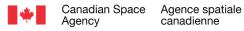
Departmental Results Report 2023–24

Canadian Space Agency

The Honourable François-Philippe Champagne, P.C., M.P.

Minister of Innovation, Science and Industry





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Canadian Space Agency's 2023–24 Departmental Results Report: At a glance

A departmental results report provides an account of actual accomplishments against plans, priorities and expected results set out in the associated Departmental Plan.

- Vision, mission, raison d'être and operating context
- Minister's mandate letter

Key priorities

The CSA's top priorities for 2023–24 were as follows:

• Propelling space exploration through the Lunar Program

The Canadian Space Agency (CSA) provided a wide range of funding opportunities for future Canadian science and technology activities in lunar orbit, on the Moon's surface, and beyond. Training for the first Canadian to travel to the Moon, development of a <u>lunar rover</u>, and conception of a state-of-the-art robotic system took place in 2023–24.

Adapting to climate change with space-based data

The Government of Canada announced \$1.012 billion in funding of the RADARSAT+ initiative to maintain and increase the availability of SAR data to Canadians, which has enabled the CSA to prioritize the continued delivery of satellite Earth observation data to its national and international partners. Data from Earth Observation (EO) satellites is used by national and international partners in their efforts to monitor the environment – including Canada's vast forests, lakes and territories. It is also essential for the advancement of scientific knowledge, information and projections that underpin climate change adaptation and mitigation efforts. Finally, Canada's satellite EO data enhances our national and international partners' emergency response capacity.

• Leveraging deep-space health and food innovations

Technologies developed for space exploration have the potential of being adapted for use in both space and on Earth, for example in applications within Northern and remote communities, where distance and harsh environments can lead to similar challenges. Activities like the Deep Space Food Challenge, the Deep Space Healthcare Challenge and the Health Beyond initiative advanced technologies that contribute to the development of low-input food production systems and remote health care here on Earth as well as in space. The CSA has also funded the development of biomedical analysis technologies to help monitor astronauts' health while on the International Space Station (ISS) which can also be used to monitor health in remote regions.

Building a resilient economy

The global space sector is forecasted to continue growing over the next decade, underlining the potential for further economic opportunities for Canadian firms, science and technologies. Considering this projected growth, CSA funding programs provided opportunities for the Canadian space industry and academia to scale up and compete on the global market. The Space Technology Development Program (STDP) continued supporting the development of innovative technologies with strong commercial potential while the Lunar Exploration Accelerator Program (LEAP) provided a wide range of opportunities for Canadian lunar science and technology activities. The smartEarth initiative helped support Canadian organizations as well as universities and post-secondary institutions working on Satellite Earth Observation applications through investments. Building on the existing Canadian innovation ecosystem, the CSA continued the development of SpaceHub, a collaborative approach that would seek to position Canadian SMEs for success in global supply chains. The CSA has optimized its workspace and modernized its lab equipment for better service offerings to help the innovators develop their capacity or space solutions.

As part of meeting the commitment of Refocusing Government Spending, in 2023–24, the CSA reduced its spending by \$8M by:

- Reducing professional services expenses, specifically consultants in management; and
- Reducing investments in CSA's existing space capacity development funding programs and activities.

Highlights

In 2023–24, total actual spending (including internal services) for the CSA was \$450,747,210 and total full-time equivalent staff (including internal services) was 937 FTE. For complete information on the CSA's total spending and human resources, read the <u>Spending and human resources section</u> of the full report.

The following provides a summary of the department's achievements in 2023–24 according to its approved Departmental Results Framework. A Departmental Results Framework consists of a department's core responsibilities, the results it plans to achieve and the performance indicators that measure progress toward these results.

Core responsibility 1: Canada in Space

Actual spending: \$371,378,033

Actual human resources: 507.7

Departmental results achieved

- Canada remains a leading space-faring nation
- Space information and technologies improve the lives of Canadians
- Canada's investments in space benefit the Canadian economy

Canada remains a leading space-faring nation

Investing in space fosters innovation and stimulates economic growth, propelling Canada to a brighter future. Space exploration also advances technological breakthroughs that can have tangible applications that improve the lives of Canadians here on Earth. Canadian astronaut Jeremy Hansen will be one of the four astronauts to go around the Moon before coming back to Earth. Canadian astronaut Jenni Gibbons has been announced as Jeremy Hansen's official backup. In 2023–24, the design work of Canadarm3 continued. The robotic system will be an integral element of the NASA-led Lunar Gateway, an international space station that will orbit the Moon and that will be essential for supporting a sustained human presence on the Moon. Joshua Kutryk, another CSA astronaut was also assigned a mission in 2023–24 as part of Canada's fourth long duration flight to the International Space Station.

The CSA's contribution to the <u>James Webb Space telescope</u> (JWST), the most powerful and complex space observatory that has ever existed, continued to yield benefits for Canadian researchers in 2023—24. It earned them allocated time to use the JWST to delve deeper into the origins of the universe, advancing Canada's world-class expertise in astronomy. The CSA's expertise in planetary exploration was notably demonstrated via the CSA's participation in the <u>OSIRIS-REx</u> mission to bring a sample from asteroid Bennu back to Earth. This significant achievement will lead to Canada becoming the fifth country in the world to receive and curate a sample collected in space.

Space information and technologies improve the lives of Canadians

To ensure the continuity of essential EO satellite data, the Government announced \$1.012 billion in funding for the RADARSAT+ initiative to ensure the continuation and resiliency of the RCM system, as well as to start the development of a next-generation RADARSAT system for Canada. These efforts will ensure that federal organizations can continue to use EO data to deliver a variety of quality services to Canadians. Access to quality EO data is key to make informed science-based decisions. Throughout 2023–24, RADARSAT-2, the RADARSAT Constellation Mission (RCM), and SCISAT provided useful Earth Observation (EO) data that met the needs of governments, industry and academia around the world. The CSA also advanced the development of its three other recently announced EO satellite missions, including WildFireSat, Canada's first satellite to monitor wildfires; SWOT, which will be able to monitor a wide range of water body types; and, HAWC, which will be a part of NASA's Atmosphere Observing System and will provide information on aerosols, clouds, convection, and precipitation. EO data from the CSA's satellites has been instrumental in supporting various services from Canadian government agencies, including those related to natural disaster response, ecosystem monitoring, and national security.

Canada's investments in space benefit the Canadian economy

Space sparks innovation, generates transformative technologies and drives economic growth. Throughout 2023–24, the CSA funded innovative ideas stemming from the Canadian space industry through the <u>STDP</u> to help Canadian companies to scale up and thrive in this fast-paced market. The program provided contributions to Canadian organizations to support the development of innovative technologies with strong commercial potential. The CSA's expertise in space robotics and technology positions Canada as a sought-after partner in international space exploration endeavours. The <u>LEAP</u> initiative offered a wide range of opportunities for science and technology activities such as the development of a Canadian Lunar Rover Mission (LRM).

With the objective of enhancing the competitiveness of Canadian industry and generating growth and economic benefits for Canadians, the CSA launched a new wave of investments under the smartEarth initiative umbrella. smartEarth supports Canadian organizations, including universities and post-secondary institutions, to develop new applications using Canada's wealth of satellite EO data. The CSA also continued to support the development of Canada's next-generation space workforce by fostering interest in STEM through youth activities and by providing access to training and career development opportunities to postsecondary students.

More information about <u>Canada in Space</u> can be found in the "Results – what we achieved" section of the full departmental results report.

The Canadian Space Agency's 2023–24 Departmental Results Report On this page

- From the Minister
- Results what we achieved
 - o Core responsibility 1: Canada in Space
 - Internal services
- Spending and human resources
 - Spending
 - o **Funding**
 - o <u>Financial statement highlights</u>
 - o <u>Human resources</u>
- Corporate information
- Supplementary information tables
- Federal tax expenditures
- Definitions

From the Minister

It is our pleasure to present the 2023–24 Departmental Results Report for the Canadian Space Agency (CSA).

Throughout the past year, the Innovation, Science and Economic Development Canada (ISED) Portfolio worked closely with other government departments and agencies to build a more resilient, sustainable and inclusive economy that benefits all Canadians.

The year 2023–24 was an exciting chapter in our space history, with not one but two missions announced for CSA astronauts. In April 2023, CSA astronaut Jeremy Hansen was officially announced as part of the crew of the historic Artemis II mission to the Moon, with CSA astronaut Jenni Gibbons acting as his official back-up. Another CSA astronaut, Joshua Kutryk, is slated to undertake Canada's fourth mission to the International Space Station (ISS). Canada is also playing an important role in humanity's return to the Moon. We are notably a partner in the next major international collaboration in human space exploration, a space station called Gateway that will orbit the Moon. Canada's flagship contribution to Gateway is Canadarm3, a sophisticated robotic system that will use cutting-edge software to perform some tasks around the Moon autonomously and without human intervention. We are also building on decades of Canadian expertise in rover technology by developing the very first Canadian rover set to explore the Moon, but also a multi-purpose utility rover to support logistics, crew operations and science on the lunar surface as part of NASA's Artemis program.

