

Canadian Space Agency

2019–20

Departmental Results Report

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Minister of Innovation, Science and Industry

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Minister's message

I am pleased to present the 2019–20 Departmental Results Report for the Canadian Space Agency (CSA). As the Department continues to mobilize industry and the research community to confront the COVID-19 pandemic, the various organizations in the Innovation, Science and Economic Development (ISED) Portfolio have coordinated their efforts to position Canada as a global innovation leader and shape an inclusive economy for all Canadians.

In response to the Prime Minister's historic announcement that Canada is going to the Moon and the publication of [Canada's Space Strategy—Exploration, Imagination, Innovation!](#), the CSA's focus in 2019–20 was the implementation of this strategy by delivering better conditions for the growth of the Canadian space sector to fully realize the benefits of space for Canadians.

Through its commitment to the lunar gateway mission and focus on harnessing space to solve everyday problem, the daily lives of Canadians' have continued to improve and the Canadian space sector magnify. To ensure that Canada could deliver on these long-term commitments, the CSA has also focused on delivering outreach programs to inspire our youth to participate in the future Canadian space sector workforce. The CSA continues to ensure Canada's leadership and contributes to its economy by supporting science excellence, innovation, and economic growth through partnerships at the academic, industry, governmental, and international level.

These are just a few examples of the CSA's work on behalf of Canadians regardless of their background, region or generation. We invite you to read this report to learn more about how the CSA is unlocking the full potential of the space sector in order to respond to the realities of the new evolving space environment as a national strategic asset that is essential for Canada's sovereignty, security, and economic growth.



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and Industry

Results at a glance and operating context

In the face of a global pandemic, it is important to search for new ways to meet our basic needs, maintain our health and connect with others. The current reality has made it ever more evident that modern technologies supported by space infrastructure are essential to the evolving daily lives of Canadians. As the Government of Canada focuses on ensuring the safety and wellbeing of its people, in 2019–20, the CSA supported 12 federal departments and agencies on their mandates and priorities through its space data in areas such as environment and climate change monitoring, weather forecasting, safety and security, and sustainable agriculture.

The CSA's growing investments in space, such as the [Space Technology Development Program](#)ⁱⁱ (STDP), also had a direct impact on creating high-quality jobs by providing opportunities in space research and development (R&D) and continuously encouraging an environment for innovation and science excellence. This allowed Canadian science teams to participate in the National Aeronautics and Space Administration's (NASA) [Curiosity](#)ⁱⁱⁱ rover mission on Mars. Canada's contribution to the [OSIRIS-REx](#)^{iv} asteroid sample-return mission to the asteroid Bennu was also a major success as it is now the planetary object with the highest resolution global map in the entire solar system, including Earth. At the same time, Canada had the highest citation score of space-related publications in 2018 among G7 countries.

The CSA's continued collaboration with its international partners on the [International Space Station](#)^v (ISS) has provided a unique laboratory environment for advancements in science. During astronaut David Saint-Jacques' mission to the ISS, Canadians were inspired to reach for the stars and a total of seven number of science experiments were completed thus taking advantage of this unique laboratory.

In 2019–20, the CSA's key priorities directly aligned with its Departmental Results Framework and program inventory. Advancing these priorities enabled the CSA to make progress on achieving its mandate, as well as Government of Canada commitments to and for Canadians. Each of these priorities were aligned to the [Minister of Innovation, Science and Economic Development's Mandate Letter](#),^{vi} which stated that the Minister's overarching goal is to help Canadian businesses grow, innovate and export, and the [Minister of Science's Mandate Letter](#)^{vii}, which stated that the Minister's overarching goal is to support scientific research and the integration of scientific considerations in our investment and policy choices to create sustainable economic growth and support and grow the middle class. They were also fully aligned with the [Innovation and Skills Plan](#)^{viii}, a vehicle to foster new partnerships to leverage Canada's innovation strengths to bridge the gaps from science, to commercialization, to investment and scaling up.

Priority 1 — Lunar Gateway and a whole-of-government Canadian Space Strategy

Canada was the first nation to declare its participation in the next major international human space exploration, the United States-led [Lunar Gateway](#)^{ix} program. This historic announcement was made on February 28, 2019 by the Prime Minister of Canada with a commitment to invest \$2.05B over 24 years in Canada's Space Program. In response to this announcement, the CSA has participated in discussions with NASA and other partners to formalize the legal approach to the Gateway partnership and on the definition of the procurement strategy for [Canadarm3](#)^x. The CSA also launched the first activities conducted under the new [Lunar Exploration Accelerator Program](#)^{xi} (LEAP), which include the development of science instruments and in-space demonstration of innovative technologies, such as miniature planetary rovers, planetary impactor spacecraft, and a broad variety of science instruments. In addition, the CSA launched the [Junior Astronaut](#)^{xii} initiative in the fall of 2019 to inspire the next generation of astronauts and get young Canadians interested in careers in science, technology, engineering, and mathematics (STEM).

Since the announcement of [Canada's Space Strategy—Exploration, Imagination, Innovation](#)ⁱ in March 2019, the CSA has focused on the growth of the Canadian space sector, fully realizing the benefits of space for Canadians. As a result, the CSA has worked closely with its partners across government, industry, and academia to move forward on key initiatives, such as supporting innovation, science, and industrial activities, as well as operationalizing the [RADARSAT Constellation Mission](#)^{xiii} (RCM) and planning for future missions and activities. The strategy has reinvigorated linkages across government, ensuring that space activities are optimized to deliver services to Canadians and enable socio-economic benefits in new ways.

Priority 2 — Launch and commissioning of the RADARSAT Constellation Mission

The three [RCM](#)^{xiii} satellites were launched on June 12, 2019, and commissioning of all three satellites was completed on November 29, 2019. Since then, RCM operations and data production have begun, which has provided access to an increasing amount of daily images. With the progress made in 2019–20, Government of Canada organizations begun, as planned, their transition to RCM as their primary Earth Observation (EO) data source in order to support the delivery of their mandates.

Priority 3 — Astronaut David Saint-Jacques ISS mission: Science and Outreach

[David Saint-Jacques' mission](#)^{xiv} was of inspirational value in raising public awareness of Canada's space activities as well as giving Canadian youth a role model to propel their desires and aspirations. The implementation of a national communications and outreach campaign inspired Canadians of all ages to acquire the skills to pursue studies and careers in STEM.

Priority 4 — Canada’s participation in the European Space Agency’s (ESA) 2019 Ministerial Council meeting

The CSA represented Canada at ESA’s 2019 Ministerial Council meeting in November 2019, where participants committed new investments to ESA programs in order to continuously offer Canadian business opportunities in the European market. Canada committed \$90M over three years to a variety of programs, including Earth Observation, Telecommunications, General Support, and the Human and Robotic Exploration programs that support key government priorities, Canadian industry, and the scientific community.

Priority 5 — Scientific satellites — Collaboration with other government departments

The CSA worked with Natural Resources Canada (NRCan) and Environment and Climate Change Canada (ECCC) on the highly innovative [WildFireSat^{xv}](#) micro satellite project, issuing initial contracts in September 2019. The WildFireSat project aims to improve characterization of forest fires to assist in earlier suppression efforts and ensure more strategic evacuations, particularly in rural and remote areas, as well as to improve smoke and air quality predictions for public health and the accuracy of forest fire carbon emissions data.

