CANARIE Annual Business Plan 2023-24

Table of Contents

1 Executive Summary

CANARIE is pleased to present its Annual Business Plan for fiscal year 2023-24 (FY24), currently the fourth year of its 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 (NREN 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: FY24 (April 1, 2023 to March 31, 2024)

CANARIE's focus during the 2020-2024 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 FY24, 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 FY24 include:

- Launching new initiatives to strengthen the cybersecurity of eligible organizations connected to the NREN, as recommended by the Cybersecurity Advisory Committee and its standing committees, under the Cybersecurity Initiatives Program;

- Projects and activities to refresh 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 or research facility l 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 are defined by the following developments 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 and ongoing evolution 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 directly align 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 2022-23 Accomplishments to Date

2022-23 (FY23) is the third year of CANARIE's 2020-2024 mandate. The following sections provide an overview of CANARIE's accomplishments in FY23 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 FY23 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. This provides 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-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 FY23, CANARIE:

- Launched a process to procure new networking equipment which can support 400Gbps traffic flows

- Completed Cloud Connect performance testing with both Amazon AWS and Microsoft Azure

- Continued to roll out *eduroam* through service providers in public, non-institutional environments such as airports and libraries

- Created communications to explain the benefits and logistics of rolling out multifactor authentication (MFA) for Federated Identity Management (FIM)

- Formed a new Cybersecurity Department at CANARIE and integrated the activities of CanSSOC into the department, along with CANARIE's existing Cybersecurity Initiatives Program (CIP) and Canadian Access Federation (CAF) activities

- Launched the National Cybersecurity Assessment (NCA) service, the fifth initiative funded under the CIP

- Hosted a series of workshops to engage with the community on the creation of a Federated Security Operations Centre

- Launched NREN Call 3 to increase reliability, capacity, and resiliency of networks operated by NREN Partners (with funding dependent on the signing of a Contribution Agreement amendment for CANARIE funding in FY25)

- Hosted the 2022 NREN Assembly to strengthen collaboration among the Canadian NREN Partners

- Enhanced NREN cybersecurity capacity by training a federated team of analysts, and supported the renewal and maintenance of Security information and event management (SIEM) equipment

- Finalized a common mission, vision, and values for the NREN

- Hosted the 2022 CANARIE Summit

Key projects to be completed before the end of FY23 include:

- Begin deployment work for a refreshed Optical System in Central Canada

- Begin work to renew eastern dark fibre

- Begin development of network operation management/automation platforms

- Begin assessment of capacity improvement for Northern connections

- Complete the first cycle of the NCA, including the delivery of reports to participant organizations

- Analyze the aggregated results of the NCA and Benchmarking initiatives to identify gaps in the Canadian research and education sector, with the goal of using this information to define new initiatives in FY24

- Work with the University of Waterloo and Concordia University to finalize a plan to define the next-generation software platform that nationally aggregates data from the Intrusion Detection System (IDS) initiative

- Hold consultations for the development of a five-year NREN strategic plan and a three-year NREN operational plan

2.2 Technology Innovation

Research Software

Prior to FY23, CANARIE championed the development of powerful research software tools that accelerated discovery and enabled 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.

Formal federal responsibility for research software has passed to the Digital Research Alliance of Canada, but to close out its previous commitments, thus far in FY23, CANARIE:

- Hosted the 2022 Canadian Research Software Conference

Key projects to be completed before the end of FY23 include:

- Ongoing maintenance funding for pre-transition funded projects, to be completed by the end of FY23

Research Data Management (RDM)

The ability to reuse research data accelerates opportunities for creating new knowledge and maximizes the return on investment of research funding. Prior to FY23, CANARIE funded the development of software and tools to support the research data management workflow and supported the work of Research Data Canada.