This year, much progress was made on delivering on the <u>Satellite Earth Observation (SEO) Strategy, as well as advancing concrete</u> space-based solutions and tackling Earth's greatest challenges. In October 2023, an investment of over \$1 billion was announced for <u>RADARSAT+</u> to support immediate and future Earth Observation (EO) data needs. This investment, along with <u>WildfireSat</u> and <u>High-altitude Aerosols, Water vapour and Clouds</u> (HAWC), will help to address the impacts of climate change, responding to natural disasters, and keep Canadians safe and our borders secure.

To continue helping to grow the Canadian space sector, different CSA funding initiatives, like the <u>Space Technology Development Program</u> (STDP), the <u>Lunar Exploration Accelerator Program</u> (LEAP) and the <u>smartEarth</u> initiative, provided opportunities for the Canadian space industry and academia to scale up and compete on the growing global market.

We invite you to read this report to learn more about how the ISED Portfolio is working together with Canadians of all backgrounds and in all regions—urban and rural—to position Canada as a leader in the global economy.



Minister of Innovation, Science and Industry

The Honourable François-Philippe Champagne

Results – what we achieved

Core responsibilities and internal services

- Core responsibility 1: Canada in Space
- Internal services

Core responsibility: Canada in Space

In this section

- Description
- Progress on results
- Key risks
- Resources required to achieve results
- Related government-wide priorities
- Program inventory

Description

The CSA coordinates the space policies and programs of the government of Canada; ensures that other government departments and agencies have access to space data, information, and services to deliver on their mandates; plans, directs and manages projects relating to scientific or industrial space research and the development of space science and technology; promotes the transfer and diffusion of space technology to and throughout Canadian industry; and encourages commercial exploitation of space capabilities, technology, facilities and systems. The CSA also aims to build Canada's capacity and engage

the next generation of space scientists and engineers, and provide opportunities to inspire young people to pursue studies and careers in science, technology, engineering and math.

Progress on results

This section presents details on how the agency achieved results and met targets under the Canada in Space core responsibility. Details are presented by departmental result. The table below tracks the CSA's Departmental Result Indicators and the targets identified. The CSA exceeded the target to rank 25th among OECD and BRIC nations in terms of civilian space budget as a share of GDP. Canada's rank declined among OECD nations in terms of the citation score of Canadian space-related publications. The number of Canadian technologies adapted for re-use declined in 2023-24 after exceeding the target the previous year. Services dependent on data from space increased this year to just below the targeted number. Finally, the space sector's contributions to Canada's economy exceeded targets with incremental growth over last year's metrics.

Table 1: Targets and results for Canada in Space

Table 1 provides a summary of the target and actual results for each indicator associated with the results under Canada in Space

Result 1: Canada remains a leading spacefaring nation

Departmental Result Indicators	Target	Date to achieve target	Actual Results
Canada's rank among Organization for Economic Co- operation and Development nations on the citation score of space-related publications	13	March 31, 2024	2021–22: 15 2022–23: 20 2023–24: 21
Ranking of Canadian Government civil space budget as a share of GDP among OECD and BRIC nations	25	March 31, 2024	2021–22: 27 2022–23: 22 2023–24: 21

Result 2: Space information and technologies improve the lives of Canadians

Departmental Result Indicators	Target	Date to achieve target	Actual Results
Number of Canadian space technologies adapted for use on earth or re-use in space	34		2021–22: 25 2022–23: 41 2023–24: 31
Number of services offered to Canadians dependent on space data	111		2021–22: 101 2022–23: 101 2023–24: 107

Result 3: Canada's investments in space benefit the Canadian economy

Departmental Result Indicators	Target	Date to achieve target	Actual Results
Value of gross domestic product (GDP) of the Canadian space sector	\$2.7B	·	2021–22: \$2.7B 2022–23: \$2.8B 2023–24: \$3.2B
Number of employees in the Canadian space sector	11,500	•	2021–22: 10,868 2022–23: 11,629 2023–24: 12,624

Additional information on the detailed results and performance information for the CSA's Departmental and program inventory is available on <u>GC InfoBase</u>.

Details on results

Investing in space fosters innovation and stimulates economic growth, propelling Canada to a brighter future. Furthermore, space exploration advances technological breakthroughs that can have tangible applications here on Earth, improving the lives of Canadians. This Departmental Results Report focuses on three departmental results that supported the CSA's Canada in Space core responsibility. The following section compares the actual results for Canada in Space with the planned results set out in the CSA's 2023–24 departmental plan.

Result 1: Canada remains a leading spacefaring nation

<u>Artemis II</u> will be the first crewed mission to the Moon since 1972. Canadian Jeremy Hansen will be one of the four astronauts to go around the Moon before coming back to Earth. Artemis II will be a key step in advancing the ambitions of Canada and its international partners to support human spaceflight and exploration in lunar orbit and beyond. Canadian astronaut Jenni Gibbons has been announced as Jeremy Hansen's official backup. Crew training began in June 2023, and it includes nominal and contingency

tasks that allow the astronauts to be successful on their journey to the Moon and back. The astronauts have been learning how to operate and monitor systems of the Orion spacecraft, to perform tasks in microgravity as well as to survive in hostile environments.

In 2023–24, the design work of <u>Canadarm3</u> continued. The robotic system will be an integral element of the NASA-led <u>Lunar Gateway</u>, an international space station that will orbit the Moon and that will be essential for supporting a sustained human presence on the Moon. The Government of Canada (GoC)'s <u>Industrial and Technological Benefits Policy</u> was applied to the procurement of Canadarm3 to maximize Canadian know-how and expertise in the design and development of this technology, while stimulating growth in the broader economy.

Image 1 : Destination Moon

Jeremy Hansen and Jenni Gibbons during their training for the Artemis II lunar mission, learning to prepare for a potential emergency exit from the Orion spacecraft after splashdown.

(Credit: NASA/James Blair)

The CSA also supported new cutting-edge Canadian research to help the country remain a leading spacefaring nation through its <u>Research Opportunities in Space Science</u> (ROSS) funding initiative. In 2023–24, the CSA awarded two dozen grants to post-secondary institutions to advance projects using space data in the fields of planetary science, solar terrestrial sciences, atmospheric science, and Earth system sciences. The project topics range from understanding the exosphere of Mercury and the Moon, to how space weather impacts Canadian society, to how Earth's atmospheric composition and surface processes affect our planet's changing climate.

The CSA has also been leveraging the inspiring nature of its space exploration activities to encourage young Canadians to pursue careers in space. In 2023–24, the CSA was able to engage 39,807 youth with kindergarten to grade 12 (K-12) focused activities as part of the Objective: Moon initiative. An additional 46,276 youth were reached through 61 school presentations with CSA Astronauts and experts. The CSA's K-12 activities aimed to increase access to space for young minds in equity deserving communities. Considering geography, access to technology, cultural relevance and world views, broadband connectivity as well as gender, the CSA has provided engagement supports to ignite learners' potential and connect to Canada's space endeavours. Speaker presentations reached 20,530 youth from





underrepresented communities, 745 of whom were indigenous.

In November 2023, Canadian astronaut Joshua Kutryk was announced as a mission specialist to Canada's fourth long-duration mission to the International Space Station (ISS), where he will live and work for a planned period of 6 months. He will be the first CSA astronaut to fly under NASA's Commercial Crew Program, a partnership with the private sector that uses a newgeneration spaceship and launcher.

The <u>Canadarm2</u>, <u>Dextre</u> and the <u>Mobile Base</u>
<u>System</u> successfully performed inspections and surveys on ISS as well as capture and berthing of

visiting vehicles, as demonstrated by a <u>cosmic catch</u> of a cargo ship of over 8,200 pounds of critical supplies, food and equipment for the astronauts on the ISS.

Since its launch in 2021, the James Webb Space Telescope (JWST) and its magnificent images have revolutionized our understanding of the cosmos. The JWST allows people around the world to enjoy never-before-seen pictures of cosmic phenomena, invisible to the human eye. Thanks to the CSA's contributions - the Near-Infrared Imager and Slitless Spectrograph (NIRISS) and the Fine Guidance Sensor (FGS) – Canadian astronomers receive a guaranteed share of JWST's observation time, pushing Canadian astronomy to new heights. The CSA continued to support Canadian astronomers through its series of Announcements of Opportunity (AO) for JWST General Observers (GO) projects. The CSA funded 28 new projects for the JWST second cycle of observations, for a total of \$1.7 million. The CSA also actively contributes to the successful operation of the JWST by contributing scientific and technical personnel to the mission's operation centre.

Image 3: Rho Ophiuchi cloud complex



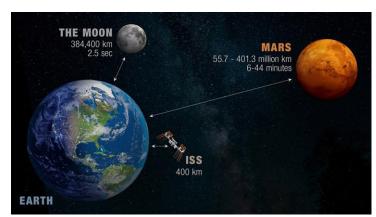
The James Webb Space Telescope captures images full of detailed, impressionistic texture. The Rho Ophiuchi cloud complex depicted here is the closest star-forming region to Earth. Some stars display the telltale shadow of a circumstellar disk, the makings of future planetary systems.

(Credits: Canadian Space Agency, <u>ESA</u>, <u>NASA</u>, <u>STScI</u>, K.Pontoppidan (STScI), Image processing: A. Pagan (STScI))

Activities continue on Mars with NASA's <u>Curiosity</u> rover, which is exploring the surface of the planet. In 2023–24, the rover travelled 1075 metres on the Martian surface and the Canadian provided instrument <u>Alpha-Particle X-ray Spectrometer</u> (APXS) analyzed 133 samples and sent back 334 results to Earth. Studying the dust and rock of Mars is bringing us closer to understanding and finding evidence of past conditions that could once have supported life on the planet.