Extensive efforts were also carried out by the CSA and 15 federal departments in 2019–20 to identify needs and gaps to ensure a modern EO infrastructure for government that will better serve Canadians, help keep Canadian industry competitive internationally, and advance Canadian science and research amidst a changing climate.

Operating Context

Canada has a rich space heritage and an industrial base with niche capabilities—in space operations, satellite communications, space robotics, space-based radar, optical science instruments, as well as value-added EO and geospatial services.

Many federal departments and agencies rely on space-based data and applications to deliver their mandates, and many others expect to do so in the near future. The RADARSAT satellites deliver EO data to monitor agricultural productivity, track ice in the North, detect pollution on our waters, and critically, provide the Canadian Armed Forces with imagery to support their mission. Satellites also monitor our environment and support science and evidence-based decision-making on climate change, water and resource management, and disaster management.

Going forward, new opportunities are on the horizon. Around the world, space agencies are set on returning to the Moon and pushing to Mars. Canada’s own involvement in the ISS is extended to 2024. Disruptive technologies have changed the economics of building, launching, and operating spacecraft, opening the frontier of space to new and lucrative commercial business activities. Launch costs are starting to fall and mass

production of small satellites (up to 1,000 kg) is being explored, bringing the promise of more affordable and frequent access to space that much closer to reality.

For countries like Canada with smaller space programs, activities are often carried out in partnership with other space-faring nations, to share the costs and leverage capabilities to create systems and satellites that can tackle some of the most pressing global issues such as climate change. To maximize those benefits, the CSA collaborates internationally through international partnerships and international committees such as the Global Space Exploration Committee and the Committee on EO Satellites. The CSA also works closely with NASA and builds on its unique partnership with ESA to leverage space investments as well as to maintain open access to European markets for Canadian space companies and academia. Targeted investments in key science and technology capabilities and flight heritage or demonstration opportunities ensure that the Canadian space sector remains relevant in a dynamic international context.

To fully develop its growth potential and seize opportunities to join international space projects, the Canadian space sector kept pace with a fast-evolving context. In line with the Innovation and Skills Plan, the CSA supports the development of people, science, and innovative technologies while offering demonstration opportunities to help Canada's industry maintain and enhance its current competitive edge.

Financial and Human Resources

2019–20 Total Actual Spending	2019–20 Total Actual Full-Time Equivalents FTEs
324,436,091	677.5

For more information on the Canadian Space Agency's plans, priorities and results achieved, see the [“Results: what we achieved,”](#) section of this report.

Results: what we achieved

Core responsibility

Canada in Space

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 mandate; 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 the Canadian industry; and encourages the commercial exploitation of the 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 develop the required skills and to pursue studies and careers in science, technology, engineering and math.

Results

This section outlines the key achievements of the CSA against its four departmental results outlined in its Departmental Results Framework: space research and development advances science and technology, Canadians engage with space, space information and technology improve the lives of Canadians and Canada's investments in space benefit the Canadian economy.

Result 1 — Space research and development advances science and technology

Fostering growth in a vibrant Canadian economy, an ecosystem that supports the full research and development cycle from inception through to commercialization is of critically important now more than ever. In recognition of this, the CSA continues to invest in the advancement of technology readiness levels and risk-reduction efforts for innovative space technologies required for future space missions with the possibility of being re-purposed on earth. Below are some of the areas in which the CSA's investments in 2019–20 have demonstrated leadership in fostering an innovative environment.

The CSA launched another wave of the [STDP](#)^{Error! Bookmark not defined.} with an investment totaling \$18M over three years in space technologies such as a Miniaturized Radiation Spectrometer, a Dual manipulator controller with virtual reality, a Breadboard spectrometer for climate observation, and Antenna Technologies for Mars Subsurface Radar. Through the STDP, the CSA also invested a similar amount of \$18.8M to support the advancement of 55 commercially promising technologies in various space domains, such as a hazard avoidance navigation system for landers, and 45 activities to reduce the technological uncertainties of potential future missions of interest to Canada.

The STDP also contributed to [LEAP](#)^{xi} by supporting the development of 10 space technologies related to lunar missions as well as by implementing a mechanism to support promising technologies with a strong commercial potential for the Lunar supply chain. In addition, the CSA has collaborated with the National Research Council (NRC) in ISED's [Innovative Solutions Canada](#)^{xvi} (ISC) on industry challenges to foster Small and Medium Business (SMB) involvement in the eventual Canadarm3 supply chain.

As part of the [Lunar Gateway](#)^{Error! Bookmark not defined.}, the CSA invested \$6.7M in 2019–20. These investments encourage Canadian industry to invest in R&D to produce the next advancements in technology, mainly in space robotics, machine vision, and artificial intelligence (AI), needed to operate the Lunar Gateway for the mission's first 20 years. It is expected that the R&D expenditures made by businesses will lead to technical innovation thus providing significant social and economic benefits to Canada. The CSA has established its procurement strategy for [Canadarm3](#)^x, which will include the first use of the [Industrial and Technological Benefits Policy](#)^{xvii} (ITB) outside of military procurement. This will allow the use of proven means and controls to best meet key project objectives, while maximizing benefits to Canada. The use of ITBs will drive technical innovation within Canada's space industry, engaging and growing small and medium enterprises, and sponsoring partnerships and R&D opportunity across Canadian academia, robotics ecosystem (space and terrestrial), and emerging fields such as AI where Canada has demonstrated leadership. The CSA has worked with NASA and other international partners on the concept definition for [Canadarm3](#)^x and provided initial mission-level technical requirements to guide industry, and defined detailed technical requirements for the robotic interfaces that will support Canadarm3 and its payloads.

Planetary exploration and space astronomy missions provide opportunities for Canadian scientists to embark on international space missions and gain access to scientific data. In 2019–20, the CSA invested \$2.6M in Canadian science teams participating in scientific space missions, including NASA's [Curiosity](#)^{Error! Bookmark not defined.} rover mission, the [OSIRIS-REx](#)^{Error! Bookmark not defined.} asteroid sample-return mission, India's [ASTROSAT](#)^{xviii} mission, and Japan's X-ray Imaging and Spectroscopy Mission [XRISM](#)^{xix}. These projects and others have generated 66 peer-reviewed and 164 non peer-reviewed scientific publications by Canadian space researchers in 2019–20.