Formal federal responsibility for research data management has passed to the Digital Research Alliance of Canada, but to close out its previous commitments, key projects to be completed before the end of FY23 include:

- Final RDM Call 2 Report

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 FY23, CANARIE:

- Launched three (3) new BoosterPacks, free, curated packages of resources on a specific emerging technology, built by experienced Canadian SMEs

2.4 Innovation Projects

The digital research infrastructure needs of the research, education and innovation community can (and do) evolve considerably 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 inclusion of Innovation Projects is not new for this mandate. In the prior mandate for example, this approach 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.

Thus far in FY23, CANARIE:

- Identified possible initiatives for Innovation Project funding

3 2023-24 Planned Activities

FY24 will be the fourth fiscal year of CANARIE's 2020-2024 mandate, though CANARIE has responded to a request from the Government of Canada to provide a proposal for extending the current Contribution Agreement by one year, to March 31st, 2025. To deliver on its expected results for the mandate, CANARIE will undertake the following activities in the 2023-24 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 2023-24 fiscal year:

   i)   Operate the network

   ii) Increase capacity, redundancy, and reliability

   iii) Continue to improve the network security posture

   iv) Improve 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) 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

   viii) Promote and implement in-house cybersecurity expertise

   The following measurable short- and medium-term outcomes will be achieved in FY24:

   - Deployment of additional network capacity to support traffic growth

   - Improved access to commercial cloud services

   - Continued work on the 400Gbps capacity upgrade

   - Continued work on the refresh of the Eastern and Central fibre systems

   - Deployment of additional network capacity to support Northern connectivity

   - Improvement of the network security reporting, monitoring, and measurement system

   - Launch of version 1 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 2023-24 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 FY24:

- 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 2023-24 fiscal year:

      i.   Continue to work with the Trust and Identity Committee to plan how CAF can evolve

     ii.   Expand the number of sites that broadcast eduroam in the community to offer options for distance learning and creative utilization of community space

   iii.   Continued support for the roll-out of Multi Factor Authentication (MFA) within Federated Identity Management (FIM)

   iv.   Expand the portfolio of identity-based services, with a focus on offering Federated Identity Management as a managed service deployment

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

- Increased adoption of CAF

- Increased number of eduroam log-ins per year

- Increased number of projects to upgrade the capacity/capability of the Federation

- Increased number of interfaces, applications, and tools available to support CAF services

4) Cybersecurity Initiatives Program (CIP) and CanSSOC (jointly 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 2023-24 fiscal year:

      i.   Continue to implement existing initiatives and services at eligible organizations

     ii.   Design and deliver initiatives to align the community to a common approach to cybersecurity

   iii.   Enhance the Threat Feed service

   iv.   Create an operating plan for the development of a Federated Security Operations Centre for the R&E sector

    v.   Continue to leverage the NREN Partners to provide program outreach, technical/ operational support, and cybersecurity enablement

   vi.   Continue to work with the Measurement and Metrics Committee to assess the ongoing state of cybersecurity in the research and education sector

  vii.   Work with the Cybersecurity Advisory Committee (CAC) and its standing committees to define and implement the next set of initiatives based on the results of the National Cybersecurity Assessment (NCA) and Benchmarking initiatives

viii. Monitor the development of the next generation Intrusion Detection System monitoring and aggregation platform

ix. Launch the second cycle of the National Cybersecurity Assessment

The following measurable short- and medium-term outcomes will be achieved in FY24:

- New initiatives deployed at eligible organizations

- Community cybersecurity event hosted

- An incident response system deployed

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 2023-24 fiscal year:

i. Extend capacity, redundancy, reliability, and security through Provincial and Territorial NREN Partners' networks

ii. Connect research and education 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 FY24:

- Execution underway for projects defined in the NREN FY24 Operational Plan

- Execution underway for all approved projects in NREN Call 2 for increased reliability, capacity, and resiliency of networks operated by NREN Partners

- Execution underway for all approved projects in NREN Call 3 (dependent on the signing of a Contribution Agreement amendment)

- 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) 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 moved to the Digital Research Alliance of Canada as of March 31st, 2022. In order to bring CANARIE's Research Software Program to a close, the following activities will be undertaken and completed in the 2023-24 fiscal year:

i. Financial audit of participants in Research Software Platform projects

ii. Final report for Research Software Platform projects

   iii. Financial audit of participants in Local Research Software Support program

   iv. Final report for Local Research Software Support program

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 moved to the Digital Research Alliance of Canada as of March 31st, 2022, and no activities are expected to be undertaken in 2023-24.