The year 2023–24 also marked the successful return of samples from the OSIRIS-REX mission after seven

Image 4: From Earth to Mars



This infographic shows the distances between the Earth and the International Space Station as well as the Moon and Mars. It also indicates the communication delay to the Moon and Mars. (Credit: Canadian Space Agency)

years in space. In September 2023, the sample return capsule landed on Earth with a sample of the asteroid Bennu. The Canadian instrument OSIRIS-REX Laser Altimeter (OLA) played a crucial role in this mission: it was used to scan and measure the surface of the asteroid to support the selection of the best site to collect the sample. This contribution earned Canada the opportunity to become the fifth country in the world to obtain a sample collected in space. The CSA worked throughout 2023–24 with Canadian industry to construct a clean room at the John H. Chapman Space

Centre, where Canada's portion of the sample will be housed and made available to researchers after 2025.

Space weather events pose a risk to astronauts and satellites, and they can cause serious damage to infrastructure back on Earth. Monitoring the weather conditions in the near-Earth space environment is key to protecting modern infrastructure such as satellites, power grids, pipelines and radio communications towers. Canada plays a key role in space weather science and monitoring due to its proximity to the North Pole. In 2023–24, the CSA funded the Super Dual Auroral Radar Network (SuperDARN), a network of radars capable of monitoring space weather conditions, and Space Environment Canada (SEC), the world's foremost facility for sensing ionospheric properties and phenomena. These Geospace Observatory (GO) Canada initiatives enabled scientific research and supported the academic community in gathering space weather data from critical locations across the nation which improve our understanding of space weather events.

The <u>Near-Earth Object Surveillance Satellite</u> (NEOSSat), the world's first telescope dedicated to detecting and tracking orbiting space objects, continued operations throughout 2023–24. The microsatellite is helping scientists conduct research on techniques to reduce the risk of collisions and to expand our knowledge of exoplanets. NEOSSat data is the most accessed CSA dataset shared via the GoC Open Data portal and used by astronomers, scientists and students across Canada and the world.

In 2023–24, the CSA continued developing the <u>Quantum Encryption and Science Satellite</u> (QEYSSat) mission, the aim of which is to demonstrate in-space quantum key distribution (QKD), a technology that can support the development of virtually unbreakable encrypted communications. Currently in its implementation phase, this mission will allow Canadian scientists to study how QKD behaves between space and the Earth supporting the exchange of encryption keys over long distances.

In order to remain a leading spacefaring nation, Canada needs to ensure that the next generation of Canadian space specialists have the opportunities they need to develop their expertise. In June 2023, under the CUBICS initiative, the CSA awarded nine grants, representing \$3.15 million over three years,

to Canadian post-secondary institutions to advance space science and technology while training the next generation of space experts. CUBICS provides students the opportunity to work on an end-to-end space mission where they design and build their own miniature satellites. The selected projects aim to increase scientific knowledge to better understand climate change. CUBICS is the successor to the Canadian CubeSat Project (CCP), which was successfully concluded in 2023–24. The last three CubeSats were finalized at the CSA headquarters in November 2023 and successfully launched onboard the SpaceX Dragon cargo vehicle at the end of March 2024. Through CCP, 14 CubeSats from 12 universities and two colleges were launched, and more than 2,000

Image 5: SpaceX Dragon Cargo launch



Carrying thousands of kilograms of equipment, SpaceX's Dragon cargo ship flies towards the International Space Station, leaving behind a trail of light in the sky. (Credit: SpaceX)

Canadian students were trained to be the next generation of space Highly Qualified Personnel (HQP) in Canada.

The Canadian academic community also benefited from the CSA's <u>STRATOS</u> stratospheric balloon program. This program provides flight opportunities to test and validate new technologies and perform scientific experiments in a near-space environment. In August 2023, four <u>zero-pressure balloons</u> were launched from the <u>Timmins Stratospheric Balloon Base</u> in Ontario. The <u>Strato-Science 2023 campaign</u> allowed teams from five Canadian universities and colleges involving more than 100 students to fly seven Canadian payloads in atmospheric science, astronomy and space surveillance. These teams, composed of professors and their students, with participation from the local community, were able to conduct and validate their research in the field and train the next generation of experts.

The CSA has continued working closely on the NASA-led <u>Atmosphere Observing System</u> (AOS), and more specifically on the Canadian <u>HAWC</u> mission. HAWC is tailored to provide critical data to support the science behind extreme weather prediction, climate observation and monitoring of natural disasters. In 2023–24, the CSA awarded six contracts to industry and academia to mature the technologies for the mission and prepare universities to manage and integrate data when they become available. Instrument prototypes were also flown on a high-altitude aircraft to collect scientific data and to validate both capabilities and measurement techniques.

The CSA continues to leverage its expertise in Earth Observation (EO) by making Synthetic Aperture Radar (SAR) data available to the international community as part of its commitment to the International Charter "Space and Major Disasters." Specifically, SAR data from the RADARSAT Constellation Mission (RCM) and RADARSAT-2 were shared to support disaster management and relief efforts. Expertise in SAR data positions Canada as a leader through various international partnerships. In October 2023, the CSA took on the role of Leading Agency for the International Charter "Space and Major Disasters" alongside the European Organisation for the Exploitation of Meteorological Satellites. Canada provides EO images for over 80% of the charter activations each year and taking on the leadership role for a six-month period further demonstrated Canada's commitment to this humanitarian aid initiative.

Summary of results achieved

- CSA astronaut Jeremy Hansen was announced as the first Canadian to fly on a ten-day journey to and around the Moon in the <u>Artemis II mission</u>.
- The CSA continued the development of <u>Canadarm3</u> for the lunar Gateway, preparing to send humans deeper into space than we have ever been.
- CSA astronaut Joshua Kutryk was announced as the Canadian astronaut to take part in the longduration mission to the ISS.
- Canadian researchers used allocated time of the <u>JWST</u> to study the universe, pushing Canada's world-class expertise in astronomy even further.
- The <u>OSIRIS-REx</u> sample return capsule successfully landed back on Earth and the CSA is developing a facility to prepare for the proper curation of the sample.

Result 2: Space information and technologies improve the lives of Canadians

Access to Earth Observation (EO) data is critical for the GoC to make science-based decisions in many fields, such as adapting to climate change, resource management, infrastructure, and disaster response.

Canada's vast territory and remote regions create unique and ongoing EO data. In October 2023, RADARSAT + was announced, representing an investment of \$1.012 billion over the next 15 years. RADARSAT+ will allow Canada to maintain and increase the availability of SAR data to Canadians by extending the operational life of RCM and carrying out early-stage studies to identify a next-generation SAR satellite system. This investment will help maintain Canada's ability to monitor its territory day and night

Image 6: RADARSAT at the service of Canadians



RADARSAT data enables faster and safer travel on sea ice for northern communities.

and in all weather using C-band SAR satellites, and builds on 25 years of Canada's legacy in SAR through RADARSAT-1, RADARSAT-2 and RCM.

CSA representatives joined discussions at the Space Agencies Leaders' Summit on December 4, 2023, held during the United Nations Climate Change Conference of Parties under the United Nations Framework Convention on Climate Change to discuss the important role that satellites and space-based science and monitoring play in efforts to monitor and combat the impacts of climate change.

In 2023–24, the RCM data significantly contributed to services across various sectors. For example, Natural Resources Canada (NRCan) leveraged satellite-derived flood extents to support national and international emergency response, collaborating with federal departments, and provincial emergency agencies to manage disasters. Similarly, Agriculture and Agri-food Canada (AAFC) produces the Annual Space-Based Crop Inventory (ACI), an invaluable tool for mapping Canada's agricultural landscape. This data supported the evaluation of agricultural sustainability, informed the National Inventory Report on greenhouse gases, and aided in drought monitoring and crop yield assessments, ensuring timely responses to weather-related risks. These services reflect the critical role of RCM data in enhancing government capacity to respond effectively to natural disasters, improve resource management, and develop informed policies that benefit Canadians.

With increasing needs for SAR satellite data, the CSA investment in RADARSAT-2 is still supporting government departments' service delivery by fulfilling additional needs that could not be covered by RCM. For example, the Department of Fisheries and Oceans (DFO) utilized RADARSAT-2 data in its Dark Vessel Detection program to identify undetectable vessels engaging in illegal, unreported, and unregulated (IUU) fishing. This capability enhances ocean ecosystem protection and supports Canada's leadership in achieving the United Nations Sustainable Development Goal 14. As RADARSAT-2, the precursor to the RCM, provided invaluable historical insights, it laid the foundation for more advanced

monitoring capabilities now realized through the RCM. Additionally, access to some RADARSAT-1 data was also available to public users through NRCan's Earth Observation Data Management System.

Ensuring the continuity of the science and services that depend on Canada's SAR satellites remains a core objective of Canada's <u>Satellite Earth Observation (SEO) Strategy</u>, developed in partnership with Environment and Climate Change Canada (ECCC) and NRCan.

In 2023–24, the CSA also worked with industry to define the best implementation approach to the <u>WildFireSat</u> mission. The Canadian-developed WildFireSat is being carried out in partnership with ECCC and NRCan. Once operational, WildFireSat will provide near-real-time data at least twice a day in support of wildland fire management and research, improving Canada's ability to defend Canadian communities and better protect our resources, infrastructure, and environment by providing better situational awareness regarding wildfires, particularly near inhabited areas.