In support of advancing space, as well as Earth science and technologies, the CSA invested \$2.2M to maintain the operations and data production of Canada's [SCISAT](#)^{xx} science satellite. This investment supported the upgrade of the mission's IT server system, to secure resources for data calibration and validation, and to analyze instrument performance to increase the quality of data products. Its dataset, spanning 16 years, continues to be used to monitor stratospheric ozone depletion to advise future regulations of the [United Nations \(UN\) Montreal Protocol](#)^{xxi}. SCISAT's data was also highlighted in over 10 scientific publications as part of a special issue of the [Journal of Quantitative Spectroscopy](#)^{xxii} honouring the 15th anniversary of the SCISAT satellite. Among the featured scientific advances was one describing the satellite's new hydrofluorocarbon

(HFC) dataset, making it the only satellite in the world to measure them from space. In addition, SCISAT's greenhouse gas and air quality data, used to further Canada's contribution to Arctic research and data from onboard instruments, was published in a [UN/World Climate Research Program water vapour assessment](#).^{xxiii} This contributes to Canada's existing leadership in high-resolution measurements of the atmosphere and advancing global research in greenhouse gases. Open data from SCISAT was also featured as part of Canada's participation in the 2019 NASA [Space Apps Challenge](#).^{xxiv}

The growing reliance on secure telecommunications for Canadians' daily activities, such as online banking, is supported by CSA's investments in projects such as the [QEYSSat](#).^{xxv} demonstration mission. In 2019–20, the CSA selected its prime contractor to design and build the QEYSSat, as well as initiate the preliminary design phase. The mission aims to demonstrate quantum key distribution technology over very long distances and is expected to provide Canada with ultra-secure communications in the age of quantum computing.

Through these investments, the CSA contributed to Canada maintaining its Business Expenditures on Research and Development (BERD) in the space sector. In 2018 (the most recent data available), BERD reached \$356M, which is much higher than the expected target of \$250M. This variance is due to the CSA using a five-year rolling average to set the target based on the fluctuations of the Canadian space sector over time as missions proceed through their lifecycles. Another factor in this variance is the presence of a company, which recently entered the Canadian space sector, that has reported significant BERD in the past two years. In response to the evolving reality, a new target has been developed for the [2020-21 Departmental plan](#).^{xxvi} to account for changes in industry. Furthermore, by providing access to high-quality scientific data and supporting researchers, the CSA contributed to Canada's 16th rank among Organization for Economic Cooperation and Development (OECD) nations with regard to the average relative citation score of space-related publications. Canada's average relative citation (ARC) score, ranking it 16th among OECD countries, corresponds to a value of 1.59 for the period from 2012 to 2018, compared with 1.62 for the previous period from 2012 to 2017, or 11th rank. The gap between these two periods must be interpreted carefully given the gap separating Canada from the country holding the 10th rank is less than 0.10 ARC points, which is not statistically significant. It should also be noted that with this score, Canada is above average among OECD countries and scores the highest among G7 countries.

Result 2 — Canadians engage with space

By taking advantage of the unique ability of space to inspire Canadians of all ages and by providing opportunities for youth to acquire the skills to pursue studies and careers in STEM, in 2019–20 the CSA engaged with Canadians of all ages through communications events and campaigns, notably with the astronaut David Saint-Jacques' mission outreach campaign.

Social media engagements for 2019–20 were 3,592,089 on CSA’s social media platforms, on all space topics combined. The increase compared with previous years is explained by the astronaut mission which generated increased content and therefore more engagements.

The results for the astronaut mission were exceptional. From October 2017 to July 2019, the campaign generated over 6 million engagements on social media, 16 million views of videos, 2.5 million visits to mission webpages, and nearly 7,000 media mentions. Mission related outreach [activities](#)^{xxvii} reached over 227 thousand Canadians directly. Of these, at least 105 thousand were youth (primary-secondary). The Living Space initiative alone reached over 88,000 students in nearly 4,000 classrooms across Canada.

Announced by the Right Honourable Justin Trudeau in February 2019, the CSA launched its [Junior Astronauts](#)^{xii} activities related to STEM, Fitness & Nutrition, and Teamwork & Communications for educators and youth in grades 6 to 9. Registered participants were invited to take part in two nationwide contests. The prize of one was to win a visit from an astronaut in the spring of 2020, and the other to be invited to the Junior Astronaut Camp where winners would engage and train with CSA scientists, engineers, and astronauts at the CSA headquarters in the summer of 2020. By the end of 2019–20, the Junior Astronaut campaign had over 58,000 engagements with youth, and 1,549 schools and youth organizations from every province and territory registered in the activities.

The CSA continued to engage Canadians by supporting the development of space science and technology and expertise required for the future through the [Science, Technology and Expertise Development in Academia](#)^{xxviii} (STEDiA) initiative. In 2019–2020, STEDiA supported 99 activities such as the [Flights and Fieldwork for the Advancement of Science and Technology](#)^{xxix} (FAST).

As part of the CSA’s [stratospheric balloon program](#)^{xxx}, the [Strato-Science 2019](#)^{xxxi} campaign provided Canadian academia and industry with an opportunity to test and validate new technologies and perform scientific experiments in a near-space environment, while inspiring and training the next generation of experts. Thirteen payloads, involving more than 80 students, were launched with great success.

The CSA also supported the [Canadian CubeSat Project](#)^{xxxii} which provides professors in post-secondary institutions with an opportunity to engage their students in a real space mission by designing, building, testing, and operating their own miniature satellite. In May 2019, a one-week hands-on workshop was organized at CSA’s headquarters and offered to more than 45 students from 15 teams across Canada (1 team per province and territory). The gender split was roughly equal with 44% of participants women and 56% men.

The implementation of a consultative committee with industry and academia to address common challenges, such as attracting new people and organizations into the space sector and renew a talented and skilled Canadian workforce, has been postponed with

the CSA's intent to modernize its engagement and consultations mechanisms over the next year.

CSA's efforts to provide opportunities for youth to acquire the skills to pursue studies and careers in STEM, resulted in 1041 new people and organizations entering space-related fields in 2018 (the most recent data available). This result, well above the target, is mainly attributable to the amount of students participating in the CubeSat Project.

Result 3 — Space information and technologies improve the lives of Canadians

There are two significant ways that the CSA improves the lives of Canadians. The first is through space science and technology that is reused on Earth for the benefit of Canadians, and the second is delivering the data and services that Canadians need from space on a daily basis.

From a science and technology perspective, during [David Saint-Jacques'](#) ^{xxxiii} time aboard the [ISS](#) ^v, a series of seven scientific experiments were conducted ([At Home in Space](#) ^{xxxiv}, [Wayfinding](#) ^{xxxv}, [TBone](#) ^{xxxvi}, [Vascular Echo](#) ^{xxxvii}, [Radi-N2](#) ^{xxxviii}, [Vectron](#) ^{xxxix}, [Vascular Aging](#) ^{xxxvii}). Among these, the Vascular Series of experiments examined changes in the blood vessels and the heart while the astronauts were in space, and then followed their recovery after their return to Earth. At Home in Space assessed the culture, values, and psychosocial adaptation of astronauts to a space environment shared by multinational astronaut crews on long-duration missions as they dealt with the isolated and confined environment of the spacecraft. Canadian researchers use the ISS to explore scientific questions lying at the convergence of space and terrestrial needs. As such, discoveries and new knowledge from space research are transferred to Earth applications.

In 2019–20, two Canadian-developed technologies were tested aboard the ISS: [Bio-Monitor](#) ^{xi} and [Bio-Analyzer](#) ^{xli}. Both technologies are intended to be used in human research on the ISS and are expected to find applications on Earth in areas such as health monitoring in remote areas. Bio-Monitor is a smart garment that records six physiological parameters, including heart rate and temperature. The commissioning of the Bio-Monitor was successfully completed and is now used on the ISS to collect data for experiments such as Vascular Aging. Bio-Analyzer is a new technology which was designed to perform real-time analysis of blood cells and biomarkers. The commissioning was partially completed on orbit in 2019–20; additional work to complete the operational implementation of the instrument has been impeded by the COVID-19 pandemic.

