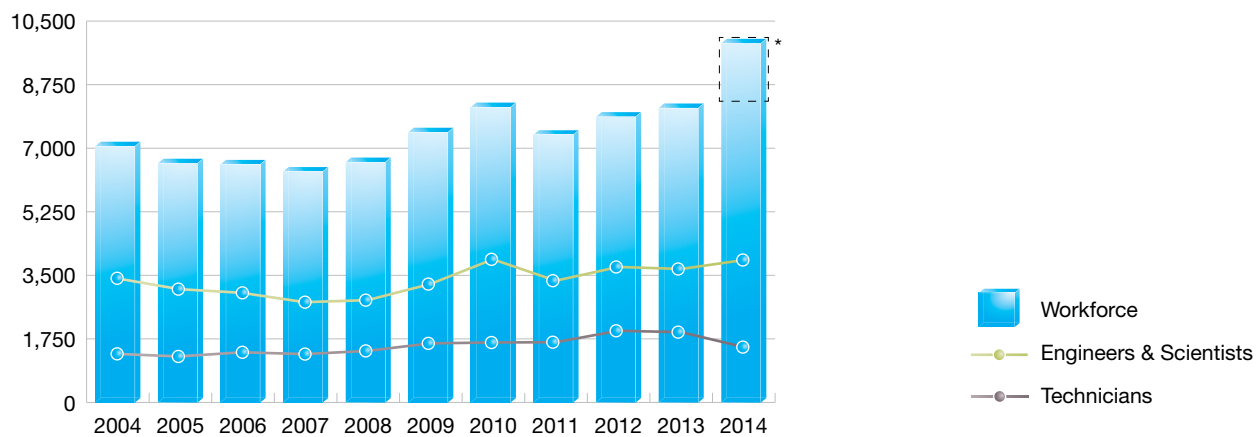
REVENUES BY CANADIAN REGION: 2004–2014 (CAN\$M)



*The amounts within the dotted lines correspond to revenues by Canadian region included in the annual report as a result of methodological changes.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
B.C.	165	148	219	138	151	183	177	210	237	226	309
Prairies	112	123	123	137	234	232	275	274	211	228	268
Ontario	1,473	1,648	1,686	1,804	2,035	2,079	2,327	2,401	2,295	2,376	2,705
Quebec	477	367	299	123	172	216	267	348	340	402	1,797
Atlantic	217	212	173	171	202	314	393	252	244	256	304

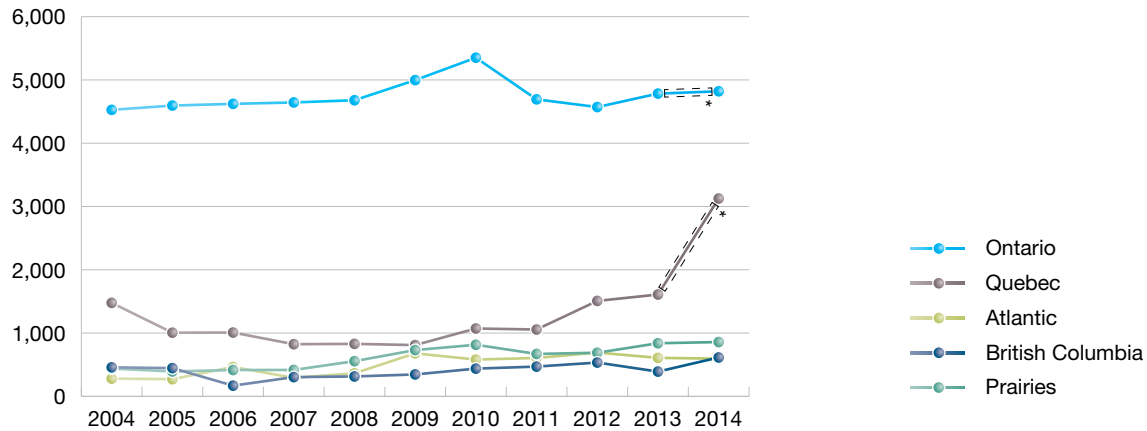
WORKFORCE BY TYPE OF EMPLOYMENT



*The number within the dotted lines corresponds to total workforce included in the annual report as a result of methodological changes.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Workforce	7,179	6,710	6,678	6,481	6,742	7,564	8,256	7,494	7,993	8,231	10,012
Engineers & Scientists	2,679	2,436	2,353	2,144	2,189	2,549	3,103	2,625	2,932	2,887	3,088
Technicians	987	929	1,022	982	1,053	1,222	1,241	1,248	1,503	1,473	1,138

WORKFORCE BY CANADIAN REGION: 2004-2014



*The numbers within the dotted lines correspond to workforce by Canadian region included in the annual report as a result of methodological changes.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
B.C.	458	446	169	303	314	346	438	470	534	391	614
Prairies	438	393	416	419	557	731	815	670	689	839	858
Ontario	4,525	4,595	4,622	4,644	4,679	4,997	5,415	4,693	4,571	4,793	4,820
Quebec	1,479	1,006	1,008	824	829	810	1,008	1,056	1,508	1,609	3,126
Atlantic	280	271	464	291	364	680	581	606	692	608	595
Total	7,179	6,710	6,678	6,481	6,742	7,564	8,256	7,494	7,993	8,240	10,012

THE *STATE OF THE CANADIAN
SPACE SECTOR REPORT* PROVIDES
INSIGHT FOR DECISION-MAKERS
IN GOVERNMENT AND INDUSTRY
TO HELP MAKE INFORMED,
STRATEGIC CHOICES
FOR THE FUTURE.



CANADIAN SPACE AGENCY

JOHN H. CHAPMAN
SPACE CENTRE

6767 Route de l'Aéroport
Saint-Hubert, Quebec J3Y 8Y9
Canada

www.asc-csa.gc.ca