Launched in 2022, the NASA/CNES-led <u>Surface Water and Ocean Topography</u> (SWOT) mission monitors 90% of Earth's surface water, and provides high-value data that will help to improve marine safety and security, water management, responsible resource development, environmental monitoring, fisheries, climate change adaptation and marine transportation. The <u>first public release</u> of SWOT data was made in December 2023 and images from the <u>RCM</u> were used to calibrate and validate SWOT data over inland waters. Through shared investments with ECCC and the Department of Fisheries and Oceans Canada (DFO), the CSA also enabled Canadian scientists to lead field measurement campaigns to validate SWOT data over Canadian waters, including a major campaign in the St. Lawrence estuary. Scientists took ground and airborne measurements that will contribute to the validation of SWOT data over a range of water body types, such as lakes, rivers, estuaries and coastal zones.

In August 2023, SCISAT celebrated its 20 years of operations – 10 times the satellite's originally intended lifetime. National and international researchers all reported on the unique measurements used in monitoring international environmental treaties, advancing numerical climate and chemistry models, comparing and merging with multiple other satellite datasets, and in discovering climate and atmospheric chemistry processes. SCISAT continues to provide the most accurate measurements currently available of chemicals that affect ozone, the stratosphere's layer that protects humans and living organisms from the Sun's ultraviolet radiation. Its unique profile data continues to contribute directly to our understanding of ozone recovery, ozone-climate coupling, and helps scientists better understand the interaction between air pollution and ozone chemistry. During 2023–24, SCISAT data were used to discover a new chemical process that links wildfire smoke to ozone depletion, a process that could delay recovery in a warming world. The mission science team also released a new dataset, which includes multiple new data products focused on HFC substances now regulated by the UN Montreal Protocol, including difluoromethane (HFC-32). SCISAT remains the only satellite in the world with a 20-year data record of multiple atmospheric species, including HFCs.

As Canada prepares to send humans on deep space missions, the CSA is investing in science and technology that will keep astronauts safe and healthy for longer-duration missions while also driving socioeconomic benefits here on Earth. In 2023–24, the CSA launched and completed two Challenge Prizes: the Deep Space Healthcare Challenge and the Deep Space Food Challenge. This leveraged Canadian expertise in healthcare technologies and food production technologies to prepare for the challenging endeavour of looking after the health and well-being of astronauts on their missions to space. Technologies developed for space exploration have the potential to be adapted for use both in

space and on Earth. For example, these technologies could be applied in Northern and remote communities, where distance and harsh environments can lead to similar challenges. In 2024, the winner of the Deep Space Healthcare Challenge was announced. The winning technology, EZResus, is an application that streamlines the information needed by emergency personnel in the critical first hour of resuscitation, from diagnosis to required drug dosage and equipment. As a direct result of the Challenge funding and consultation with Community Advisors from Indigenous Services Canada on the needs and challenges faced by remote community healthcare practitioners, EZResus is now being used to help save lives on Earth. The application will contribute to meaningful detection and diagnosis in space, paving the way for contributions to future human space exploration missions while enhancing healthcare delivery on Earth. The winning technology for the Deep Space Food Challenge was also announced in 2024. The CANGrow Modular Indoor Food Production System uses an innovative approach to grow a variety of produce and high-quality protein sources with minimal resources, and may be the solution to food insecurity in both isolated regions here on Earth and on long-duration missions in space. As a direct result of the Challenge, the winning team founded two companies based on their Challenge solution and raised \$2.3 million in first-round investments to expand food production and accelerate its research and development activities. Following the conclusion of the first Deep Space Food and Healthcare Challenges, the CSA launched a new Challenge Prize in January of 2024 called the Aqualunar Challenge. It is being carried out in collaboration with the UK Space Agency and Challenge Works, and it seeks to develop new water purification technologies to remove potential contaminants found in water ice on the Moon – an important endeavour to support sustained human presence on the Moon.

Under the Health Beyond initiative, deep-space healthcare technologies were also demonstrated and assessed via a testing phase. In 2023–24, prototypes for the flagship Connected Care Medical Module (C²M²) were delivered to the CSA, to advance the concept of a health care delivery system that could solve challenges of astronauts' healthcare in deep space missions. The C²M² is a plug-and-play architecture that will enable multiple configurations of the latest medical technologies so that users can independently detect, diagnose, treat, and/or monitor health conditions in a modular setting. This could help improve the timeliness, quality, and continuity of care, refines clinical decision-making, and could reduce the occurrence of risky and expensive medical transportation of patients from remote regions to urban hospital facilities.

Canada's participation in the ISS since the year 2000 has offered Canadian scientists the opportunity to lead or collaborate on more than 100 research projects conducted in this orbiting laboratory. Much of this research has focused on health issues faced by astronauts in low- or zero-gravity, which can be similar to issues faced by aging or inactive populations on Earth, including impacts on the cardiovascular system, bone loss or brain function. At the same time, the CSA has funded the development of biomedical analysis technologies to help monitor astronauts' health while on the ISS. These technologies can also be used to monitor health in remote regions without clinical infrastructure. These include the TBone2, which refines our understanding of bone loss in microgravity, similar to accelerated osteoporosis; the SANSORI project, which investigates how spaceflight affects vision, and may help to advance research on glaucoma; and the CARDIOBREATH project, which investigates how the interaction of heart, lungs and blood circulation is affected by spaceflight, using real-time monitoring methods. All these experiments currently collect data on ISS crewmembers and will generate new knowledge on health issues faced by humans on Earth. In March 2024, commercial spacecraft launched to the ISS to transport equipment, such as the Bio-Monitor and Mobil-O-Graph hardware, for the Canadian Vascular

<u>Aging, Vascular Calcium</u>, Space Health and <u>CARDIOBREATH</u> investigations. The launch also included seeds for the CSA-led educational project <u>Tomatosphere</u>TM. Seeds from the Tomatosphere project returned to Earth to be distributed to thousands of classrooms across Canada and the United States for students to gain first-hand experience using the scientific method by growing tomato plants.

The space environment presents substantial health risks to astronauts. To mitigate these risks, astronauts must adhere to specially crafted exercise protocols. In 2023–24, the CSA initiated testing of new exercise measures to counteract and address cardiovascular and metabolic health risks. These new protocols have the potential to significantly reduce the health impacts of sending crew on long-duration missions. Additionally, they will inform guidelines on Earth to address the effects of sedentary lifestyles and enhance rehabilitation after an injury.

Summary of results achieved

- The GoC announced funding of the RADARSAT+ initiative to ensure SAR data continuity underpinning services to Canadians.
- Data from the <u>RCM</u> and <u>RADARSAT-2</u> continued to allow Canada to help support disaster management and relief efforts.
- The CSA supported the calibration/validation of SWOT data by acquiring and providing the SWOT mission over 100 high-quality SAR images from the RCM.
- The CSA focused advanced planning and development work to determine the best implementation approach to the WildFireSat mission.
- The CSA awarded six contracts to industry and academia to help further develop the HAWC mission, which aims to support the science of extreme weather prediction, climate observation and monitoring of natural disasters.
- The <u>SCISAT</u> mission allowed the discovery of a new chemical process that links wildfire smoke to ozone depletion.
- The C²M² prototypes were delivered to the CSA, bringing Canada closer to the creation of a health care delivery system in remote environments.

Result 3: Canada's investments in space benefit the Canadian economy

For over 20 years, the CSA's <u>Space Technology Development Program</u> (STDP) has fuelled innovation in Canada's space industry and reduced technological unknowns. In 2023-24, the CSA invested \$15 million in STDP funding for research and development of innovative space technologies. This funding was awarded to 27 Canadian companies, including 22 Small and Midsize Enterprises (SMEs). This included the first phase of developing <u>concepts for potential Moon infrastructure</u>. Of the seven concept studies that were completed, six were deemed ready to advance to the prototyping phase, with \$3 million in funding awarded to four Canadian companies.

Under the <u>Lunar Exploration Accelerator Program</u> (LEAP), the preliminary design of the <u>Lunar Rover</u> <u>Mission</u> (LRM) was completed in 2023–24. With a scheduled launch in 2026–27, the LRM aims to explore

the lunar south pole, assess lunar surface radiation, and seek water ice. This work also involved the issuance of a request for proposals for a Canadian science instrument. The instrument will conduct science on the lunar surface while advancing technologies that position Canada to play an important role in future lunar exploration missions.

In September 2023, the Research Opportunities in Satellite Earth Observation (ROSEO) announcement of opportunities was launched to support Canadian universities and post-secondary institutions working on Satellite Earth Observation application development projects, which use satellite data and contribute to the objectives of Canada's Strategy for Satellite Earth Observation. Through this smartEarth initiative, Canadian academic institutions will be better equipped to train the highly qualified personnel (HQP) of tomorrow and advance the application readiness levels of their projects. Concluded in 2023–24, the smartWhales initiative enabled Canadian industry to partner with academia and non-governmental organizations to advance innovative solutions using SEO data to enhance the Government of Canada's ability to protect North Atlantic right whales (NARW) in Canadian waters. The CSA also advanced another smartEarth initiative in 2023–24 called smartHarbour. smartHarbour will allow Canadian companies to develop innovative SEO data-based applications that track environmental variables that are important for conserving the biodiversity of natural habitats in support of the Port of Montreal expansion in Contrecœur. Four research and development contracts, totalling \$4 million, were awarded to Canadian companies as part of smartHarbour in 2023–24.

