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CANARIE Annual Business Plan 2022-23

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1 Executive Summary

CANARIE is pleased to present its Annual Business Plan for fiscal year 2022-23 (FY23), the third year of the 2020-24 mandate. The document includes past accomplishments as well as CANARIE's plans to achieve its expected results. Risks and risk mitigation strategies are also presented.

1.1 Role of CANARIE

CANARIE connects Canadians to each other and to the world. Our programs equip Canadian researchers, students, and startups to excel on the global stage.

Together with our thirteen provincial and territorial partners, we form Canada's National Research and Education Network (NREN). This ultra-high-speed network connects Canada's researchers, educators, and innovators to each other and to global data, technology, and colleagues.

Beyond the network, to strengthen the security of Canada's research and education sector, we collaborate with our partners in the NREN, government, academia, and the private sector to fund, implement, and support cybersecurity initiatives. We also provide identity management services to the academic community and boost Canada's startups with cloud resources and expertise in emerging technologies. We also funded and promoted the development of software for research and national efforts to manage data generated from research.

Established in 1993, we are a non-profit corporation, with most of our funding provided by the Government of Canada.

1.2 Focus of Activities: FY23 (April 1, 2022 to March 31, 2023)

CANARIE's focus during its new mandate is on amplifying the impact of Canada's digital infrastructure, as Canadians engaged in data-intensive, collaborative research and innovation are increasingly dependent on this critical infrastructure.

In FY23, CANARIE will continue to launch and execute programs that build on strong foundations and evolve to support better alignment and integration of the components of Canada's digital research infrastructure, while working to improve cybersecurity within the communities we serve.

In addition to the ongoing management of the CANARIE network and other programs, key planned activities, and outcomes for FY23 include:

- Launching new initiatives to enhance the cybersecurity of eligible organizations connected to the NREN that are recommended by the Cybersecurity Advisory Committee and its standing committees, under the Cybersecurity Initiatives Program;
- Projects and activities to undertake the refresh of the Eastern fibre network;
- Deployment of additional network capacity to support Northern connectivity, and continuing activities to support the newest NREN partner organization in Nunavut;
- Ongoing execution of projects that create, extend, or maintain network infrastructure on regional and territorial partner networks under NREN Call 2;
- Development of additional BoosterPacks for the DAIR cloud environment to catalyze the use of transformative technologies by Canadian SMEs;

- Continued evolution of a Global Research and Education Network (GREN) map to provide dynamic visualizations of global connectivity, down to the institutional level; and
- Ongoing coordination with the Digital Research Alliance of Canada (the Alliance) in support of the Government of Canada’s Digital Research Infrastructure Strategy.

1.3 Focus of Activities: 2020 – 2024 Mandate

CANARIE’s programming and activities during the 2020-2024 mandate will be defined by the following trends that are shifting the research and innovation landscape:

- 1) the continued digitization of research,
- 2) the growing need for cybersecurity,
- 3) the adoption of cloud technologies in all sectors, and
- 4) the creation of the Digital Research Alliance of Canada (the Alliance) to manage the federal investment in advanced research computing, research data management, and research software.

CANARIE activities in the 2020-2024 mandate are focused on the following three areas which align directly with the Expected Results outlined in CANARIE’s Contribution Agreement with the Government of Canada.

Network Operations

To deliver a world-class, high performance network and network-based services, CANARIE will:

- a) Increase network capacity and performance to keep pace with the growth in demand;
- b) Expand network reach and redundancy to address the needs of research and education communities from coast to coast to coast;
- c) Strengthen the overall security posture of the NREN, and better understand its vulnerabilities;
- d) Support the development of security capability at NREN-connected institutions; and
- e) Evolve the network services portfolio, including identity management, to enhance research, collaboration, and innovation.

Technology Innovation

To bring new collaboration capabilities not previously offered to Canada’s research community by creating and funding new software technologies, CANARIE will:

- a) Test network-driven and network-enabled technologies to support the research workflow;
- b) Drive the adoption of software tools and services to utilize and exploit data (until the end of FY23);
- c) Develop new tools and services to support cybersecurity in the research and education ecosystem;
- d) Increase the impact of tools and services to users;
- e) Support research data management through the development of tools and applications (until the end of FY22); and

- f) Promote the collaborative development of data management tools (until the end of FY22).