In 2019–20, the CSA completed the testing, delivery, and integration of the second flight model of three Extended Interaction Klystons (EIK) with its partner, the NASA, in support of the joint NASA-CNES (In French, the Centre national d'études spatiales) [Surface Water Ocean Topography](#) ^{xlii} (SWOT) science mission. EIKs are key components of the radar instrument within SWOT. This technology will enable accurate measurements of Canada's water resources, which in turn will provide the scientific community with a better understanding of the dynamics of the world's oceans and terrestrial surface water, allowing it to address important global issues like climate change and improve our

management of water as a strategic resource. SWOT data could lead to improvements in water-related services in Canada, such as weather predictions and flood-warning systems thus benefitting the scientists of ECCC and the Department of Fisheries and Oceans (DFO) with better data in support of their mandates. In February 2020, NASA postponed the launch from November 2021 to February 2022 due to problems encountered during SWOT development and assembly that were not related to CSA deliverables.

With respect to delivering data and services that Canadians need from space, the CSA achieved a significant milestone in 2019–20 with the successful launch and commissioning of the [RCM](#).^{xiii} Canada's new EO flagship mission designed to make Synthetic Aperture Radar (SAR) data available to Canadian users, capturing our territory with unprecedented capacity in terms of imaging revisit and coverage.

The [RCM](#)^{xiii} was launched in June 2019 and commissioned in November 2019. By the end of the fiscal year, data from the RCM was already contributing to an increased quality and volume of data and services being offered. This data contributes to activities that help Canadians better understand our environment and possible threats, including land use changes, coastal change, sea ice monitoring, urban sinking, measuring human activity influences on local environments, and improving Canada's space-based capabilities to detect ships and manage marine traffic with the use of automatic identification systems. In total, 12 federal departments and agencies used RADARSAT data in 2019–20 to deliver on their mandate, including, but not limited to ECCC, DFO, the Department of National Defence, Agriculture and Agri-Food Canada, and the Public Health Agency of Canada. The CSA also continued to provide high-quality data services to the various government departments and agencies through [RADARSAT-2](#).^{xliii} for the same purpose.

Early in 2019–20, approximately 37,000 images from the [RADARSAT-1](#).^{xliiv} data archives were made available to the public in an effort to encourage the development of novel applications and further the socio-economic benefits of the RADARSAT-1 archive, which represents more than 17 years of continuous EO data across the globe. A survey of the EO user community, conducted in the summer of 2019, was used in preparation for the Request for Information on technical solutions to data access, which was posted in January 2020. The RADARSAT-1 open data initiative is expected to increase the number of services offered to Canadians in priority areas such as climate change, the North, and innovation. It will also increase the openness of federal scientific activities, demonstrating the CSA's leadership in the management of space-based datasets and commitment to Treasury Board of Canada – Secretariat's Directive on Open Government.

In 2019–20, the CSA put in place a Data Expertise Centre to improve the management and the use of CSA data by employees, federal departments and agencies, provinces and territories, academic institutions, and Canadian industry. By putting in place this centre, the CSA has the infrastructure and expertise required to manage the ever-increasing volumes of data that can then be made available to Canadians (including CSA

decision-makers and data users in industry, in universities and in government) through the CSA Data Strategy.

Space infrastructure has a planned lifetime and can stop functioning if it reaches the end of its operational lifetime, if it suffers a technical malfunction, or is hit by space debris. To mitigate these risks, the CSA continued its support to more than 70 Canadian and international missions in 2019–20, through the [Conjunction Risk Assessment and Mitigation System](#)^{xlv} (CRAMS). CRAMS is used to detect space debris risks to space infrastructure and determine suitable collision avoidance options. In addition, technologies for on-orbit automatic risk detection, assessment, and mitigation were explored.

In 2019–20, the CSA also continued its analytical work on opportunities for Canada to collaborate with [Europe's Copernicus Program](#)^{xlvi}. In an effort to better understand Canada's potential usage of Copernicus' data and services, as well as opportunities for profitable collaboration. In addition, the CSA continued to support the [International Charter on Space and Major Disasters](#)^{xlvii}, taking part in its critical operations and providing [RADARSAT-2](#)^{xlviii} data to organizations across the world that are involved in natural disaster relief efforts.

Through the [smartEarth](#)^{xlviii} initiative, the CSA issued an announcement of opportunity (AO) in January 2020 to ensure that the Canadian downstream space sector capitalizes on the current transformations in the digital marketplace and open new opportunities. The AO will identify innovative ways through further research and testing with actual imagery to maximize the use of satellite data and other environmental data sources in various domains such as forestry, oceans, and urban applications.

The CSA has been working in close cooperation with DFO and Transport Canada to explore the unique potential of space-based solutions to help detect, monitor, and predict the movements of the endangered [North Atlantic right whales](#)^{xlix} in Canadian waters. A request for proposals is planned for 2020–21.

In 2019–20, 22 space technologies and applications were adapted for use on Earth or re-use in space, which is significantly higher than the target of 7 and represents of improvement from results in 2018–19 (16) and 2017–18 (13). For example, the technology developed for lunar rovers was re-used to develop a more sustainable agricultural irrigation system.

Ensuring that space-based data is accessed and used to develop new innovative services or enhance current services that play a critical role for Canadians is an ongoing priority of the CSA. In 2019–20, a total of 12 departments and agencies directly integrated space-based data from CSA assets to deliver 109 services that benefit Canadians. This represents an increase from 96 services offered to Canadians in 2018–19. These services support government initiatives addressing challenges on climate change, changing landscapes, the management of Canada's natural resources, innovation in the agriculture and agri-food sectors and in the management of ocean resources, as well as monitoring

activities for national security purposes. New services launched in 2019 focused particularly on environmental initiatives related to water and forest management.

Result 4 — Canada’s investments in space benefit the Canadian economy

In 2019–20, the CSA continued to foster innovation in the space sector and enabled Canadian innovators and entrepreneurs to take advantage of growth opportunities that create well-paying jobs and grow the middle class. These benefits are the ultimate goal of the [Innovation and Skills Plan](#)^{viii}, which is an ambitious effort to make Canada a world-leading centre for innovation.

In 2018 (the most recent data), the number of countries investing in space was at a historic high at 84 countries. This rapidly evolving landscape has resulted in increased competition from new space-faring countries. The CSA continues to engage with international partners and in international forums to advance strategic priorities and to establish collaborative opportunities. In addition, to position Canada’s commercial space sector to help grow the economy and create the jobs of the future, the CSA has led multiple domestic and international business development activities with a variety of stakeholders across the sector. The Canadian space sector is inherently export-oriented and commercial relationships with foreign partners and inclusion into the global supply chain is critical to the prosperity of Canadian space firms.

The [Canada-European Space Agency Cooperation Agreement](#)ⁱ fosters Canadian space industry exports and facilitates access to European markets. In November 2019, Canada took part in ESA’s Ministerial Council meeting. Following broad consultations with Canada’s space sector, Canada confirmed new investments totalling approximately \$90M in a series of ESA programs that support key government priorities, as well as the space industry and the scientific community. Investments cover several areas, including EO, satellite communications, space exploration, and technology development.