In 2023–24, the CSA continued to facilitate access to the European market for the Canadian space industry through the 2020–30 Canada-ESA Cooperation Agreement. Canadian involvement in ESA missions has played an important role in developing Canadian expertise in Earth Observation and in establishing Canada as a world leader in space-based Synthetic Aperture Radar (SAR) technology. In 2023–24, 52 Canadian organizations participated in ESA projects that involved 199 Highly Qualified Personnel (HQP) of whom 58 were early-career professionals. Furthermore, 36 technologies advanced their Technology Readiness Levels (TRL) or Application Readiness Levels (ARL), demonstrating the ongoing impact of the Canada-ESA partnership in driving technological progress. As an example of this cooperation, Canadian companies have secured \$9.9 million in contracts for space technology development and work related to two ESA missions: BIOMASS and FORUM.

Space is congested, contested and competitive. To ensure that Canada's space-related regulations are keeping pace with the rapidly evolving and highly innovative global space sector, the CSA worked with governmental partners to review Canada's regulatory framework for space-related activities. Following a public consultation where Canadians were invited to share their views, the CSA published the What we heard report: Consulting Canadians on a modern regulatory framework for space in December 2023.

In 2023–24, in order to align with a rapidly changing space ecosystem, the CSA continued preparatory and planning work to advance CSA's Space Hub. Its mission is to establish a network of experts and facilities to help Canadian innovators develop their space solutions by connecting scientists and entrepreneurs.

Summary of results achieved

 Through the <u>STDP</u>, the CSA awarded \$15 million to 27 Canadians companies to advance R&D for 28 advanced space technology projects.

- The CSA completed the preliminary design of the <u>LRM</u>, an instrument that will seek water ice on the surface of the Moon.
- The CSA launched a new wave of investments under the <u>smartEarth</u> initiative to help support Canadian organizations as well as universities and post-secondary institutions working on Satellite Earth Observation applications.

Key risks

The CSA's 2023–24 Corporate Risk Profile (CRP) identifies three key risks facing the organization related to talent, cybersecurity, and innovation.

Talent: The Talent Risk refers to the potential hazard arising from a shortage of qualified resources and challenges in recruiting individuals with the appropriate profiles for various positions at the CSA. Since its identification in 2021–22, the CSA has implemented a variety of mitigation measures such as a Strategic Workforce Management Plan, a Departmental Recruitment Strategy along with Employment Equity hiring objectives, and the creation of pools of qualified candidates.

Cybersecurity: The risk that aging information technology (IT) infrastructure, cyber attacks on high-tech space assets and data can lead to a disruption of services to Canadians. The CSA's IT security team approach enhanced the CSA's resilience against cyber threats by allowing for the anticipation and mitigation of potential risks before they materialize.

Innovation: Embracing innovation is crucial for maintaining the CSA's relevance and competitiveness in the rapidly evolving space sector. By including the Innovation risk within its CRP, the CSA aimed to foster a culture of innovation and continuous improvement, allowing for the exploration of new ideas and approaches within its internal services. As part of those efforts, the CSA initiated a strategic plan on innovation and experimentation. Additionally, certain business processes are currently being reviewed to enhance efficiency, ensure alignment with strategic objectives, and optimize its operational processes.

Resources required to achieve results

Table 2: Snapshot of resources required for Canada in Space

Table 2 provides a summary of the planned and actual spending and full-time equivalents (FTEs) required to achieve results.

Resource	Planned	Actual
Spending	476,342,693	371,378,033
Full-time equivalents	466.1	507.7

<u>Complete financial</u> and <u>human resources information</u> for the CSA's program inventory is available on GC InfoBase.

Related government-wide priorities

Gender-Based Analysis Plus

In 2023–24, the CSA continued to execute the Action Plan outlined in the evaluation of the implementation of <u>Gender-Based Analysis Plus</u> (GBA Plus) to further integrate GBA Plus into internal processes and decision-making. Moreover, as part of the action plan, the CSA renewed its GBA Plus Policy to align more closely with Women and Gender Equality (WAGE) Canada's enhanced vision of GBA

Plus. The CSA's updated policy highlights the intersectional analysis of race, indigeneity, rurality, disability, and sexual identity, among other characteristics.

As part of the renewed GBA Plus Policy, the CSA launched a new suite of implementation tools. These updated tools include a policy implementation guide, a policy infographic, an updated self-assessment questionnaire, an updated data cheat sheet, and the GBA Plus Review: Recent Insights and Actions document. The CSA also introduced a mandatory <u>GBA Plus Training</u> requirement for all employees to enhance their understanding of GBA Plus and how it applies to their work.

In 2023–24, the CSA continued to support the Space4Women initiative, in efforts to help achieve Sustainable Development Goals 4 and 5 on quality education and gender equality. Space4Women is a project of the United Nations Office for Outer Space Affairs (UNOOSA); it was introduced to facilitate access to the benefits of space exploration, science, technology, engineering, and mathematics (STEM) education, and STEM careers for women and girls around the world.

In fall 2023, the UNOOSA and the CSA jointly hosted the fourth annual Space4Women Expert Meeting. Canada is an active player advancing gender work and exercises its expertise at the international level. The 2023 Expert Meeting focused on building the capacity of participants to promote and advance gender equality and empower women and girls in the space sector, inspiring and helping participants to drive gender equality efforts. 69 participants from 36 member states attended the event, and their contributions throughout the Expert Meeting were key to the preparation of the first-ever Gender Mainstreaming Toolkit (GMT) for the space sector.

The work done in 2023–24 resulted in the release of the GMT at the Sixty-Seventh Session of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in June 2024. The GMT provides simple and practical measures, examples and tools to help people who are not gender specialists adapt gender mainstreaming efforts to their unique situations, in turn helping bring about meaningful improvements for gender equality in the global space community.

To learn more, consult the CSA's 2023–24 supplementary information tables.

United Nations 2030 Agenda for Sustainable Development and the UN Sustainable Development Goals (SDG)

The CSA is dedicated to promoting the peaceful use and development of space while ensuring benefits for Canadians. In alignment with this mission, the CSA has formulated a Sustainable Development Vision, which emphasizes the exploration and utilization of space to enhance Canadians' lives while prioritizing sustainable practices and the preservation of Earth and its space environment. This vision served as the foundation on which the CSA's first Departmental Sustainable Development Strategy (DSDS) was developed and tabled in Parliament in November 2023. The DSDS outlines the various ways through which the CSA contributes to the United Nations 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs).

Through collaboration with partners and stakeholders across the space sector (<u>SDG 17</u>), the CSA is leveraging the technologies developed for deep space exploration to contribute to more sustainable food systems (<u>SDG 2</u>) and to support access to quality essential health-care services (<u>SDG 3</u>). The CSA has also committed to promoting knowledge and skills for sustainable development (<u>SDG 4</u>), championing gender equality (<u>SDG 5</u>), encouraging inclusive and sustainable economic growth (<u>SDG 8</u>),

and advancing reconciliation and reducing inequality ($\underline{SDG\ 10}$). Internally, the CSA is working to reduce waste and transition to zero-emission vehicles ($\underline{SDG\ 12}$) and take action on climate change ($\underline{SDG\ 13}$).

More information on the CSA's contributions to Canada's Federal Implementation Plan on the 2030 Agenda and the Federal Sustainable Development Strategy can be found in CSA's Departmental Sustainable Development Strategy.

Innovation

During 2023–24 the CSA has undertaken work to revise the current structure of its "From Ideas to Action to Innovation" (I2A) initiative. The goal is to align with the CSA's priorities and enable more flexibility for the initiative. The CSA also initiated work on an action plan that will lay a solid foundation for the initiative and ensure its sustainability.

Program inventory

Canada in Space is supported by the following programs:

- Space Exploration
- Space Utilization
- Space Capacity Development

Additional information related to the program inventory for Canada in Space is available on the <u>Results</u> page on GC InfoBase.

Internal services

In this section

- Description
- Progress on results
- Resources required to achieve results
- Contracts awarded to Indigenous businesses

Description

Internal services are the services that are provided within a department so that it can meet its corporate obligations and deliver its programs. There are 10 categories of internal services:

- management and oversight services
- communications services
- legal services
- human resources management services
- financial management services
- information management services
- information technology services
- real property management services
- materiel management services
- acquisition management services

Progress on results

This section presents details on how the agency performed to achieve results and meet targets for internal services.

The CSA continued working on the modernization of tools and infrastructure, automating processes and generating efficiencies in the CSA's operations. Namely, 2023–24 saw the finalization of the migration to a cloud-powered productivity platform, with all users being able to take full advantage from the new functionalities. Guided by the Digital Transformation Strategy, the CSA worked to empower its user base to adopt new digital tools and ways of working. As part of these initiatives, the digitization of over 180 linear feet of paper documents was completed, including key historical documents of past CSA space missions. The launch of the GC Data Strategy brought the opportunity for the CSA to update its 2019–22 Data Strategy and align it with this whole-of-government effort. Work on integrating artificial intelligence in the CSA's operations has started and a community of practice is scheduled to be launched in 2024–25.