Private Sector Innovation

To stimulate commercialization CANARIE will:

- a) Leverage the network to support innovation, development and adoption of transformative ICT technologies, including DAIR (the Digital Accelerator for Innovation and Research);
- b) Facilitate academic and private sector partnerships to drive collaborative innovation and commercialization; and
- c) Facilitate access to the CANARIE network to support the CENGN (Centre of Excellence in Next Generation Networks) testbed capabilities across Canada.

2 2021-22 Accomplishments to Date

2021-22 (FY22) is the second year of CANARIE's 2020-2024 mandate. The following sections provide an overview of CANARIE's accomplishments in FY22 to date under each of the three Eligible Activities outlined in the Contribution Agreement that governed that mandate, along with information on outstanding projects for completion. The balance of FY22 accomplishments will be captured in the Annual Report.

2.1 Network Operations

To evolve and expand the CANARIE network in a flexible and cost-effective manner over the long-term, CANARIE's vision is to deploy fibre from coast-to-coast across Canada. In high-use, high-growth network corridors, CANARIE purchased fibre and therefore has the flexibility to add capacity and deploy transformative technologies quickly and at a considerably lower incremental cost, especially as network traffic is returning to pre-COVID-19 pandemic levels and is expected to continue its exponential growth in the future. This connectivity is protected by leased services, which provide necessary network diversity.

Thus far in FY22, CANARIE:

- Completed the replacement of the western section of the national R&E backbone's optical fibre system
- Continued leading an international working group tasked with creating a dynamic visualization of the Global Research and Education Network, including an international demonstration at the (virtual) TNC21 Conference
- Adopted the NIST Risk Management Methodology for internal network Threat Risk Assessment
- Completed the first CANARIE Security Audit using the Canadian Center for Cyber Security (CCCS) methodology implemented in the Canadian Cyber Security Tool (CCST)
- Launched the second, third and fourth initiatives – CanSSOC Threat Feed, Intrusion Detection System, and CUCCIO Benchmarking Project – under the Cybersecurity Initiatives Program
- Hosted the fourth annual initiatives planning meeting of provincial and territorial network staff at the NREN Assembly
- Held the 2021 CANARIE Summit, the first to be conducted online
- Launched a project to raise awareness of Research and Education Networks in the Americas, in partnership with our international partners Internet2 (the U.S.) and RedCLARA (pan-Latin America)

Key projects to be completed before the end of FY22 include:

- Co-hosting the second NREN Summit, held jointly with our 13 Canadian NREN partners

2.2 Technology Innovation

Research Software

CANARIE continued to champion the development of powerful research software tools that accelerate discovery and enable researchers to focus their time and funding on research activity rather than software development. Research software enables users to seamlessly access digital infrastructure and resources

without having expert knowledge of these infrastructures, thereby expanding use of these resources across many research domains.

These tools are available via CANARIE's online research software portal (science.canarie.ca). The online portal, the first of its kind in Canada, allows users to find reusable software services and examine each service's availability and usage statistics. The portal creates a national clearinghouse for research software and provides seamless access to advanced software tools to spur broad adoption by the research community.

Thus far in FY22, CANARIE:

- Executed on platform Call 3, to support research teams who will adapt existing research platforms for re-use by new research teams
- Executed on Local Research Software Support Initiative Call 1, to support the development of on-campus teams of research software experts
- Hosted the 2021 Canadian Research Software Conference
- Conducted the 2021 survey of Canadian research software developers

Key projects to be completed before the end of FY22 include:

- Ongoing work to support the transition of Research Software to the Alliance

Research Data Management

The ability to reuse research data accelerates opportunities for creating new knowledge and maximizes the return on investment of research funding. To support Canada's research data management ecosystem, CANARIE funds the development of software and tools to support the research data management workflow and support the work of Research Data Canada.

Thus far in FY22, CANARIE:

- Executed on RDM Call 2, to support collaborative interoperability and integration of data repositories and systems within Canadian and global digital research infrastructures

Key projects to be completed before the end of FY22 include:

- Hosting the 2022 National Data Services Framework Summit
- Ongoing work to support the transition of Research Data Management to the Alliance

Innovation Fund

The digital research infrastructure needs of the research and education community can (and do) evolve significantly during the term of CANARIE's mandate. Additionally, Information Technology (IT) capabilities or demands on IT continue to evolve, often significantly. For example, current investments in cybersecurity are being driven by the pervasive use of IT in all facets of society which was unforeseen a number of years ago. The CANARIE governance model enables it to respond to the demands in a manner that aligns with CANARIE's Contribution Agreement. The role of the Innovation Fund is to ensure CANARIE can respond to these demands.