In 2019–20, all five [ISC](#)^{xvi} projects from the CSA’s first challenge related to artificial intelligence and big data analytics for advanced autonomous space systems were completed.

The CSA actively contributed to the implementation of the national Intellectual Property (IP) Strategy. Through [Explore IP](#)ⁱⁱ, a national web platform, and [IP Marketplace](#)ⁱⁱⁱ, a platform to share federal government patents, the CSA disseminated its own portfolio and the spin-off potential of space technology patents. With respect to business IP, in collaboration with the Canadian Intellectual Property Office, four awareness sessions were held, with the attendance of 45 organizations in Ontario (Toronto and Waterloo) and Atlantic Canada (Halifax and St. John’s).

By supporting the development, maturation, and commercialization of space technologies and services, the CSA fully supported the goals of ensuring that investments benefit the Canadian economy through the development of value-added services and fostering space export growth. According to the most recent available data, the Canadian space

sector generated \$2.3B in exports, which represents an increase from the \$2.1B generated in 2018–19 and maintained 4,120 highly qualified jobs in 2018.

Gender-based analysis plus

Since 2017, Gender-Based Analysis Plus (GBA+) has been included in the Investment Governance and Monitoring Framework and has been part of the roles and responsibilities of a designated manager.

A policy was implemented to establish the roles and responsibilities of CSA employees, stipulating that all new initiatives, or those to be renewed, are subject to GBA+. In addition, during the development of the Workforce Management Strategic Plan (WMSP), consultations were conducted with the various CSA groups to gather their feedback on the actions and issues identified. These consultations are done through internal CSA committees, including the Continuous Improvement Committee and the Employment Equity and Diversity Advisory Committee. The CSA will also consult with the individuals identified as the point of contact for GBA+ within the organization to ensure that the actions identified will not negatively impact certain diverse groups of women, men and gender diverse people, and will promote better outcomes for Canada's diverse population.

In 2019–2020, the CSA reviewed three initiatives through the lens of GBA+. These initiatives were mainly aligned with four of the six objectives of the Gender Results Framework, e.g., education and skills development; economic participation and prosperity; poverty reduction and health and well-being; and gender equality around the world.

Experimentation

The CSA outlined an approach to incorporate experimentation when it comes to finding the best method to deliver on its core mandate for most, if not all its investments related to its programs. In fact, the use of experimentation is included in the CSA's Investment Governance and Monitoring Framework (IGMF). The IGMF is the Agency-wide investment process for projects. This directive elaborates the standard requirements and processes for overseeing projects, and applies to all projects, space and non-space, managed by the CSA. It ensures disciplined management of investments in projects and full accountability. As part of this framework, experimentation is included during the option analysis phase and project definition phase at which point technical elements are prototyped and tested to find the most efficient technological solution that will result in the largest benefit for Canadians and the best alignment with the CSA's Departmental Results Framework and Program Information Profiles. For instance, two or more technologies are prototyped and then the outcomes are rigorously compared through

technical indicators and business need requirements related to the strategic fit, potential achievability, and affordability. In most cases, the technology that most efficiently achieves the greatest outcomes is chosen for the project.

Following the success of a pilot project conducted in 2018 called CS-01, *100% Virtual* where the Agency completely eliminated the use of traditional interviews and replaced them with a fully virtual skills assessment, the initiative was expanded in 2019 for a CR-04 external advertised process and for an AS-01 internal advertised process. In fact, the results of the pilots were tracked and measured against results achieved from conventional staffing actions and demonstrated significant savings in time and resources and will inform future staffing actions at the Agency.

Results achieved

Departmental results	Performance indicators	Target	Date to achieve target	2019–20 Actual results	2018–19 Actual results	2017–18 Actual results
1: Space research and development advances science and technology	Business Expenditures in Research and Development (BERD) in the space sector	\$250M	March 31, 2020	\$356M ¹ (2018)	\$363M (2017)	\$254M (2016)
	Canada's rank among OECD nations on the citation score of space-related publications	11	March 31, 2020	16 ² (2018)	11 (2017)	11 (2016)
2: Canadians engage with space	Number of new people and organizations entering space-related fields as a result of CSA funding	330	March 31, 2020	1041 ³ (2018)	206 (2017)	N/A New indicator
	Number of engagements on social media related to the CSA	2M	March 31, 2020	3,592,089 ⁴ (2019)	3,884,506 (2018)	2,591,031 (2017)

¹ The CSA is using a five-year rolling average to set the target based on the fluctuations of the Canadian space sector over time as missions proceed through their lifecycles. As a new company reported significant BERD in the past two years, the report numbers are now significantly higher than the five-year average. A new target has been developed for the 2020-21 Departmental Plan to account for changes in the industry.

² By providing access to high-quality scientific data and supporting researchers, the CSA contributed to Canada's 16th rank among Organization for Economic Cooperation and Development (OECD) nations with regard to the average relative citation score of space-related publications. Canada's average relative citation (ARC) score, corresponds to a value of 1.59 for the period from 2012 to 2018, compared with 1.62 for the previous period from 2012 to 2017, or 11th rank. The gap between these two periods must be interpreted carefully because the gap separating Canada from the country holding the 10th rank is less than 0.10 ARC points, which is probably not statistically significant. At the same time, Canada had the highest citation score of space-related publications in 2018 among G7 countries.

³ The increase is attributable to the fact that last year's result was a partial result, as the survey question to universities was mid-year. We have also noted that, this year, a strong increase in the result is related to a large number of new people involved in the CubeSat project (44% of new people from academia). The gender distribution of all new people was 69% female and 31% male.

⁴ 2019–20 was an exceptional year for the CSA's social media accounts with the highly successful and visible campaign for David Saint-Jacques' mission to the ISS.

Departmental results	Performance indicators	Target	Date to achieve target	2019–20 Actual results	2018–19 Actual results	2017–18 Actual results
3: Space information and technologies improve the lives of Canadians	Number of services offered to Canadians dependent on CSA information (such as remote sensing data, including satellite imagery and science observations)	87	March 31, 2020	109 (2019)	96 (2018)	83 (2017)
	Number of Canadian space technologies adapted for use on Earth or re-use in space	7	March 31, 2020	22 ⁵ (2018)	16 (2017)	13 (2016)
4: Canada's investments in space benefit the Canadian economy	Number of highly qualified people in the Canadian space sector	4,250	March 31, 2020	4,120 (2018)	4,302 (2017)	4,085 (2016)
	Value of exports of the Canadian space sector	\$2B	March 31, 2020	\$2.3B ⁶ (2018)	\$2.1B (2017)	\$2B (2016)

⁵This result is largely due to technologies developed for the space domain increasingly having applications on Earth. The majority of technologies were related to the EO sector. The CSA uses a seven-year rolling average for this measure and given multiple years had only six technology transfers or less, the target is lower compared with the result.

⁶ The CSA is using a five-year rolling average to set the target based on the fluctuations of the Canadian space sector over time as missions proceed through their lifecycles. The current target is \$300M more than the five-year rolling average.

