CANARIE ANNUAL REPORT

for

Innovation, Science and Economic Development (ISED) Canada

Submitted on

July 28, 2023

Table of Contents

1. Overview

Context for CANARIE

CANARIE's role in Canada's innovation ecosystem was set out in its 1993 Articles of Incorporation and reiterated in its 2013 Articles of Continuance: *to contribute to Canadian competitiveness in all sectors of the economy, to wealth and job creation and to the quality of life of Canadians.*

Throughout its history, CANARIE has evolved to support Canadian competitiveness through the development and deployment of digital technology for Canada's research, education, and innovation communities. Over the course of its 30-year history, CANARIE has helped shape Canada's digital landscape by leading, among others, the following initiatives:

- laying the groundwork, with provincial partner networks, for the first commercial Internet in Canada;
- incubating the Internet Registration Authority in Canada, now known as CIRA;
- supporting hundreds of Canadian businesses, educational and health organizations in their transition to digital models and processes via the Technology Development, Technology Diffusion Program; Technology Applications Development Program; and E-business, E-learning and E-health Programs;
- working with global peers to align international research and education infrastructures to support globally collaborative research, now formalized via the Global Network Advancement Group (GNA-G);
- developing the grid certificate authority in Canada that provides secure access to data generated from the Large Hadron Collider and other advanced digital technologies;
- supporting the uptake of cloud technology by Small and Medium-sized Enterprises (SMEs) in Canada;
- identifying gaps in research software and championing the development of powerful research software tools to efficiently enable researchers across many disciplines to accelerate discovery, now transitioned to the Digital Research Alliance of Canada as part of the Digital Research Infrastructure (DRI) Strategy; and
- supporting Research Data Canada to align research data activities within Canada and internationally, now transitioned to the Digital Research Alliance of Canada as part of the DRI Strategy.

This continual evolution of CANARIE and its activities can be seen in the tremendous advances in aligning the sector on a highly coordinated approach to enhancing cybersecurity, which has most recently led to the integration of CanSSOC (the Canadian Shared Security Operations Centre) into CANARIE, which was announced this fiscal year (in May 2022). Initial steps toward this vision will enable coordination among local institutional cybersecurity specialists, together with regional and national cybersecurity experts, to detect and respond to evolving cybersecurity threats.

CANARIE's activities serve to continually advance Canada's digital infrastructure for research, education, and innovation so that Canadians are positioned to compete in the global knowledge economy. More detailed information on current activities may be found below.

Executive Summary

CANARIE's Contribution Agreement for 2020-2024 with Innovation, Science and Economic Development (ISED) Canada requires the organization to "provide to the Minister, by July 31 of each Fiscal Year, beginning in 2021, an Annual Report approved by the Board, in both official languages relating to the previous Fiscal Year." This report addresses those requirements.

Over the past year, CANARIE has executed on all eligible activities outlined in its 2022-23 Business Plan. These eligible activities align with CANARIE's core purpose: **the advancement of Canada's knowledge and innovation infrastructure,** and its mission: **to design and deliver digital infrastructure, and drive its adoption for research, education, and innovation**. At a high level, through its programs, CANARIE works towards achieving these objectives by:

- overseeing the ongoing evolution of Canada's National Research and Education Network (NREN);
- supporting a collaborative approach to improving cybersecurity in the research and education ecosystem;
- championing the development of research software, research data management, and collaboration tools; and
- providing users in the private sector with access to advanced technologies to accelerate their time to market.

Together, these activities align to deliver more integrated and accessible digital research infrastructure, tools, and services. Beyond these activities, CANARIE also champions the evolution of Canada's digital research infrastructure (DRI) and continues to partner with the Digital Research Alliance of Canada (the Alliance) in support of the Government of Canada's DRI Strategy.