The Innovation Fund is not new for this mandate. In the prior mandate for example, the Innovation Fund was used to respond to the needs of the community for national Research Data Management (RDM), and also to maximize participation in Phase 1 of the Joint Security Project pilot.

CANARIE is currently working, in line with its 2021-2022 Business Plan, to define the initial project(s) to be funded under the Innovation Fund.

Key projects to be completed before the end of FY22 include:

- Defining the first project(s) to be funded under the Innovation Fund in the 2020-24 Mandate

2.3 Private Sector Innovation

Under Private Sector Innovation activities, CANARIE leveraged its infrastructure and relationships to support adoption of digital technologies by Canadian SMEs to advance innovation and commercialization.

Thus far in FY22, CANARIE:

- Launched and promoted to SMEs our fifth BoosterPack. BoosterPacks are packages of cloud resources and curated knowledge developed by Canadian SMEs about emerging technologies
- Executed community development activities including, but not limited to, outreach and events in collaboration with accelerators and the Ontario Regional Innovation Centres (RICs); webinars; and the development training materials and of an updated DAIR user survey
- Engaged SMEs for future BoosterPack development

3 2022-23 Planned Activities

FY23 is the third fiscal year of CANARIE's 2020-2024 mandate. To deliver on its expected results for the mandate, CANARIE will undertake the following activities in the 2022-23 fiscal year:

3.1 Network Operations

CANARIE will continue to undertake all required activities to support and evolve the existing CANARIE network and the services delivered over it.

- 1) Network Program – As a result of this program, the CANARIE network will continue to operate and evolve as essential research infrastructure to support research, education, and innovation. To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:
 - i. Operate the network
 - ii. Increase capacity, redundancy, and reliability
 - iii. Continue to improve the network security posture
 - iv. Improve the network monitoring activities through the adoption of new tools
 - v. Continue to enhance user access to support tools
 - vi. Continue to develop software-driven network services
 - vii. Continue the collaboration in the cybersecurity crisis management activities conducted together with CANARIE's GREN partners (annual CLAW exercise)
 - viii. Participate in CUCCIO Benchmarking Project to promote and maintain a strong cybersecurity posture for CANARIE IT Infrastructure and Networks
 - ix. Operate the Distributed Denial of Service (DDoS) detection system dedicated to the CANARIE network and actively collaborate with NREN Partners on the validation of incident data and delivery of mitigation options
 - x. Provide a sustainable cybersecurity monitoring service by efficiently managing and integrating the SIEM (Security Information and Event Management) systems deployed on CANARIE infrastructure and network, and in collaboration with each NREN Partner
 - xi. Promote and implement in-house cybersecurity expertise

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Deployment of additional network capacity to support traffic growth
- Improved commercial cloud support
- Refresh of the largest segment of the Central fibre system
- Commence work on the refresh of the Eastern fibre system
- Deployment of additional network capacity to support Northern connectivity
- Improvement of network security reporting, monitoring, and measurement system
- Improvement of the Global Research and Education Network (GREN) Map

- Deployment of Software Networking Applications
 - Deployment of support tools accessible through the user portal
- 2) Infrastructure Extension Program (IEP) – As a result of this program, government research institutes will continue to leverage the research network in support of collaborative research with national and international partners. To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:

- i. Provide high-speed network connections to government research facilities
- ii. Ensure connections are adequate to meet user needs

The following measurable short- and medium-term outcome will be achieved in FY23:

- Continue to support connections to government research facilities that meet the performance needs of the government science community

- 3) Canadian Access Federation (CAF) Program – As a result of this program, Canada will continue to benefit from robust identity and access management services that enable secure and efficient remote access to distributed resources and tools, anytime. To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:

- i. Promote the adoption of the *eduroam* Configuration Assistant Tool (CAT) profile to elevate the security posture of the entire *eduroam* community
- ii. Work with the Trust and Identity Committee to plan how CAF can augment the Cybersecurity Initiatives Program
- iii. Expand the number of sites that broadcast *eduroam* in the community to offer options for distance learning and creative utilization of community space
- iv. Integration of Multi Factor Authentication (MFA) with Federated Identity Management (FIM) and roll-out to the community
- v. Expand the portfolio of identity-based services. The following initiatives are currently under investigation for FY23: managed deployment Identity Provider (IdP) services for both FIM and *eduroam*

The following measurable short- and medium-term outcomes will be achieved in FY22:

- Increased adoption of CAF
- Increased number of *eduroam* log-ins per year, following the decline in March 2020 due to COVID-19
- Increased number of projects to upgrade the capacity/capability of the federation. The number of CAF projects is projected to grow to 26 by the end of FY23 based on the FY22 count of 23
- Increased number of interfaces, applications, and tools available to support CAF services. The number of CAF tools available to support CAF services is projected to grow to 10 by the end of FY23 based on the FY22 count of 9

- 4) Cybersecurity Initiatives Program (CIP), referred to as the Joint Security Project in CANARIE's Contribution Agreement – To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:

- i. Continue to implement the DNS Firewall, Intrusion Detection System (IDS), and Threat Feed initiatives at eligible organizations
- ii. Implement Benchmarking and Information Security Assessment initiatives, as approved by the CANARIE Board in October 2021
- iii. Continue to leverage the NREN Partners to provide program outreach, technical/operational support, and cybersecurity enablement
- iv. Continue to work with the Measurement and Metrics Working Group (MM WG) to assess the ongoing state of cybersecurity in the research and education sector
- v. Work with the Cybersecurity Advisory Committee (CAC) and its standing committees to define the next set of initiatives, taking into account the technical architecture and gap analysis work currently underway

The following measurable short- and medium-term outcomes will be achieved in FY23:

- DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed for all interested eligible organizations
- Implement CUCCIO Benchmarking and Information Security Assessment initiatives deployed at eligible organizations and results collection in progress
- Define the next set of Cybersecurity initiatives

5) NREN Program – The NREN Program initiatives will continue to evolve the NREN such that it acts in a coordinated manner to advance common objectives, while respecting and leveraging the diversity within the federated model. NREN partner engagement will be increased, and initiatives will be better integrated to support this vision. To achieve this, the following activities will be undertaken in the 2022-23 fiscal year:

- i. Extend capacity, redundancy, reliability, and security through Provincial and Territorial NREN Partners' networks
- ii. Connect institutional facilities
- iii. Strengthen cybersecurity of the NREN
- iv. Strengthen the NREN in the North
- v. Further enhance the processes and capacity of the NREN

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Execution underway for projects defined in the NREN FY23 Operational Plan
- Execution underway for all approved projects in NREN Call 2 for increased reliability, capacity, and resiliency of networks operated by NREN partners
- Increase NREN security through continuation of the NREN SIEM project and continued development of the federated NREN Cybersecurity Analyst team
- Development and launch of projects to enhance security
- Continued progress towards the technical implementation of the Nunavut NREN partner
- Organization of an NREN Assembly event to foster engagement between NREN Partners

3.2 Technology Innovation

- 1) Research Software – As a result of this program, CANARIE developed software tools that enhanced the usability and accessibility of research infrastructure for all Canadian researchers. Responsibility for Research Software moves to the Digital Research Alliance of Canada as of March 31st, 2022, but in order to support a smooth transition, the following will be undertaken in the 2022-23 fiscal year:
 - i. Continue to operate the research software portal at science.canarie.ca
 - ii. Support and monitor funded projects in platform Call 3 in their second maintenance phase
 - iii. Support and monitor funded projects under the Local Research Software Support Call 1
 - iv. Host the 2022 Canadian Research Software Conference (CRSC)
 - v. Continue to work with participants in the Local Research Software Support Initiative Call 1 to support computational researchers at the institution level, including defining meaningful metrics and best practices
 - vi. Support the transition of all activities to the Digital Research Alliance of Canada at the end of FY23

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Transition to the second maintenance portions of projects funded under platform Call 3
 - Continued evolution of a research software community in Canada using Slack as an online collaboration tool for sharing lessons learned and best practices
- 2) Research Data Management – As a result of this program, CANARIE contributed towards a future state where Canada’s publicly funded data is available to accelerate discovery and commercialization by the academic and private sectors. Responsibility for Research Data Management moves to the Digital Research Alliance of Canada as of March 31st, 2022, but in order to monitor the investments CANARIE made, the following will be undertaken in the 2022-23 fiscal year:
 - i. Technical and financial audits of funded projects

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Technical and financial audits of Call 2 funded projects completed as required
- 3) Innovation Fund – To support technology innovations and community needs defined during the mandate, the following activities will be undertaken in the 2022-23 fiscal year:
 - i. Launch the first identified projects to be funded by the Innovation Fund, including community consultations if and where necessary

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Execution underway on the first identified project(s)

3.3 Private Sector Innovation

The activities undertaken will include delivery of the following programs, along with key initiatives listed under each program:

- 1) DAIR Program – As a result of this program, CANARIE will continue to leverage the CANARIE network to support Canadian firms’ ability to develop and test innovative ICT applications. To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:
 - i. Operate the DAIR cloud platform (embracing updates to the platform core technologies as necessary)
 - ii. Enhance technical capabilities of the DAIR cloud infrastructure with features to help users reduce time to market
 - iii. Create and publish educational content related to efficient and secure use of cloud resources and services
 - iv. Create a community forum for information exchange between private sector innovators
 - v. Evolve the DAIR BoosterPack Catalogue to include additional BoosterPacks (training materials and source code developed by Canadian SMEs focused on emerging technologies)
 - vi. Cultivate strategic partnerships to add value for the DAIR user community, contributing toward the evolution of a consolidated cloud service

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Increased usage of DAIR
 - New features added to the DAIR cloud platform
 - Content released to educate SMEs on cloud independence and security in the cloud
 - Monitor ongoing cloud usage patterns of SMEs as they develop and test cloud-based applications and services
 - Provide additional BoosterPacks, to reduce the time and cost for SMEs to develop new technology skills
 - Further advance the partnership between DAIR and CENGN, making participant transitions between programs more apparent and seamless
- 2) CENGN Network Testbed – As a result of this program, the CANARIE network will be used to foster innovation and commercialization of new ICT technologies in partnership with CENGN. To achieve the results of this program, the following activities will be undertaken in the 2022-23 fiscal year:
 - i. Ensure network connectivity and related support for CENGN test bed initiative

The following measurable short- and medium-term outcome will be achieved in FY23:

- CENGN will be able to leverage the CANARIE network to support advanced testing and demonstration of new ICT products and services

3.4 Activities Supporting Equity, Diversity, and Inclusion

In order to advance Equity, Diversity, and Inclusion (EDI), the following activities will be undertaken in the 2022-23 fiscal year:

- i. Continued use of institutional Equity, Diversity, and Inclusion plans as an adjudication criterion for funding selection where appropriate
- ii. Work with partners in the DRI ecosystem to coordinate joint policy positions on Equity, Diversity, and Inclusion
- iii. Training for CANARIE staff on EDI
- iv. Continued work to renew CANARIE policies, procedures, and practices
- v. Ongoing Indigenous community engagement strategy and activities
- vi. Work in Canada and internationally to support underserved communities

The following measurable short- and medium-term outcomes will be achieved in FY23:

- Measurement and targeting of diversity metrics on external CANARIE advisory committees
- Creation of a staff EDI workspace and training catalogue
- Updated committee Terms of Reference to reflect a commitment to diversity

4 Program Delivery Timelines

		Fiscal year 2022-23			
Eligible Activities	Initiatives	Ongoing	Projected or Actual Launch	Major Milestones Previous ()	Projected Completion Previous ()
Network Operations					
Network Program	Operate the Network				
	Increase capacity, redundancy, reliability - Milestone 3: Refresh of portion of Central fibre system, begin refresh of Eastern fibre system, add connectivity to commercial cloud, increase capacity to Yukon and add connectivity or capacity to other Territories based on their ability to support		2020-04-01	2023-02-24	2024-03-31
	Continue to enhance network security and measurement monitoring tools				
	Continue to enhance user access to support tools - Milestone 3: Global networking map inservice release in collaboration with global network partners		2018-08-24	2022-12-16	2022-12-16 (2022-03-31)
	Continue to develop software-driven network services - Milestone 1: Software driven network operations tests (was automated lightpath tests) completed between an NREN Partner and CANARIE		2022-04-01 (2021-04-01)	2022-11-25 (2022-03-26)	2024-03-31
	Deployment of support tools accessible through the user portal - Milestone 1: Upgrade Route Registry to current software technologies		2020-04-01	2023-03-31	2024-03-31
	Provide sustainable cybersecurity monitoring service by efficiently managing and integrating the SIEM systems deployed on CANARIE infrastructure and network, and at each RAN location				
	Operate the Distributed Denial of Service (DDoS) detection system dedicated to the CANARIE network and actively collaborate with NREN Partners				
	Promote and implement in-house cybersecurity expertise development for CANARIE dedicated security staff and NREN security analyst community				
IEP Program	Provide high-speed network connections to government research facilities				
	Ensure connections are adequate to meet user needs				
CAF Program	Promote the adoption of the eduroam Configuration Assistant Tool (CAT) profile to elevate the security posture of the entire eduroam community				
	Development of more robust technical documentation and tutorials to simplify deployment, operation, and use of CAF services				
	Expand the number of sites that broadcast eduroam wifi in the community - Milestone 2: Managed service technology chosen		2020-09-01	2023-03-31	2024-03-31
	Research and development efforts focused on expanding identity services				
Joint Security Program (CIP)	DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed for all interested eligible organizations				
	Implement Benchmarking and IS Assessment initiatives at eligible organizations - Milestone 1: Information from eligible organizations gathered		2021-10-28	2022-12-16	2024-03-31
	Next set of Cybersecurity initiatives defined - Milestone 1: Approval by BoD		2021-12-13	2022-06-23	2024-03-31
NREN Program	Execution of approved projects within NREN Call 2 - Milestone 1: Completion of installations		2021-10-07	2023-12-22	2024-03-31
	Increase NREN security through continuation of the NREN SIEM project - Milestone 2: alignment on renewal of SIEM software maintenance		2020-04-01	2022-04-29	2024-03-31
	Strengthen cybersecurity of the NREN - Milestone 5: Consultations - Milestone 6: Agreement on next initiative		2019-11-28	2021-12-14 2022-06-24	2024-03-31
	Strengthen the NREN in the North - Milestone 2: 1st network connection with Nunavut regional network		2019-08-28	2022-09-30 (2022-03-26)	2024-03-31
	Organization of an NREN Assembly		2022-09-01	2022-12-06	2022-12-06