Budgetary financial resources (dollars)

2019–20 Main Estimates	2019–20 Planned spending	2019–20 Total authorities available for use	2019–20 Actual spending (authorities used)	2019–20 Difference (Actual spending minus Planned spending)
278,432,275	278,432,275	388,162,893	273,268,394	-5,163,881

Human resources (full-time equivalents)

2019–20 Planned full-time equivalents	2019–20 Actual full-time equivalents	2019–20 Difference (Actual full-time equivalents minus Planned full-time equivalents)
399.9	387.6	-12.3

Financial, human resources and performance information for the Canadian Space Agency's Program Inventory is available in [GC InfoBaseⁱⁱⁱ](#).

Internal Services

Description

Internal Services are those groups of related activities and resources that the federal government considers to be services in support of programs and/or required to meet corporate obligations of an organization. Internal Services refers to the activities and resources of the 10 distinct service categories that support Program delivery in the organization, regardless of the Internal Services delivery model in a department. The 10 service categories are

- ▶ Acquisition Management Services
- ▶ Communication Services
- ▶ Financial Management Services
- ▶ Human Resources Management Services
- ▶ Information Management Services
- ▶ Information Technology Services
- ▶ Legal Services
- ▶ Material Management Services
- ▶ Management and Oversight Services
- ▶ Real Property Management Services

Results

In order to ensure modern, efficient, and relevant delivery of its services, in 2019–20, the CSA has continued to improve its internal services processes and business models in order to be strategically and operationally aligned with its international partners, stakeholders, academia, and other government departments.

The last month of 2019–20 presented the Agency with an unprecedented challenge from the COVID-19 pandemic. This forced CSA to quickly adapt to the new reality of virtual work to minimize disruptions in the delivery of its services. To enable this virtual work, the CSA's laptop deployment and remote access privileges were scaled up and implemented prior to the COVID-19 lock-downs.

The CSA also continued to implement departmental and government-wide solutions to improve its information management and information technology tools to promote openness and to enhance business effectiveness, collaboration and mobility (i.e., Wi-Fi, mobile devices, cellular coverage, and collaborative space). These solutions included the development of a cloud-based productivity environment, for planned deployment in 2020-21.

In 2019–20, the CSA conducted an assessment of its maturity level in corporate risk management and reviewed its processes. This will result in better integration of risk information in decision-making processes at a strategic level. The CSA sought to further

improve the alignment of its Programs' expected results with its Departmental Result Framework.

The [2019 State of the Canadian Space Sector Report](#),^{liv} based on the 2018 Canadian Space Sector data, measures and identifies key economic trends in revenues, exports, employment, and R&D. In order to enhance the understanding of the gender distribution of new employees at space companies, a new question was added to the survey. The report was published on the CSA website on March 30, 2020.

With regard to the employee wellness perspective, 2019–20 ended very differently than expected for all Canadians and the world. Throughout the year, the CSA maintained its regular activities to promote a healthy and inclusive workplace, while devoting more time and effort to consultations and further engagement with employees as part of the CSA's focus on open dialogue to enable a better understanding of employees' needs prior to submitting a revised plan aimed at creating a Psychological Health and Safety Management System.

At the same time, to support a talent-based management approach, the first round of consultations was held with the innovation and future-oriented Infinity Group, CSA's local chapter of the Federal Youth Network, to begin discussions about the future skills development needs in response to the new space strategy.

Additional resources dedicated to building capacity on HR analytics and planning were added and working methods were reviewed to support a wider use of HR analytics in decision-making as well as to explore continuous improvement possibilities in HR analytics capacity and tools. This resulted in an increase in the use of data to identify potential issues such as workforce renewal, employment equity, and leave management; and monitor progress related to both the workplace and the workforce.

In 2019–20, the CSA approved its three-year Departmental Security Plan and began the development of mitigation efforts to address the identified key corporate security risks, in accordance with the planned three-year schedule. Furthermore, the activities planned and approved in support of the CSA's Greening of Government Long-Term Action Plan were implemented in accordance with the schedule.

Finally, the CSA developed its data strategy and implementation plan in alignment with the [Data Strategy Roadmap for the Federal Public Service](#)^{lv}. This plan not only aims to make scientific data and information more accessible to Canadians, but it also ensures support and compliance with the [Chief Scientific Advisor of Canada's Open Science Roadmap](#)^{lvi}.

Budgetary financial resources (dollars)

2019–20 Main Estimates	2019–20 Planned spending	2019–20 Total authorities available for use	2019–20 Actual spending (authorities used)	2019–20 Difference (Actual spending minus Planned spending)
50,516,301	50,516,301	53,675,245	51,167,697	651,396

Human resources (full-time equivalents)

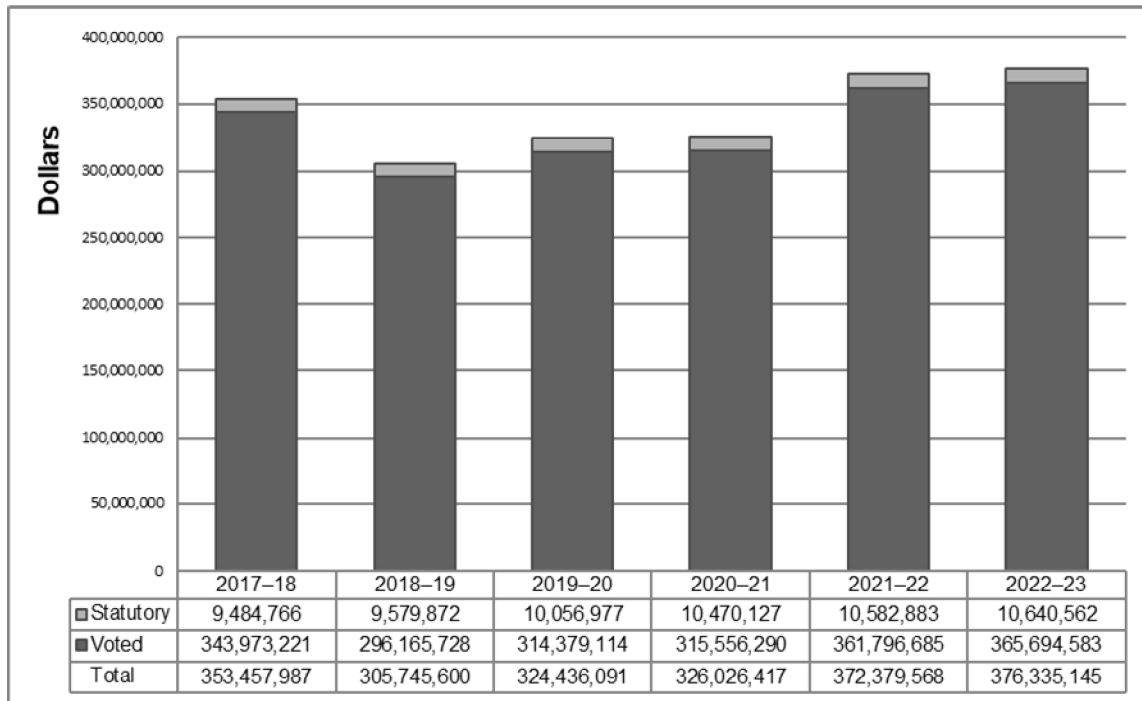
2019–20 Planned full-time equivalents	2019–20 Actual full-time equivalents	2019–20 Difference (Actual full-time equivalents minus Planned full-time equivalents)
294.7	289.9	-4.8

Analysis of trends in spending and human resources

Actual expenditures

Departmental spending trend graph

The following graph presents planned (voted and statutory spending) over time.