Network Evolution

As the primary role of the CANARIE Network is to provide interprovincial and international connectivity for Canada's National Research and Education Network (NREN), CANARIE works closely with provincial and territorial network partners that build and operate regional networks in their province or territory to co-deliver services to the Canadian research and education community. Through a governance structure which is led by the NREN Governance Committee, this successful federal/provincial partnership manages the evolution of the NREN to ensure that Canada's research, education, and innovation communities can access nationally and globally distributed data, tools, and colleagues.

CANARIE understands the impact of increasing amounts of digital data on research, education, and innovation, and has evolved the national backbone network to ensure Canada's research and education community can continue to access and leverage these data to support world-class research. Network traffic continues to grow as the research community responds to the challenges presented by the COVID-19 pandemic, and traffic on the network grew by 21% in FY23 over FY22 levels.

Given the foundational nature of the network to a wide range of research, education, and innovation activities, CANARIE focuses on both its core network and the ongoing strategic evolution of Canada's NREN to meet the evolving needs of the research community in Canada. Of note is the on-going execution of the 2020-2024 NREN Strategic Plan, which supports the federal-provincial partnership that is the cornerstone of Canada's NREN.

CANARIE continues to represent Canada in the international advanced networking community, participating actively in the Global Research and Education Network CEO Forum – including chairing the Forum's Financial Benchmarking Working Group, and participating in the Global Marketing Communications Group (SIG-Marcomms) and the Global R&E Network Advancement Group (GNA-G). CANARIE's participation in these and other communities ensures that Canada's digital research infrastructure evolves to enable Canada to participate and lead globally collaborative research.

CANARIE supports mission-critical research at a range of government laboratories, assisting Shared Services Canada (SSC) in network and network-based services planning and execution. As well, a CANARIE representative sits on the Government of Canada's Canadian Forum for Digital Infrastructure Resilience (CFDIR) to work with industry and government towards identifying existing, and anticipating future, resilience issues and then finding solutions. CANARIE is increasingly called upon to provide objective advice to government partners regarding new technology initiatives and opportunities for Canada.

Collaboration Tools

Under the Canadian Access Federation (CAF) service umbrella, CANARIE enables Canada's post-secondary students, faculty, and staff to securely access remote resources using digital identities from their home institutions. This service enables seamless access to protected online content, via Federated Identity Management (FIM), and to campus Wi-Fi networks through *eduroam*. CANARIE continues to see significant growth in the use of these services, and identity management is increasingly seen as a key pillar of institutions' cybersecurity defenses.

Cybersecurity

Cybersecurity is a significant and growing concern for all sectors, but organizations in the research and education sector operate in a uniquely complex environment: large and mobile user bases; policies that support "bring-your-own device" to campus; and significant amounts of Information Technology (IT) infrastructure outside the purview of central IT. These organizations also hold a large amount of data of value to cybercriminals, including personal data of staff, faculty, and students, as well as commercially valuable intellectual property developed by academic researchers - often in collaboration with industrial and/or international partners.

CANARIE is working to help secure this sector through the creation and implementation of its Cybersecurity Initiatives Program (CIP) and the establishment of the Cybersecurity Advisory Committee (CAC) and its standing committees. With representation from a cross-section of Canada's research and education institutions and supporting organizations, these committees provide insights on the priorities, realities, and challenges of the sector and advise CANARIE on proposed CIP initiatives.

Research Software

Recognizing that software is essential infrastructure to support access to data and its computation, CANARIE has invested in research software tools since 2007. CANARIE's long-term vision is to enable software reuse and software development best practices within Canada's research community. Through its Research Software Program, CANARIE spearheaded the development of 146 reusable software tools and supported the onboarding of new researchers onto existing research software tools. To maximize

the impact of these investments, CANARIE took steps to ensure these software tools are available to all researchers.

CANARIE's most recent funding calls have added support for the modification and maintenance of existing research software platforms to meet the needs of research teams and funded local software expertise on campuses to enable and support the use of research software tools. CANARIE actively worked with the Alliance over the course of FY21 and FY22 to seamlessly transfer responsibility for the Research Software program to the Alliance to ensure continuity for the community. To support this seamless transition, CANARIE continued to fund the maintenance portions of its projects through to the end of FY23.