Eligible Activities	Initiatives	Ongoing	Projected or Actual Launch	Major Milestones Previous ()	Projected Completion Previous ()
Technology Innovation					
Research Software Program	Support and monitor funded projects in platform Call 3 in their maintenance phase - Milestone 4: 2nd year of maintenance phase for projects		2019-09-03	2022-04-01	2023-03-31
	Hold the 2022 Canadian Research Software Conference (CRSC)		2022-02-01		2022-05-31
Research Data Management	Technical and financial audits of Call 2 funded projects as required.				2022-06-30
Innovation Fund	Support technology innovations and community needs defined during the mandate. - Milestone 2: Execution underway on first identified project(s)		2021-10-22	2022-04-01	2024-03-31
Private Sector Innovation					
DAIR Cloud Program	Operate the cloud platform (embracing updates to the platform core technologies as necessary)				
	Enhance technical capabilities of the DAIR cloud infrastructure with features to help users reduce time to market				
	Create and publish educational content related to efficient and secure use of cloud resources and services				
	Community forum for the information exchange between private sector innovators				
	Evolve the DAIR BoosterPack pilot project, which utilized a new hybrid cloud environment leveraging private sector investment in Canadian cloud infrastructure/services, and deliver BoosterPack training materials with source code developed by Canadian SMEs - Milestone 3: Continuous call for additional BoosterPacks from SMEs - Milestone 4: Additional BoosterPacks available from SMEs				2024-03-31
	Cultivate strategic partnerships to add value for the DAIR user community, contributing toward the evolution of a consolidated cloud service - Milestone 4: SME transition between CENGN and DAIR programs more apparent and seamless		2019-12-11	2022-12-06	2024-03-31
CENGN Network Testbed	Ensure network connectivity and related support for CENGN testbed initiative				

5 Representation and Financial Plan

The Government of Canada is investing \$137M to support CANARIE's activities from 2020-2024. This funding commitment ensures that CANARIE can continue to deliver strategic investments in infrastructure and services for Canada's research and innovation communities. CANARIE has identified a cash flow requirement of \$37.5M for the FY23 funding year.

CANARIE covenants and agrees to hold, invest, administer, and disburse that amount in accordance with the stipulations of the Contribution Agreement. No interest or investment income is payable by the Minister on the funds to be provided.

5.1 Program Revenues and Expenses

The following table summarizes CANARIE's program revenue and expenses projections for the FY23 fiscal year.