3) Innovation Projects – To support technology innovations and community needs defined during the mandate, the following activities will be undertaken in the 2023-24 fiscal year:

   i. Research and identify future projects to be funded

The following measurable short- and medium-term outcomes will be achieved in FY24:

- Continued investigation and validation of identified projects to determine value and to ensure alignment with other national organizations; and to ensure they qualify under expected outcomes for Network Operations or Private Sector Innovation

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 2023-24 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. Evolve the DAIR BoosterPack Catalogue to include additional BoosterPacks (training materials and source code developed by Canadian SMEs focused on emerging technologies)

   v. 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 FY24:

- Increased usage of the DAIR Cloud

- 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

Additionally, CANARIE will continue working with its advisory committee, incubators, accelerators, ISED, and other collaborators towards the development of requirements for a National Innovation Platform, and to determine whether a future funding proposal should be developed and approved.

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 2023-24 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 FY24:

- 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

To advance Equity, Diversity, and Inclusion (EDI), the following activities will be undertaken in the 2023-24 fiscal year:

    i. Continued use of institutional EDI plans as an adjudication criterion for funding selection, where appropriate

    ii. Work with partners in the DRI ecosystem to coordinate joint policy positions on EDI

    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 FY24:

- Engagement with submarine Arctic cable consortia to support Northern Connectivity

- Continued progress towards the technical implementation of the Nunavut NREN Partner

- Creation of a framework for CANARIE Employee Resource Groups

- Carrying out recommendations of a third-party review of CANARIE's corporate policies

4 Program Delivery Timelines

			Fiscal year 2023-24		
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. - Delay in completion of Central fibre system beyond FY23 due to supply chain equipment delivery issues. - Milestone 4: Eastern fibre options review, 400Gbps capable routers installed on main routes.		_2020-04-01_	**2023-06-30** (2023-02-24) 2023-09-30	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_	_2022-11-25_ _(2022-12-16)_	_2022-11-25_ _(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 - Delayed following continued discussions on applications		**2023-04-01** (2022-04-01) (2021-04-01)	**2023-12-15** (2022-11-25) (2022-03-26)	2024-03-31
	Deployment of suport tools accessible through the user portal - Milestone 1: Upgrade Route Registry to current software technologies - Milestone 2: Upgrade Network Operations Portal to current software technologies		_2020-04-01_	**2023-01-31** (2023-03-31) 2023-06-30	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				

Eligible Activities	Initiatives	Ongoing	Projected or *Actual* Launch	Major Milestones Previous ( )	Projected Completion Previous ( )
Joint Security Program (CIP)	DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed for all interested eligible organizations	▓			
	Implement Bechmarking and IS Assessment initiatives at eligible organizations - Milestone 1: Information from eligible organizations gathered - Milestone 2: Information gathered used to assess next initiative		*2021-10-28*	*2022-12-16* 2023-05-26	2024-03-31
	Next set of Cybersecurity initiatives defined - Milestone 1: Approval by BoD - Integration of CanSSOC into CANARIE - Milestone 2: Approval by BoD		*2021-12-13*	*2022-06-23* 2023-06-22	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*	*2022-11-03* *(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*	2023-06-30 (2022-09-30) (2022-03-26)	2024-03-31
	Organization of an NREN Assembly		*2023-09-01*	2023-12-01	2023-12-01
	NREN Call 3 - Milestone 1: Selection of eligible projects		*2022-10-28*	2023-05-05	2025-03-31
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.				2023-02-24 (2022-06-30)
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: Continous 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*	2023-06-30 (2022-12-06)	2024-03-31
CENGN Network Testbed	Ensure network connectivity and related support for CENGN test bed initiative	▓			

5 Representation and Financial Plan

The Government of Canada is investing $137M to support CANARIE's activities from FY20-FY24. 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 $40.6M for the FY24 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 FY24 fiscal year.