Research Data Management

Beginning in 2014, CANARIE provided funding for Research Data Canada (RDC) and its programs, enabling opportunities for greater integration of the elements of digital research infrastructure. More recently, CANARIE launched a Research Data Management program to fund the development of national data management tools and software. The program funded 14 research teams to develop software components and tools to enable Canadian researchers to adopt best practices in managing data resulting from scientific research. With the transition of research data management activities to the Alliance, FY22 was the last year that CANARIE supported these programs. CANARIE actively worked with the Alliance over the course of FY21 and FY22 to seamlessly transfer responsibility for the Research Data Management program to the Alliance to ensure continuity for the community. This transition is now complete.

Private Sector Innovation

CANARIE enables the private sector to leverage advanced digital infrastructure to accelerate the commercialization process. The DAIR (formerly the Digital Accelerator for Innovation and Research) Cloud Program has supported over 1,900 small and medium-sized enterprises (SMEs) to develop and test a range of novel Information and Communications Technology (ICT) products and services. DAIR provides SMEs with an opportunity to benefit from the scale and agility of cloud resources (computing and storage resources located in distributed data centres). Deploying these advanced technologies provides businesses with an opportunity to test and develop innovative products at no cost, which both speeds time to market and reduces development costs. Further, the opportunity to deploy cloud technologies in early product development is a powerful demonstration of how these technologies can transform traditional business models and serves to further incent businesses in adopting cloud technologies as part of their long-term business strategy.

Additionally, to support the use of emerging technologies that can leverage cloud resources, CANARIE launched the DAIR "BoosterPacks" initiative. BoosterPacks are curated packages of resources and sample code for a specific emerging technology, available to SMEs in Canada at no cost, built by experienced Canadian SMEs. These SMEs – "BoosterPack Builders" – curate their knowledge and expertise to help earlier stage businesses understand and overcome challenges in key emerging technologies such as machine learning, IoT, blockchain and cybersecurity. The goal of each BoosterPack is to help SMEs get to market faster by benefiting from tips and resources that helped the Builders, while avoiding some of their pitfalls.

CANARIE continues to promote the use of DAIR and the transformative power of cloud technologies to the SME community through a range of media and case studies, published on the CANARIE website. This content highlights businesses' use of DAIR and the tangible competitive value delivered using cloud infrastructures. Additionally, the Innovation and Commercialization Committee, comprising executives and technical experts from SMEs and innovation centres, helps drive the evolution of CANARIE's private sector activities.

To advance Canada's leadership in networking technology, CANARIE is a founding partner in the Centre of Excellence in Next Generation Networks (CENGN). CENGN is a consortium of industry, academic, and research leaders who are pooling their expertise and equipment to enable SMEs to test new products at scale, with the goal of accelerating the commercialization of Canadian networking technologies in the global marketplace. CANARIE continues to provide connections and support to stakeholders in the private and public sectors that underpin CENGN.

Partnerships and Community Engagement

CANARIE continues to engage with a broad range of stakeholders to ensure its activities align with changing community needs, including our Canadian NREN Partners, the Digital Research Alliance of Canada (the Alliance), the CFI, Compute Canada, Universities Canada, the U15, CUCCIO, CAUBO, Colleges and Institutes Canada, Polytechnics Canada, Fédération des cégeps, Genome Canada, and the granting councils. CANARIE has worked closely with the Alliance to manage the transition of the Research Software and Research Data Management programs to them, and the two organizations are committed to working together to support the Government of Canada's DRI Strategy, and to provide Canada's researchers with world-class tools to support their research workflow.

CANARIE's role in the digital research infrastructure landscape continues to solidify through premier events such as the CANARIE Summit; speaking opportunities for CANARIE staff at provincial, national, and international events and conferences; through ongoing updates to its corporate website and social media platforms; and with outreach/educational materials.