	<u>FY23</u> <u>(in 000s)</u>
<i>REVENUES</i>	
FUNDING	
Government of Canada	37,500
TOTAL FUNDING	<u>37,500</u>
PROGRAM REVENUES	
User Fees	604
Interest Income	35
TOTAL PROGRAM REVENUES	<u>639</u>
TOTAL REVENUES	<u>38,139</u>
<i>EXPENSES</i>	
PROGRAM EXPENSES	
Network Operations	
Network Infrastructure & Services	16,979
Network Security	694
Joint Security Project (CIP)	9,755
NREN	4,147
Technology Innovation	
Research Software	3,264
Research Data Management	42
Innovation Fund	500
Private Sector Innovation	
DAIR	2,117
CENGN	13
TOTAL PROGRAM EXPENSES	<u>37,511</u>
Administrative Costs	5,753
TOTAL EXPENSES	<u>43,264</u>
EXCESS OF EXPENSES OVER REVENUES	<u><u>(5,125)</u></u>

CANARIE has cumulative Excess of Revenues over Expenses from FY21-22 of approximately \$6.3M. Those funds will be carried forward to support the planned \$43.3M expenditures for FY23.

5.2 Funding Requirements

As indicated in the Program Revenues and Expenses shown above, CANARIE’s cash requirement for FY23 (the third year of CANARIE’s 2020-2024 mandate) is \$37.5M.

5.3 Representation

CANARIE represents that it is not in default under the terms of the Contribution Agreement that is currently in force.

5.4 Cost Recovery

The following table summarizes CANARIE’s cost recovery projections for FY23.

	<u>FY23</u> <u>(in 000s)</u>
CASH	
IEP User Fees - Federal	100
IEP User Fees - Non-federal	6
Participant Fees	498
TOTAL CASH	<u>604</u>
MATCHING FUNDS	
NREN	1,211
DAIR	15
TOTAL MATCHING FUNDS	<u>1,226</u>
TOTAL COST RECOVERY	<u><u>1,830</u></u>

Throughout FY23, CANARIE will continue to charge fees to users of CANARIE services and programs.

- As part of the legacy infrastructure extension program (IEP), CANARIE supports the costs to connect federal and non-federal labs to the NREN. The federal IEP connections’ cost recovery is a fixed annual amount paid by Shared Services Canada to offset the total annual cost of supporting these connections. For non-federal IEP connections, the amount in the budget represents 100% cost recovery of planned expenditures.
- Participant Fees include the cost recovery for the CAF program and other Network program initiatives.
- The NREN program will result in sharing of costs between CANARIE and other funding sources (e.g., provincial government, NREN partner funds, etc.) for funded projects. CANARIE’s contribution level will be determined on a project-by-project basis. CANARIE will ensure the outcome of the NREN program meets its overall cost recovery target, hence, greater priority will be given to projects which have leveraged contributions.
- The DAIR program will include sharing of costs between CANARIE and an NREN partner for a funded project.

5.5 Investment Policy and Strategy

CANARIE shall continue to invest and manage any advanced funds according to investment policies, standards, and procedures that a prudent person would follow in making investment decisions regarding property belonging to others. CANARIE will manage the funds in accordance with the Contribution Agreement and, the investment directives contained in Article IV of the Contribution Agreement. The objectives are twofold: (a) to provide funds on an "as needed" basis to meet the disbursement needs of CANARIE and (b) to maximize the investment income earned by CANARIE, subject to the Investment Policy and Investment Strategy adopted by CANARIE. Investment decisions shall be made with the principal objective being the preservation of capital to meet future disbursement requirements.

The Investment Policy and the Investment Strategy specify permitted transactions and risk limitations for all market and credit risks faced by CANARIE, and levels of authority of officials who can commit CANARIE to different types of transactions. The Investment Policy and Investment Strategy must be reviewed annually: they were most recently reviewed and approved by the Audit and Investment Committee in October 2021. The Investment Policy is guided by the constraints contained in the Contribution Agreement.

6 Performance Monitoring Strategies, Risk Assessment, and Mitigation Strategies

Performance Monitoring Strategies

CANARIE collects metrics internally for all its programs, services, and for the network. External performance metrics are collected from the community in the form of user surveys, reports and reporting from the regional networks. CANARIE works with the Minister to integrate this information as part of an overall performance management strategy. Additionally, performance data for each eligible activity is part of CANARIE’s annual reporting.

Program Delivery Risks

Due to the diversity and complexity of the ecosystem CANARIE operates in, risk management is essential for CANARIE to achieve the expected results defined in the Contribution Agreement. Risk is reported on by Management and monitored by the Board of Directors.