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

- Additional funding of \$18.6M spread out over three years starting in 2019–20 for the QEYSSat project.
- Additional funding of \$374M spread over six fiscal years (from 2013–14 to 2018–19) was allocated to the RCM (\$140M was new funds arising from the Fiscal Framework and \$234M was transferred from user departments to the CSA).
- As indicated in the Budget 2015 and 2016 announcements, additional funding of \$30M spread over four years starting in 2016–17 was authorized to maintain Canada's participation in the ESA's Advanced Research in Telecommunications Systems (ARTES) Program.
- In accordance with the Budget 2015 announcements, and with \$379M in new funds earmarked in the Budget 2016, additional funding of \$164M over eight years

beginning in 2017–18 was authorized to support activities on board the ISS until 2024–25.

- In 2017–18, an additional funding of \$8M was obtained through Budget 2016 for security improvements at the John H. Chapman Space Centre, and for the purchase and installation of absorbent materials for the anechoic chamber in High Bay 2 of the David Florida Laboratory (DFL).

At the same time, the cumulative effect of reallocating unused funds to subsequent years as a result of the sound management on high-risk projects, including increased technological risks, long-term development cycles, and work schedule uncertainties, has also had an impact on the CSA's spending trend in recent years.

Budgetary performance summary for Core Responsibilities and Internal Services (dollars)

Core responsibilities and Internal Services	2019–20 Main Estimates	2019–20 Planned spending	2020–21 Planned spending	2021–22 Planned spending	2019–20 Total authorities available for use	2019–20 Actual spending (authorities used)	2018–19 Actual spending (authorities used)	2017–18 Actual spending (authorities used)
Canada in space	278,432,576	278,432,275	273,383,417	316,803,345	388,162,893	273,268,394	254,711,091	293,157,159
Subtotal	278,432,576	278,432,275	273,383,417	316,803,345	388,162,893	273,268,394	254,711,091	293,157,159
Internal Services	50,516,000	50,516,301	52,643,000	55,576,223	53,675,245	51,167,697	51,034,509	60,300,828
Total	328,948,576	328,948,576	326,026,417	372,379,568	441,838,138	324,436,091	305,745,600	353,457,987

The spending gap is mainly due to specific funding allocated to the following initiatives to supplement CSA's regular budget.

- Additional funding of \$374M over six years (2013–14 to 2018–19) was allocated to the RCM from the Fiscal Framework, and \$234M was transferred from user departments to the CSA. The RCM was launched in June 2019, a few months after the original launch date in 2018–19. Some inherent challenges are being addressed and are expected to be completed in fiscal year 2020–21.
- In accordance with the Budget 2015 announcements, and with \$379M in new funds earmarked in the Budget 2016, additional funding of \$164M over eight years beginning in 2017–18 was authorized to support activities on board the ISS until 2024–25.

At the same time and as noted above, the cumulative effect of reallocating funds to subsequent years as a result of the sound management of high-risk projects has also had an impact on the CSA's spending trend in recent years.

Actual human resources

Human resources summary for core responsibilities and Internal Services

Core responsibilities and Internal Services	2017–18 Actual full-time equivalents	2018–19 Actual full-time equivalents	2019–20 Planned full-time equivalents	2019–20 Actual full-time equivalents	2020–21 Planned full-time equivalents	2021–22 Planned full-time equivalents
Canada in space	387.3	390.0	399.9	387.6	401.1	400.9
Subtotal	387.3	390.0	399.9	387.6	401.1	400.9
Internal Services	266.7	285.4	294.7	289.9	303.1	300.9
Total	654.0	675.4	694.6	677.5	704.2	701.8

The gap between actual and planned full-time equivalents (FTEs) in 2019–20 is mainly attributable to retirements, other departures, and positions not expected to be filled until after year end.

Expenditures by vote

For information on the Canadian Space Agency's organizational voted and statutory expenditures, consult the [Public Accounts of Canada 2019–2020](#).^{lvii}

Government of Canada spending and activities

Information on the alignment of the Canadian Space Agency's spending with the Government of Canada's spending and activities is available in [GC InfoBase](#).^{lviii}

Financial statements and financial statements highlights

Financial statements

The Canadian Space Agency's financial statements (unaudited) for the year ended March 31, 2019, are available on the [departmental website](#).^{lviii}

Financial statement highlights

Condensed Statement of Operations (unaudited) for the year ended March 31, 2020 (dollars)

Financial information	2019–20 Planned results	2019–20 Actual results	2018–19 Actual results	Difference (2019–20 Actual results minus 2019–20 Planned results)	Difference (2019–20 Actual results minus 2018–19 Actual results)
Total expenses	344,613,956	347,401,440	334,472,584	2,787,484	12,928,856
Total revenues	24,799	18,750	30,481	(6,049)	(11,731)
Net cost of operations before government funding and transfers	344,589,157	347,382,690	334,442,103	2,793,533	12,940,587

Total planned expenses for 2019–20 were \$344.6M, a slight variance of \$2.8M compared with actual results of \$347.4M.

In 2019–20, total expenses were \$347.4M, an increase of \$12.9M (3.9%) compared with the previous year's total expenses of \$334.5M. The increase is mainly due to a \$7.0M increase in salaries and employee benefits expenses, a \$6.9M increase in amortization expenses and a \$6.1M increase in transfer payments mainly attributable to variations in the European Space Agency's payment schedule, combined with a \$5.2M decrease in the acquisition of RADARSAT-2 data (imagery).

The CSA's total revenues were \$0.02M in 2019–20 (\$0.03M in 2018–19), which represents the re-spendable portion of overall revenues of \$19M. The majority 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 business or other Government of Canada departments, location and use of public property, as well as other revenues.

**Condensed Statement of Financial Position (unaudited) as of March 31, 2020
(dollars)**

Financial information	2019–20	2018–19	Difference (2019–20 minus 2018–19)
Total net liabilities	78,209,306	82,971,608	4,762,302
Total net financial assets	68,924,688	75,154,787	(6,230,099)
Departmental net debt	9,284,618	7,816,821	1,467,797
Total non-financial assets	1,559,168,970	1,547,839,023	11,329,947
Departmental net financial position	1,549,884,352	1,540,022,202	9,862,150

Total net liabilities of \$78.2M consist mainly of accounts payable and accrued liabilities. These represent goods and services received at year-end but that have not yet been paid by the Agency.

The \$4.8M (5.7%) decrease in net liabilities (\$78.2M for 2019–20 compared with \$83M for 2018–19) is mainly due to a \$5.7M decrease in accounts payable and accrued liabilities. These variances are normal as payment schedules may vary from one year to another, especially those related to the ISS, the RCM and the ESA.

Total assets were \$1.63B at the end of 2019–20 (\$69M of net financial assets and \$1.56B of non-financial assets), similar to the previous year's total of \$1.62B.

Non-financial assets are mainly composed of space-related assets (\$1.4B over \$1.56B or 90.8%).