On behalf of the Board of Directors, CANARIE would like to thank the Minister and officials at Innovation, Science and Economic Development Canada, for their continued support and confidence in CANARIE. CANARIE looks forward to providing Canada's research, education, and innovation communities in the public and private sectors with world-class digital research infrastructure, so that Canada can grow its innovation capacity and compete and win in the global digital economy.

2. Statement of Eligible Activities for 2022-23 and Report on the Extent to Which CANARIE Met the Expected Results

Throughout its 2020-2024 mandate period, CANARIE will support the Government of Canada's DRI Strategy. CANARIE's activities in the third year of this mandate were aligned with the strategic goal to "ensure that Canadian researchers have the digital tools they need to support scientific excellence.[1]"

CANARIE's three eligible activities in the 2022-23 Business Plan are detailed below. A report on the extent to which each eligible activity was achieved is contained in the paragraphs following.

2.1 Network Operations

Evolve/extend Canada's world-leading collaboration network

To address the evolving needs of users in research, education, and innovation communities, CANARIE will enable a pan-Canadian collaboration capability through a world-leading high-performance network and network-based services.

CANARIE Network:

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, where economical, from coast-to-coast across Canada. In high-use, high-growth network corridors, CANARIE has purchased long term use of fibre and therefore has the flexibility to add capacity and deploy transformative technologies at a low, incremental cost. To further build out the network, CANARIE uses leased services from suppliers where the traffic demand does not warrant dedicated fibre, for service resiliency, or when fibre acquisition is cost prohibitive.

Deployment of additional network capacity to support traffic growth

CANARIE completed the deployment of additional network capacity on select network segments. This deployment has significantly improved network availability, ensuring that there is sufficient network capacity during network outages. Additionally, the new capacity enables CANARIE to support data-intensive experiments and testing with no impact on production traffic.

> *The top five CANARIE Network users in 2022-23 were:*
>
> *Simon Fraser University*
> *University of Victoria*
> *TRIUMF*
> *University of British Columbia*
> *SHARCNET*

Improved commercial cloud support

In FY23, CANARIE conducted a pilot to test the connectivity performance of the CANARIE Network to public cloud data centers. The primary objective of the pilot was to gain operational experience in provisioning and delivering Cloud Connect Services (CCS), collect data on throughput performance, and use the findings as input for discussions regarding the future of CCS. Following the pilot, CANARIE generated a technical report to support planning for next steps.

---

[1] https://www.ic.gc.ca/eic/site/136.nsf/eng/home

Refresh of the largest segment of the Central fibre system

In late 2021, a refresh of the Central fibre system was initiated. Unfortunately, supply-chain delays impacted the delivery of equipment, resulting in lead times of over a year. These delays have had a significant impact on the deployment schedule. While some equipment has been slowly arriving throughout the year, there are still a few outstanding components that are expected to be delivered within the next few months. As a result, the full deployment is expected in FY24.

Commence work on the refresh of the Eastern fibre system

The lease for the eastern fibre, which serves as the busiest corridor of the network and connects major locations like Toronto, Ottawa, and Montreal, as well as two major exchange points in the US (Chicago and New York), will expire soon. This fibre system is critical as it provides a vital path for accessing Advanced North Atlantic (ANA) resources to Europe. CANARIE begun planning the refresh in FY22, seeking fibre availability, and evaluating various options. By starting the planning process early, CANARIE looks to mitigate any potential disruptions to ensure a smooth transition from the old system to the new one.

Deployment of additional network capacity to support Northern connectivity

In FY23, CANARIE continued to work with Nunavut Arctic College (NAC) to investigate Nunavut's connectivity options to the NREN, and will continue this collaboration with NAC moving forward, specifically regarding Low Earth Orbit (LEO) satellite connectivity.

Improvement of network security reporting, monitoring, and measurement system

CANARIE deployed a tracking tool to monitor network routes received from peering partners. This tool compares Border Gateway Protocol announcements from authorized routing information sourced from Regional Internet Registries. The initial objective of this tool is to identify and highlight any invalid network routes that are received and alert the CANARIE network operations team. In the coming year, the network team plans to enhance the tool's functionality beyond monitoring the integrity of the routes by adding the capability of completely dropping any unknown routes. This action will further strengthen and improve global routing security, preventing harmful routes from being propagated throughout the network.