Identified risks are classified based on the likelihood of occurrence of the risk, as well as the severity of the negative impact of the risk. The treatment of identified risks will vary based on these two dimensions as per the table below:

		Probability		
		Low	Medium	High
Impact	Low	Accept risks	Accept risks with monitoring	Monitor and manage risks
	Medium	Accept risks with monitoring	Develop formal risk mitigation measures	Develop formal risk mitigation plan
	High	Identify mitigation steps and monitor regularly	Develop formal risk mitigation measures and monitor regularly	Develop formal risk mitigation plan and monitor regularly

Please see Table below:

Risk Name	Description	Prob.	Impact	Risk	Mitigation Strategies and Action Plans
Transition Risk	The Contribution Agreement includes a completion date for the transition of relevant CANARIE programs to the Alliance, and there are external risks which could lead to a failure to complete the transition prior to the specified deadline	M	H	MH	<ul style="list-style-type: none"> Working with ISED, the Alliance, and the community to support the development of a fully functional new organization C.A. requirements for Transition Plan and annual Joint Ecosystem Plan (completed) and Ecosystem Report. Meetings are on-going with the Alliance. Relationships with the President, and other key staff at the Alliance, continue to develop and work is on-going.
Network Operations Risks	Possibility that CANARIE is unable to find, or find at appropriate cost, fibre for certain network upgrades. Among other things, this would make CANARIE less agile in responding to the needs of the research community, as well as facing ever-growing network costs by using a growing number of leased wavelength services	M	M	MM	<ul style="list-style-type: none"> Establish and maintain senior level relationships with fibre and equipment providers Engage Board and advisory committee members, where appropriate, to work within their organizations to support this initiative Work with international community on key international routes. Continued identification of fibre suppliers
Cybersecurity Initiatives Program	Risk that the program will not have the desired uptake or adoption. Community engagement risk which impacts the mandate of securing Research and Education.	M	M	MM	<ul style="list-style-type: none"> Align the community on a common framework to work together on securing the R&E community Develop infrastructure and capacity in the system to enable rapid adoption of new initiatives Develop and implement key measures to demonstrate value to both funders and eligible organizations Community engagement strategy led by CEO
Technology changes occurring mid-mandate	Given the length of CANARIE's mandate vs the pace of technological change, it is likely that new technologies or services arise that CANARIE has not budgeted for in the normal multi-year cycle	M	M	MM	<ul style="list-style-type: none"> Budget flexibility The intent of Innovation Fund is to support new technologies and newly identified needs in the community Board oversight on Operating Plan and Program changes and evolution
RDM Alignment	Possible failure of the broader research and education community to align on tools and services within a National Data Services Framework	M	L	ML	<ul style="list-style-type: none"> Engage with the RDM personnel and software developers Strengthen partnerships with other organizations involved in RDM Support transition to the Alliance

DAIR Service Relevance	Risk that DAIR will not evolve to offer new services that are critical to the changing needs of the ICT sector, SMEs in particular and, therefore, becomes less relevant	L	H	LH	<ul style="list-style-type: none"> • Development of DAIR 2.0 (BoosterPacks) to ensure relevant service offering • Continuous interactions with SMEs and commercialization-supporting organizations • Marketing outreach to increase awareness of DAIR • Working with other organizations that support SMEs to develop a consolidated offering • Assess the utility of the service via user surveys and performance metrics
Failure of key international partner	The failure of key international NREN (e.g. Internet2, GEANT, AARNet etc.) would both limit CANARIE's ability to provide service, and weaken our value proposition	L	H	LH	<ul style="list-style-type: none"> • Maintain strong relationships with international partners to create mutual support • Work with the international community on common initiatives that demonstrate value of the GREN
Service Delivery via NREN Partners	Should one or more NREN partners start to have objectives that are not aligned with CANARIE's, it could impact, or impede, CANARIE's ability to deliver on its own mandate	L	H	LH	<ul style="list-style-type: none"> • Ongoing support for the NREN Governance Committee, comprised of CANARIE and NREN Partner presidents • Implementation of the NREN Strategic Plan to identify NREN priorities • Ensure program funding to the NREN Partners is structured in a manner to assist in attaining NREN objectives that also support CANARIE's network objectives • Ensure NREN Partners are represented by a CANARIE Board member
Research Software Uptake	Possible low adoption of software development approach by the broader R&E community	L	H	LH	<ul style="list-style-type: none"> • Engage with the R/S community • Strengthen partnerships with other R/S funders • Support transition to the Alliance
JSP Alignment	Risk that participants in the JSP fail to collaborate in a meaningful way – e.g. on data sharing agreements – or that participants drop out due to lack of alignment	L	H	LH	<ul style="list-style-type: none"> • Signing up to the JSP Call demonstrates willingness to collaborate • Experience with the pilot will allow CANARIE to steer discussions to encourage alignment