	FY24 (in 000s)	Commitments	Total
REVENUES			
FUNDING			
Government of Canada	40,600		40,600
TOTAL FUNDING	**40,600**		**40,600**
PROGRAM REVENUES			
User Fees	606		606
Interest Income	289		289
TOTAL PROGRAM REVENUES	**895**		**895**
TOTAL REVENUES	**41,495**		**41,495**
EXPENSES			
PROGRAM EXPENSES			
Network Operations			
Network Infrastructure & Services	21,716	905	22,621
Network Security	908		908
Joint Security Project (Cybersecurity)	14,380	2,500	16,880
NREN	5,105		5,105
Technology Innovation			
Research Software	172		172
Private Sector Innovation			
DAIR	1,984		1,984
CENGN	6		6
TOTAL PROGRAM EXPENSES	**44,271**	**3,405**	**47,676**
Administrative Costs	6,109		6,109
TOTAL EXPENSES	**50,380**	**3,405**	**53,785**
EXCESS OF EXPENSES OVER REVENUES	**(8,885)**	**(3,405)**	**(12,290)**

CANARIE has cumulative Excess of Revenues over Expenses from FY21-23 of approximately $12.3M. Those funds will be carried forward to support the planned $53.8M expenditures for FY24.

5.2 Funding Requirements

As indicated in the Program Revenues and Expenses shown above, CANARIE's cash requirement for FY24 (the final year of CANARIE's FY20-FY24 mandate) is $40.6M.

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 FY24.

	FY24 (in 000s)
CASH	
IEP User Fees - Federal	100
IEP User Fees - Non-federal	6
Participant Fees	500
TOTAL CASH	**606**
MATCHING FUNDS	
NREN	1,448
DAIR	50
TOTAL MATCHING FUNDS	**1,498**
TOTAL COST RECOVERY	**2,104**

Throughout FY24, 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 2022. 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:

<table>
<tr>
<td></td>
<td></td>
<td colspan="3">Probability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td rowspan="3">Impact</td>
<td>Low</td>
<td>Accept risks</td>
<td>Accept risks with monitoring</td>
<td>Monitor and manage risks</td>
</tr>
<tr>
<td>Medium</td>
<td>Accept risks with monitoring</td>
<td>Develop formal risk mitigation measures</td>
<td>Develop formal risk mitigation plan</td>
</tr>
<tr>
<td>High</td>
<td>Identify mitigation steps and monitor regularly</td>
<td>Develop formal risk mitigation measures and monitor regularly</td>
<td>Develop formal risk mitigation plan and monitor regularly</td>
</tr>
</table>

Please see Table below:

Risk Name	Description	Prob.	Impact	Risk	Mitigation Strategies and Action Plans
Transition and Sustainability Risks	Ongoing Contribution Agreement requirements that have dependency on the Alliance's ability to support the joint work required	M	H	MH	• Working with ISED, the Alliance, and the community to support the development of a fully functional new organization • Implemented project management oversight of C.A. requirements for annual Joint Ecosystem Plan 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.
Amendment to Contribution Agreement	Risk that there is no amendment to the existing Contribution Agreement ending in March 2024	M	H	MH	• Working with ISED to support their budget submission.
CanSSOC Integration Risks	Integration of CanSSOC	M	H	MH	• Assignment of dedicated senior management staff • Joint integration team in place
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	• 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	• 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

Risk Name	Description	Prob.	Impact	Risk	Mitigation Strategies and Action Plans
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	• Budget flexibility • An allocation for innovation projects for the network and private sector innovation support CANARIE's ability to respond to new technologies and newly identified needs in the community • Board oversight on Operating Plan and Program changes and evolution
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	• 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	• 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	• Ongoing support for the NREN Governance Committee, comprised of CANARIE and NREN Partner presidents • Implementation of the NREN Strategic Plan to identity 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