Improvement of the Global Research and Education Network (GREN) Map

CANARIE continued development of the GREN Map, building on the pilot implementation of the map which featured data from the Canadian NREN, and international NRENs RNP and GÉANT, and demonstrated at the international TNC conference in 2021. The GREN Map will be the first real-time visualization of the full reach of the GREN, down to the institutional level, to provide funders and institutions a better understanding of the value of connecting to their local NREN. The full Version 1 release of the Canadian implementation of the Map is imminent, and the full Version 1 release of the GREN Map is expected in summer 2023.

Deployment of Software Networking Applications

CANARIE continued the development of software networking by automating the provisioning of network services. Throughout the year, CANARIE has evaluated a number of software automation

applications. In addition, CANARIE has worked with Global NREN Partners ESnet (USA) and SURF (the Netherlands) to explore the feasibility of adapting their co-developed network automation tool. Collaboration with these partners has several advantages, including promoting global collaborations, supporting open-source software development, and potentially fast-tracking CANARIE's own software development efforts. Early in 2023, CANARIE confirmed proceeding with collaboration on the software deployment and further development with the assistance of ESnet and SURF.

Deployment of network support tools accessible through the user portal

CANARIE continued the improvement of network support tools. In FY23, CANARIE adapted a new support tool, NETBOX, that helps to track equipment inventory and other network information like IP management and site details. NETBOX is not only an essential network information tool but is now also a key component of CANARIE's network automation system. NETBOX has significantly improved the efficiency of the network inventory management process and has helped ensure that accurate information is readily available to support ongoing network operations. The tool is initially for internal use, but offers integration with the user portal via an application programming interface, or API.

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

CANARIE continues working with Shared Services Canada to evaluate departmental needs that support government science-based departments, and evolving and improving the Government of Canada Science Network (GCSN) infrastructure.

Other Achievements – Network:

International Partnerships – CEO Forum

CANARIE continues to participate as a member of the Global Research and Education Networks' CEO Forum. This Forum brings together the CEOs of 17 research and education networks – both national and supranational - to collaborate on the global evolution of critical digital infrastructures and associated services. Despite a lack of face-to-face meetings during the pandemic, the Forum continued to meet regularly on a virtual basis. The Forum provides an opportunity for Canadian representation on a broad range of global research and education initiatives that include networking evolution, shared marketing collateral, and identity management. Face to face meetings resumed after the pandemic and took place in July 2022 and February 2023.

International Partnerships – Global Network Advancement Group (GNA-G)

CANARIE was actively involved in the Global Network Architecture (GNA) initiative, with the goal of defining a reference architecture and creating a roadmap for both national and regional research and education networks to support research more seamlessly. This group has evolved into the Global Network Advancement Group (GNA-G), to provide a broader effort that will establish more capable, predictable, cost-effective, and resilient next-generation global connectivity for research and education. In support of the model being advanced by GNA-G, CANARIE operates a global R&E exchange point, MOXY, in Montreal, to support international data flows. Additionally, CANARIE's CEO serves as the Executive Liaison between the GNA-G leads and CEOs of R&E networks globally.

CANARIE Summit

The CANARIE Summit returned as an in-person event in FY23, following a move to virtual events due to COVID-19. The event was held in October in Toronto, with a theme of "Stronger Together: Celebrating Inspiring Collaborations & Remarkable Successes."

Canadian Access Federation:

CANARIE works with stakeholder groups to identify demand for network services and collaborates with national and global partners to deliver them. Currently, CANARIE is the national operator of the Canadian Access Federation (CAF). Through the CAF Federated Identity Management service, Canada's post-secondary students, faculty, and staff at participating institutions can access protected online content using their home institutions' digital identities. Institutions participating in CAF also benefit from the *eduroam* service, which provides students, faculty, and staff with secure, seamless access to Wi-Fi at participating sites in 106 territories worldwide.