The CSA has developed a new three-year Information Management Plan that supports the access, protection, utilization and sharing of information to facilitate the decision-making process across the CSA. CSA's Open Government Roadmap and CSA's Data Strategy promote access to space data to further support innovation and research in the private sector as well as in academic, public sector, and industry-based research communities.

The competitive Canadian employment market pushes the CSA to be on the lookout for innovative and people-centred ideas. The CSA has engaged in a wide range of activities to support a culture of togetherness and a sense of belonging in the workplace. In 2023, a new Integrated Leadership Framework (ILF) was implemented and became the blueprint for the CSA's leadership development approach, with Character-Based Leadership (CBL) as its central focus. The ILF aims to build a workplace culture that can withstand geopolitical, cultural and social issues, ultimately driving better innovation and higher performance.

In line with the <u>Directive on the Management of Real Property</u>, the CSA has been engaged in efforts to create an optimized, efficient, eco-friendly and technologically advanced workplace. The scope of achievements to date includes the construction of new collaboration areas through optimization of space, new workplace management processes and the implementation of new shared workstations. These new accommodations are designed to enable employees to perform their functions in a productive, secure and safe work environment and to align CSA with the whole-of-government approach towards maximizing the use of our facilities. Major capital investments in accordance with building condition report recommendations have been delivered to preserve the value, reliability and capacity of the CSA's facilities to support space programming. The CSA is on track to deliver a modernized real property portfolio strategy (RPPS) that will guide its investment decisions for the coming decade to ensure sound stewardship and support of the CSA's strategic business objectives.

The CSA has taken decisive steps to advance our progress towards Greening Government Strategy targets. Among these is the development of a 2023–2027 action plan to contribute to the CSA's first Departmental Sustainable Development Strategy (DSDS), the securing of project funding through the Greening Government Fund to perform a Life Cycle Assessment (LCA) study on space missions, the delivery of comprehensive waste audits for all of our primary facilities, and the development of a carbon-neutral implementation plan for the John H. Chapman Space Centre. All these activities

contribute to greener practices within the CSA's operations to ensure we remain on track to meet prescribed targets as well as annual reporting requirements.

The CSA is committed to fostering a diverse and inclusive workplace that stimulates the growth and development of all individuals, regardless of their physical, cultural or social characteristics. Throughout the year, the CSA continued to apply its 2021–2024 Employment Equity, Diversity and Inclusion Action Plan to ensure that the workforce is fair, diverse and inclusive. As of March 2024, women made up 49.1% of active CSA employees; members of visible minorities accounted for 22.7%; persons with disabilities accounted for 13.1%; and Indigenous Peoples accounted for 1.8%. The CSA also successfully rolled out its first-ever three-year Accessibility Plan to support the government's ambitious goal of a barrier-free Canada by 2040.

In January 2023, in line with the 2021–2024 Strategic Workforce Management Strategic Plan, the CSA launched a three-year Mental Health and Wellness Strategy to reposition itself and review its mental health and wellness efforts. The CSA recognizes the importance of mental health and aims to support the mental well-being of its talent and create a supportive work environment. To that end, the CSA has appointed a Mental Health and Wellness champion to promote a respectful and healthy workplace and to regularly share mental health topics with the CSA community.

The CSA also developed a Departmental Security Plan (DSP) that is targeted to be implemented between 2024 and 2026. The DSP is a three-year plan that provides a comprehensive overview of all departmental security requirements and highlights the pivotal role of security throughout the organization's activities and priorities. The DSP serves as the foundation for the development of an annual work plan and project plans that support the implementation of approved strategies and priorities outlined in the plan and that encompass the entire organization.

The CSA has also expanded its cybersecurity governance processes to ensure readiness for implementing the Government of Canada's cybersecurity strategy. As part of this endeavour, the CSA has engaged with other space agencies to anticipate forthcoming developments. As such, the CSA aims to fortify the Agency's cybersecurity posture while preserving collaborative opportunities with partners and reinforcing Canada's competitive edge in the global space industry.

Resources required to achieve results

Table 3: Resources required to achieve results for internal services this year

Table 3 provides a summary of the planned and actual spending and full-time equivalents (FTEs) required to achieve results.

Resource	Planned	Actual
Spending	61,059,544	79,369,177
Full-time equivalents	362.2	429.3

The <u>complete financial and human resources information</u> for the CSA's program inventory is available on GC InfoBase.

Contracts awarded to Indigenous businesses

Government of Canada departments are to meet a target of awarding at least 5% of the total value of contracts to Indigenous businesses each year. This commitment is to be fully implemented by the end of 2024–25.

The CSA's result for 2023-24:

Table 4: Total value of contracts awarded to Indigenous businesses¹ As shown in the Table 4, the CSA awarded 4.36% of the total value of all contracts to Indigenous businesses for the fiscal year.

Contracting performance indicators	2023-24 Results
Total value of contracts awarded to Indigenous businesses ² (A)	\$1,537,061
Total value of contracts awarded to Indigenous and non-Indigenous businesses ³ (B)	\$184,045,095
Value of exceptions approved by deputy head ⁴ (C)	\$143,870,545
Proportion of contracts awarded to Indigenous businesses [A / (B-C) × 100]	3.83%

- ¹ For the purposes of measuring performance against the minimum 5% target for FY 2023–24, the data in this table is based on how Indigenous Services Canada (ISC) defines "Indigenous business," which is one that is owned and operated by Elders, band and tribal councils; registered in the <u>Indigenous Business Directory</u>; or registered on a modern treaty beneficiary business list.
- Includes contract amendments with Indigenous businesses and contracts that were entered into with Indigenous businesses by means of acquisition cards above \$10,000.00 (\$10K), and may include subcontracts with Indigenous businesses.
- Includes contract amendments and contracts that were entered into by means of acquisition cards above \$10K.
- ⁴ Based on Indigenous business capacity, commodities falling under Space Projects and Research and Development are temporarily exempt from the CSA's 2022–23 target calculations.

In its 2024–25 Departmental Plan, the agency forecasted that, by the end of 2023–24, it would award 4.26% of the total value of its contracts to Indigenous businesses. To this end, the CSA continued to implement the federal <u>Procurement Strategy for Indigenous Business</u> (PSIB) aimed at developing the capacity of Indigenous businesses in the space and R&D sectors.

In 2023–24, the CSA completed its annual Procurement Strategy for Indigenous Businesses (PSIB) including the use of conditional or voluntary set asides to increase contract awards to Indigenous businesses and Indigenous Participation Plans (IPPs) to grow industry capacity.

Throughout the year, CSA's procurement officers continued to receive training on matters such as identifying Comprehensive Land Claims Areas and searching the Indigenous Business Director. Furthermore, a Contract Review Committee examined procurement plans and evaluation criteria to ensure that they were not overly restrictive to prevent disadvantaged groups from encountering unnecessary challenges. Improvements to the internal procurement system have been made to improve analysis and increase the participation of Indigenous businesses.

Through the Grants and Contributions Program, the CSA awarded funds for projects reaching at least 660 Indigenous youth in 2023–24. To name a few, the Saskatchewan Polytechnic created and hosted Camp Artemis, a one-day experience for Indigenous youth to engage in Space STEM learning, the Dalhousie University's Supernova team hosted their ATLAS (Atlantic Academy of Space) summer camp that included indigenous youth from the Halifax area and the H.R. MacMillan Space Centre in Vancouver animated online programs for youth in Nunavut and connected with cultural consultants to include local indigenous astronomy in narratives of their planetarium shows. Other contributions funds recipients such as Let's Talk Science, Digital Moment, and Wilfred Laurier University offered activities reaching Indigenous youth in 2023–24.

Spending and human resources

In this section

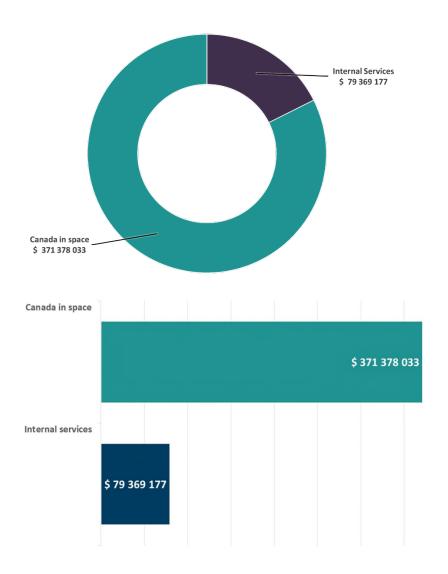
- Spending
- Funding
- Financial statement highlights
- Human resources

Spending

This section presents an overview of the department's actual and planned expenditures from 2021–22 to 2026–27.

Graph 1 and 2: Actual spending by core responsibility in 2023–24

Graph 1 and 2 present how much the department spent in 2023–24 to carry out core responsibilities and internal services.



Text version of Graph 1 and Graph 2

Core responsibilities and internal services	Actual
Canada in space	371,378,033
Internal services	79,369,177

Analysis of actual spending by core responsibility

The above charts note that, for 2023-24, the CSA spent \$371,378,033 on its core responsibility (Canada in Space) and \$79,369,177 on internal services.

Budgetary performance summary

Table 5 Actual three-year spending on core responsibilities and internal services (dollars)

Table 5 presents how much money the CSA spent over the past three years to carry out its core responsibilities and for internal services.