Additional information

Organizational profile

Appropriate minister: The Honourable Navdeep Bains P.C., M.P.

Institutional head: Lisa Campbell

Ministerial portfolio: Innovation, Science and Industry

Enabling instrument[s]: Canadian Space Agency Act, S.C. 1990, c. 13^{lix}

Year of incorporation / commencement: Established in March 1989

Other: The Canadian Space Agency was established in 1989. Approximately 84% of its employees work at the headquarters located at the John H. Chapman Space Centre, in St-Hubert, Quebec. The remaining personnel serve the CSA at the David Florida Laboratory in Ottawa, Ontario and its Policy and Planning offices in Gatineau, Quebec, with officials in Houston, Washington and Paris.

Raison d’être, mandate and role: who we are and what we do

“Raison d’être, mandate and role: who we are and what we do” is available on the [Canadian Space Agency’s website](#).^{lviii}

For more information on the department’s organizational mandate letter commitments, see the [Minister’s mandate letter](#)^{lx}.

Reporting framework

The Canadian Space Agency’s Departmental Results Framework and Program Inventory of Record for 2019–20 are shown below:

Departmental Results Framework	Core Responsibility: Canada in space		Internal Services
	Departmental Result: Space research and development advances science and technology	Indicator: Business Expenditures in Research and Development in the space sector	
		Indicator: Canada’s rank among OECD nations on the citation score of space-related publications	
	Departmental Result: Canadians engage with space	Indicator: Number of new people and organizations entering space-related fields as a result of CSA funding	
		Indicator: Number of engagements on social media related to the CSA	
	Departmental Result: Space information and technologies improve the lives of Canadians	Indicator: Number of services offered to Canadians dependent on CSA information	
		Indicator: Number of Canadian space technologies adapted for use on Earth or re-use in space	
	Departmental Result: Canada’s investments in space benefit the Canadian economy	Indicator: Number of highly qualified people in the Canadian space sector	
Indicator: Value of exports of the Canadian space sector			
Program Inventory	Program: Space Capacity Development		
	Program: Space Exploration		
	Program: Space Utilization		

Supporting information on the Program Inventory

Financial, human resources and performance information for the Canadian Space Agency’s Program Inventory is available in [GC InfoBase](#)^{liii}

Supplementary information tables

The following supplementary information tables are available on the [Canadian Space Agency's website](#).^{lviii}

- ▶ [Departmental Sustainable Development Strategy](#)
- ▶ [Details on transfer payment programs of \\$5 million or more](#)
- ▶ [Gender-based analysis plus](#)
- ▶ [Horizontal initiatives](#)
- ▶ [Status report on transformational and major Crown projects](#)
- ▶ [Up-front multi-year funding](#)

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](#)^{lxix}. This report also provides detailed background information on tax expenditures, including descriptions, objectives, historical information and references to related federal spending programs. The tax measures presented in this report are the responsibility of the Minister of Finance.

Organizational contact information

Canadian Space Agency^{lxxii}

Communications and Public Affairs

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Fax: 450-926-4352

Email: asc.medias-media.csa@canada.ca

Website: <http://www.asc-csa.gc.ca>

Appendix: 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, organizations 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.

experimentation (expérimentation)

The conducting of activities that seek to first explore, then test and compare the effects and impacts of policies and interventions in order to inform evidence-based decision-

making, and improve outcomes for Canadians, by learning what works, for whom and in what circumstances. Experimentation is related to, but distinct from innovation (the trying of new things), because it involves a rigorous comparison of results. For example, using a new website to communicate with Canadians can be an innovation; systematically testing the new website against existing outreach tools or an old website to see which one leads to more engagement, is experimentation.

full-time 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 full-time 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+) (analyse comparative entre les sexes plus [ACS+])

An analytical process used to assess how diverse groups of women, men and gender-diverse people experience policies, programs and services based on multiple factors including race ethnicity, religion, age, and mental or physical disability.

government-wide priorities (priorités pangouvernementales)

For the purpose of the 2019–20 Departmental Results Report, those high-level themes outlining the government's agenda in the 2019 Speech from the Throne, namely: Fighting climate change; Strengthening the Middle Class; Walking the road of reconciliation; Keeping Canadians safe and healthy; and Positioning Canada for success in an uncertain world.

horizontal initiative (initiative horizontale)

An initiative where two or more federal organizations 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 an organization did with its resources to achieve its results, how well those results compare to what the organization 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 an organization, program, policy or initiative respecting expected results.

performance reporting (production de rapports sur le rendement)

The process of communicating evidence-based performance information. Performance reporting supports decision making, accountability and transparency.

plan (plan)

The articulation of strategic choices, which provides information on how an organization 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 an organization, policy, program or initiative. Results are not within the control of a single organization, policy, program or initiative; instead they are within the area of the organization's influence.

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 an organization, 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.

Endnotes

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- i Space Strategy for Canada, <https://www.asc-csa.gc.ca/eng/publications/space-strategy-for-canada/default.asp>
- ii Space Technology Development Program, <https://asc-csa.gc.ca/eng/funding-programs/programs/stdp/default.asp>
- iii Curiosity, <http://www.asc-csa.gc.ca/eng/astronomy/mars/curiosity.asp>
- iv OSIRIS-REX, <http://www.asc-csa.gc.ca/eng/satellites/osiris-rex/default.asp>
- v International Space Station, <https://asc-csa.gc.ca/eng/iss/default.asp>
- vi Minister of Innovation, Science and Economic Development mandate letter, <https://pm.gc.ca/en/mandate-letters/2015/11/12/archived-minister-innovation-science-and-economic-development-mandate>
- vii Minister of Science mandate letter, <https://pm.gc.ca/eng/minister-science-mandate-letter>
- viii Innovation and Skills Plan, <http://www.ic.gc.ca/eic/site/062.nsf/eng/home>
- ix Lunar Gateway, <https://asc-csa.gc.ca/eng/astronomy/moon-exploration/lunar-gateway.asp>
- x Canadarm3, <https://asc-csa.gc.ca/eng/canadarm3/about.asp>
- xi Lunar Exploration Accelerator Program, <https://asc-csa.gc.ca/eng/funding-programs/programs/leap/about.asp>
- xii Junior Astronaut, <https://asc-csa.gc.ca/eng/resources-young/junior-astronauts/default.asp>
- xiii RADARSAT Constellation Mission, <https://asc-csa.gc.ca/eng/satellites/radarsat/default.asp>
- xiv David Saint-Jacques' mission, <https://asc-csa.gc.ca/eng/missions/expedition58/default.asp>
- xv WildFireSat, <https://asc-csa.gc.ca/eng/satellites/wildfiresat/default.asp>
- xvi Innovative Solutions Canada, <https://www.ic.gc.ca/eic/site/101.nsf/eng/home>
- xvii Industrial and Technological Benefits Policy, https://www.canada.ca/en/innovation-science-economic-development/news/2017/04/the_industrial_andtechnologicalbenefitpolicy.html
- xviii ASTROSAT, <https://asc-csa.gc.ca/eng/sciences/astrosat.asp>
- xix XRISM, <https://asc-csa.gc.ca/eng/satellites/xrism/default.asp>
- xx SCISAT, <https://asc-csa.gc.ca/eng/satellites/scisat/about.asp>
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