Core responsibilities and internal services	2023–24 Main Estimates	2023–24 total authorities available for use	Actual spending over three years (authorities used)
Canada in Space	476,342,693	562,175,378	2021–22: 307,943,051 2022–23: 425,072,047 2023–24: 371,378,033
Subtotal	476,342,693	562,175,378	1,104,393,131
Internal services	61,059,544	67,717,123	2021–22: 60,165,098 2022–23: 73,163,448 2023–24: 79,369,177
Total	537,402,237	629,892,501	1,317,090,854

Analysis of the past three years of spending

The Agency lapsed \$168.9M in 2023–24, of which 95% (\$160.9M) related to capital project funding envelopes (including the risk budget) that are reprofiled to future years via available carry-forward mechanisms. This is an inherent part of project management within the Canadian Space Program; for 2023–24, 100% of lapsed funds are reprofiled to future years.

The actual spending variances in 2021–22 to 2023–24 in the table above are mainly attributable to:

- Net increase from 2021–22 to 2022–23 in <u>Canadarm3</u> announced in the 2019 Budget.
- Net decrease from 2022–23 and 2023–24 in Canadarm3, due to continued changes to the Lunar Gateway's requirements, economic challenges related to supply chain delays, and the noncompletion of certain key milestones.

More financial information from previous years is available on the Finances section of GC Infobase.

Table 6 Planned three-year spending on core responsibilities and internal services (dollars)

Table 6 presents how much money the CSA plans to spend over the next three years to carry out its core responsibilities and for internal services.

Core responsibilities and internal services			2026–27 planned spending
Canada in space	349,012,257	255,954,383	251,985,840
Subtotal	349,012,257	255,954,383	251,985,840
Internal services	64,955,212	63,415,530	62,390,290
Total	413,967,469	319,369,913	314,376,130

Analysis of the next three years of spending

The variance between 2024–25 and 2026–27 in the "Planned three-year spending on core responsibilities and internal services" table above is mainly attributable to:

- New investment to support the International Space Station Program through 2030 announced in the 2023 Budget.
- Net decrease of investments in <u>Canadarm3</u> (announced in the Budget 2019). Additional funding for this initiative is expected to be accessed in the upcoming years.
- Net decrease of investments in Gateway External Robotics interfaces (GERI).
- Net decrease of investments in <u>WildFireSat</u> (announced in the Budget 2022); additional funding for this initiative is expected to be accessed in the upcoming years.
- Response to the "Refocusing government spending to deliver for Canadians" initiative announced in the Budget 2023.

More <u>detailed financial information from previous years</u> is available on the Finances section of GC Infobase.

Table 7: Budgetary actual gross and net planned spending summary (dollars)

Table 7 reconciles gross planned spending with net spending for 2023–24.

Core responsibilities and internal services	2023–24 actual gross spending	2023–24 actual revenues netted against expenditures	2023–24 actual net spending (authorities used)
Canada in space	371,378,033	0	371,378,033
Subtotal	371,378,033	0	371,378,033
Internal services	79,369,177	0	79,369,177
Total	450,747,210	0	450,747,210

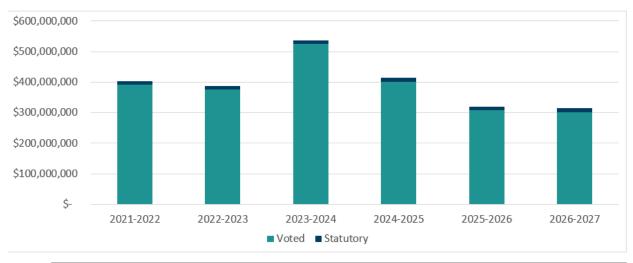
Information on the alignment of the CSA's <u>spending with Government of Canada's spending and</u> activities is available on GC InfoBase.

Funding

This section provides an overview of the department's voted and statutory funding for its core responsibilities and for internal services. For further information on funding authorities, consult the <u>Government of Canada budgets and expenditures</u>.

Graph 3: Approved funding (statutory and voted) over a six-year period

Graph 3 summarizes the department's approved voted and statutory funding from 2021–22 to 2026–27.



Exercice	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027
Statutory	\$ 11,085,844	\$ 11,276,732	\$ 12,160,460	\$ 12,154,248	\$ 12,343,502	\$ 12,240,391
Voted	\$ 392,544,828	\$ 377,001,647	\$ 525,241,777	\$ 401,813,221	\$ 307,026,411	\$ 302,135,739
Total	\$ 403,630,672	\$ 388,278,379	\$ 537,402,237	\$ 413,967,469	\$ 319,369,913	\$ 314,376,130

Text version of graph 3

Year	Statutory	Voted	Total
2021-2022	\$11,085,844	\$392,544,828	\$403,630,672
2022-2023	\$11,276,732	\$377,001,647	\$388,278,379
2023-2024	\$12,160,460	\$525,241,777	\$537,402,237
2024-2025	\$12,154,248	\$401,813,221	\$413,967,469
2025-2026	\$12,343,502	\$307,026,411	\$319,369,913
2026-2027	\$12,240,391	\$302,135,739	\$314,376,130

Analysis of statutory and voted funding over a six-year period

Spending variances are primarily attributable to specific funds allocated to the following initiatives in which funding exceeded the CSA's ongoing resource allocations.

- In accordance with the Budget 2015 announcements, and with \$379M in new funds earmarked in the Budget 2016, additional funding of \$318M over eight years beginning in 2017–18 has thus far been authorized to support activities on board the ISS and to fulfill Common Systems Operations Costs related to the extension of Canada's participation in the ISS until 2024, in accordance with international treaty obligations.
- Additional funding of \$25.1M spread over six years starting in 2018–19 for the QEYSSat project.
- Budget 2019 included additional funding of \$150M over five years starting in 2019–20 to carry out activities under the LEAP.
- In accordance with 2019 announcements, \$1.9B over 24 years for the <u>Canadarm3</u> as a Canadian contribution to the NASA-led <u>Lunar Gateway Program</u> was committed, additional funding of \$27.4M spread over four years starting in 2020–21 to undertake the first definition phase of the

Canadarm3 project and STEM activities, and additional funding of \$335.3M for fiscal years 2022–23 and 2023–24 to undertake the second definition phase of the Canadarm3 project. In accordance with Budget 2023 announcements, provide \$1.1B over 14 years, starting in 2023–24, to continue Canada's participation in the ISS until 2030, additional funding of \$404M spread over 14 years starting in 2023–24.

For further information on the CSA's departmental voted and statutory expenditures, consult the <u>Public</u> Accounts of Canada.

Financial statement highlights

The CSA's <u>complete financial statements</u> (unaudited or audited) for the year ended March 31, 2024, are available online.

Table 8: Condensed Statement of Operations (unaudited or audited) for the year ended March 31, 2024 (dollars)

Table 8 summarizes the expenses and revenues for 2023–24 which net to the cost of operations before government funding and transfers.

Financial information	2023-24 actual results	2023-24 planned results	Difference (actual results minus planned)
Total expenses	558,365,757	576,567,895	(18,202,138)
Total revenues	122,839	19,755	103,084
Net cost of operations before government funding and transfers	558,242,918	576,548,140	(18,305,222)

Total planned expenses for 2023–24 were \$576.6M, a variance of \$18.2M (3.3%) when compared to actual results of \$558.4M. The variance between planned and actual expenses is mainly explained by the following:

- Amortization expenses of assets under construction, planned to be capitalized to capital
 assets in 2023–24, being lower than projected (\$-18M), as well as the extension of the
 remaining useful life of the International Space Station's assets (\$-26M);
- Salaries and employee benefits expenses, being higher than projected (\$+30.7M).

The 2023–24 planned results information is provided in the CSA's <u>Future-Oriented Statement of</u> Operations and Notes 2023–24.

Table 9 summarizes actual expenses and revenues which net to the cost of operations before government funding and transfers.

Financial information	2023–24 actual results	2022–23 actual results	Difference (2023-24 minus 2022-23)
Total expenses	558,365,757	544,050,316	14,315,441
Total revenues	122,839	28,657	94,182
Net cost of operations before government funding and transfers	558,242,918	544,021,659	14,221,259

In 2023–24, total expenses were \$558.4M: an increase of \$14.3M (2.6%) when compared with the previous year's total expenses of \$544.1M. This increase is primarily attributable to the following:

- An increase in salaries and employee benefits by \$21.7M.
- An increase in amortization expenses, mainly related to the capitalization of the <u>JWST</u>, by \$5.1M.
- A decrease in total transfer payments by \$12.3M, mainly associated with transfer payments under the agreement with the European Space Agency.

The CSA's total revenues were \$0.12M in 2023–24 (\$0.03M in 2022–23), which represents the respendable portion of overall revenues of \$1.2M. Most of these revenues are reported under the sale of goods and services provided by the DFL, i.e., sale of goods and services to private businesses or other Government of Canada departments, and location and use of public property.

Table 10: Condensed Statement of Financial Position (unaudited or audited) as of March 31, 2024 (dollars)

Table 10 provides a brief snapshot of the department's liabilities (what it owes) and assets (what the department owns), which helps to indicate its ability to carry out programs and services.

Financial information	Actual fiscal year (2023–24)	Previous fiscal year (2022–23)	Difference (2023–24 minus 2022–23)
Total net liabilities	146,920,926	188,342,171	(41,421,245)
Total net financial assets	135,913,131	178,503,620	(42,590,489)
Departmental net debt	11,007,795	9,838,551	1,169,244
Total non-financial assets	1,225,955,647	1,325,194,597	(99,238,950)
Departmental net financial position	1,214,947,852	1,315,356,046	(100,408,194)

Total net liabilities of \$146.9M consist mainly of accounts payable and accrued liabilities. These represent goods and services that were received at year-end but that have not yet been paid by the

Agency. The \$41.4M (65.1%) variance from 2022–23 to 2023–24 is normal, as payment schedules may vary from one year to another, especially those related to space programs.

Total assets were \$1,361.9M at the end of 2023–24 (\$135.9M in net financial assets and \$1,226M in non-financial assets): a decrease of \$141.8M, mainly attributable to the decrease in the "Due from the Consolidated Revenue Fund (CRF)," which represents the net amount of cash that the Agency is entitled to draw from the CRF without further authorities to discharge its liabilities and the decrease in tangible capital assets.

Non-financial assets are mainly composed of space-related assets (\$1.05B over \$1.23B or 85.6%).

Human resources

This section presents an overview of the department's actual and planned human resources from 2021–22 to 2026–27.

Table 11: Actual human resources for core responsibilities and internal services

Table 11 shows a summary of human resources, in full-time equivalents (FTEs), for the CSA's core

responsibilities and for its internal services for the previous three fiscal years.

Core responsibilities and internal services	2021–22 actual FTEs	2022-23 actual FTEs	2023-24 actual FTEs
Canada in Space	434.1	459.5	507.7
Subtotal	434.1	459.5	507.7
Internal services	332.1	373.9	429.3
Total	766.2	833.4	937.0

Analysis of human resources over the last three years

The variance from 2021–22 to 2023–24 is mainly due to the increased personnel in preparation for the implementation of increased activities related to the Canadian space program with the success of several important budget announcements. This includes increased personnel in programs, as well as internal services that support these programs.

Table 12: Human resources planning summary for core responsibilities and internal services
Table 12 shows information on human resources, in full-time equivalents (FTEs), for each of the CSA's
core responsibilities and for its internal services planned for the next three years. Human resources for
the current fiscal year are forecasted based on year to date.

Core responsibilities and internal services	2024–25 planned FTEs	2025–26 planned FTEs	2026–27 planned FTEs
Canada in Space	492.9	499.0	490.8
Subtotal	492.9	499.0	490.8
Internal services	386.8	393.0	395.1
Total	879.7	892.0	885.9

Analysis of human resources for the next three years

The variance from 2024–25 to 2026–27 is mainly due to the increased personnel in preparation for the implementation of increased activities related to the Canadian space program with the success of several important budget announcements. This includes increased personnel in programs, as well as internal services that support these programs.

Corporate information

Departmental profile

Appropriate minister(s): The Honourable François-Philippe Champagne, P.C., M.P.

Institutional head: Lisa Campbell, President

Ministerial portfolio: Innovation, Science and Economic Development

Enabling instrument(s): Canadian Space Agency Act, S.C. 1990, c. 13

Year of incorporation / commencement: Established in March 1989

Other: The CSA was established in 1989. The Agency's headquarters are located at the John H. Chapman Space Centre, in Longueuil, Quebec. Other CSA workplaces include the DFL in Ottawa, Ontario; the Policy office in Gatineau, Quebec; and liaison offices in Houston, Washington, and Paris.

Departmental contact information

Mailing address:

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Website(s): www.asc-csa.gc.ca

Supplementary information tables

The following supplementary information tables are available on the CSA's website:

- Details on transfer payment programs
- Gender-based analysis plus
- Response to Parliamentary committees and external audits
- United Nations 2030 Agenda and the Sustainable Development Goals

Federal tax expenditures

The tax system can be used to achieve public policy objectives through the application of special measures such as low tax rates, exemptions, deductions, deferrals and credits. The Department of Finance Canada publishes cost estimates and projections for these measures each year in the Report on Federal Tax Expenditures. This report also provides detailed background information on tax expenditures, including descriptions, objectives, historical information and references to related federal spending programs as well as evaluations and GBA Plus of tax expenditures.

Definitions

appropriation (crédit)

Any authority of Parliament to pay money out of the Consolidated Revenue Fund.

budgetary expenditures (dépenses budgétaires)

Operating and capital expenditures; transfer payments to other levels of government, departments or individuals; and payments to Crown corporations.

core responsibility (responsabilité essentielle)

An enduring function or role performed by a department. The intentions of the department with respect to a core responsibility are reflected in one or more related departmental results that the department seeks to contribute to or influence.

Departmental Plan (plan ministériel)

A report on the plans and expected performance of an appropriated department over a 3-year period. Departmental Plans are usually tabled in Parliament each spring.

departmental priority (priorité)

A plan or project that a department has chosen to focus and report on during the planning period. Priorities represent the things that are most important or what must be done first to support the achievement of the desired departmental results.

departmental result (résultat ministériel)

A consequence or outcome that a department seeks to achieve. A departmental result is often outside departments' immediate control, but it should be influenced by program-level outcomes.

departmental result indicator (indicateur de résultat ministériel)

A quantitative measure of progress on a departmental result.

departmental results framework (cadre ministériel des résultats)

A framework that connects the department's core responsibilities to its departmental results and departmental result indicators.

Departmental Results Report (rapport sur les résultats ministériels)

A report on a department's actual accomplishments against the plans, priorities and expected results set out in the corresponding Departmental Plan.

fulltime equivalent (équivalent temps plein)

A measure of the extent to which an employee represents a full person-year charge against a departmental budget. For a particular position, the fulltime equivalent figure is the ratio of number of hours the person actually works divided by the standard number of hours set out in the person's collective agreement.

gender-based analysis plus (GBA Plus) (analyse comparative entre les sexes plus [ACS Plus])

An analytical tool used to assess support the development of responsive and inclusive how different groups of women, men and gender-diverse people experience policies, programs and policies, programs, and other initiatives. GBA Plus is a process for understanding who is impacted by the issue or opportunity being addressed by the initiative; identifying how the initiative could be tailored to meet diverse needs of the people most impacted; and anticipating and mitigating any barriers to accessing or benefitting from the initiative. GBA Plus is an intersectional analysis that goes beyond biological (sex) and socio-cultural (gender) differences to consider other factors, such as age, disability, education, ethnicity, economic status, geography (including rurality), language, race, religion, and sexual orientation.

government-wide priorities (priorités pangouvernementales)

For the purpose of the 2022–23 Departmental Results Report, government-wide priorities are the high-level themes outlining the government's agenda in the <u>November 23, 2021, Speech from the Throne</u>: building a healthier today and tomorrow; growing a more resilient economy; bolder climate action; fighter harder for safer communities; standing up for diversity and inclusion; moving faster on the path to reconciliation; and fighting for a secure, just and equitable world.

horizontal initiative (initiative horizontale)

An initiative where two or more federal departments are given funding to pursue a shared outcome, often linked to a government priority.

non-budgetary expenditures (dépenses non budgétaires)

Net outlays and receipts related to loans, investments and advances, which change the composition of the financial assets of the Government of Canada.

performance (rendement)

What a department did with its resources to achieve its results, how well those results compare to what the department intended to achieve, and how well lessons learned have been identified.

performance indicator (indicateur de rendement)

A qualitative or quantitative means of measuring an output or outcome, with the intention of gauging the performance of a department, program, policy or initiative respecting expected results.

plan (plan)

The articulation of strategic choices, which provides information on how a department intends to achieve its priorities and associated results. Generally, a plan will explain the logic behind the strategies chosen and tend to focus on actions that lead to the expected result.

planned spending (dépenses prévues)

For Departmental Plans and Departmental Results Reports, planned spending refers to those amounts presented in Main Estimates.

A department is expected to be aware of the authorities that it has sought and received. The determination of planned spending is a departmental responsibility, and departments must be able to defend the expenditure and accrual numbers presented in their Departmental Plans and Departmental Results Reports.

program (programme)

Individual or groups of services, activities or combinations thereof that are managed together within the department and focus on a specific set of outputs, outcomes or service levels.

program inventory (répertoire des programmes)

Identifies all the department's programs and describes how resources are organized to contribute to the department's core responsibilities and results.

result (résultat)

A consequence attributed, in part, to a department, policy, program or initiative. Results are not within the control of a single department, policy, program or initiative; instead they are within the area of the department's influence.

Indigenous business (entreprise autochtones)

For the purpose of the *Directive on the Management of Procurement Appendix E: Mandatory Procedures* for Contracts Awarded to Indigenous Businesses and the Government of Canada's commitment that a mandatory minimum target of 5% of the total value of contracts is awarded to Indigenous businesses, a department that meets the definition and requirements as defined by the <u>Indigenous Business</u> <u>Directory</u>.

statutory expenditures (dépenses législatives)

Expenditures that Parliament has approved through legislation other than appropriation acts. The legislation sets out the purpose of the expenditures and the terms and conditions under which they may be made.

target (cible)

A measurable performance or success level that a department, program or initiative plans to achieve within a specified time period. Targets can be either quantitative or qualitative.

voted expenditures (dépenses votées)

Expenditures that Parliament approves annually through an appropriation act. The vote wording becomes the governing conditions under which these expenditures may be made.