Increased adoption of CAF

In 2022-23, the total number of CAF participants increased to 226. CANARIE continues to work with our NREN Partners to explore new ways to promote CAF adoption.

Increased number of eduroam log-ins per year, following the decline in March 2020 due to COVID-19

eduroam authenticated 367 million logs-in in FY23. CANARIE expects to see continued growth in both *eduroam* and *eduroam* Visitor Access (eVa) usage as more students and faculty return to campuses following the COVID-19 pandemic.

Increased number of projects to upgrade the capacity/capability of the federation; and Increased number of interfaces, applications, and tools available to support CAF services

CANARIE undertook a joint effort with SUNET of Sweden to add new features to the R&E identity federation ecosystem by enhancing the toolkit on which the federation is based.

Other Achievements – CAF:

eduroam in Non-Campus Environments

CANARIE continues to work to increase the number of non-R&E locations (e.g., libraries, municipalities, and airports) that are broadcasting *eduroam*, to increase the service's reach and its value to the community. During FY23, new *eduroam* deployments included the City of Ottawa, Ontario and the City of Surrey, British Columbia.

eduroam Visitor Access at the Canada Winter Games

CANARIE worked with the University of Prince Edward Island to provide eduroam Visitor Access to the 2023 Canada Winter Games attendees while on campus. More than 1,300 people used the service to securely access eduroam while participating in the games.

Cybersecurity Initiatives Program (CIP) and CanSSOC:

In response to the need identified by Canada's research and education community for national coordination and alignment of cybersecurity efforts, CANARIE invests in initiatives that will strengthen the whole sector with advanced technologies, improved processes, and broadened expertise. These initiatives are primarily accessible by eligible organizations through the provincial and territorial partners in Canada's National Research and Education Network (NREN).

Initiatives funded by the CIP will support the evolution of a complementary set of capabilities at all layers - from local to national - which collectively support the goal of strengthening the overall cybersecurity of the sector. Funding supports activities that address priorities or gaps with the greatest potential to advance cybersecurity across the broadest portion of the ecosystem, and funded initiatives must equitably allow all eligible organizations to participate in and/or benefit from initiatives.

DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed at eligible organizations

CANARIE, with the support of our regional NREN Partners, continues to onboard participants to our CIP initiatives, with 213 eligible organizations out of 220 having executed an agreement with CANARIE by the end of FY23. Following the launch of DNS Firewall in FY21, Threat Feed, and Intrusion Detection System (IDS) were launched respectively in Q1 and Q2 of FY22. By the end of FY23, 166 organizations had adopted DNS Firewall, 154 had adopted Threat Feed, and 133 had adopted IDS.

Implement CUCCIO Benchmarking and National Cybersecurity Assessment[2] initiatives deployed at eligible organizations; results collection in progress

The CUCCIO Benchmarking service was launched in the Fall of 2021, with results provided in the Spring of 2022, and a second round of intake was launched in the Fall of 2022. By the end of FY23, 168 organizations had signed up to participate in the CUCCIO Benchmarking service.

The National Cybersecurity Assessment (NCA) is a new self-assessment tool, based on the US National Institute of Standards and Technology (NIST) Cybersecurity Framework (CSF), which was developed by the NREN and launched by CANARIE in the Fall of 2022. The NCA results will allow organizations to gain valuable insights into the extent to which they are actively and effectively addressing cybersecurity across the comprehensive range of CSF functions. 145 organizations participated in the NCA in the first year of the service, and participants began to receive their individual reports at the end of FY23.

Define the next set of cybersecurity initiatives

The National Cybersecurity Assessment is a crucial tool for the entire research and education sector, as its data will be used by CANARIE and the NREN to identify priority areas for investment in cybersecurity initiatives. This aggregated data, together with aggregated data from the CUCCIO Benchmarking service, and consultation with the sector, will be used by CANARIE to define the next set of cybersecurity

---

[2] This initiative was referred to as the Information Security Assessment in CANARIE FY23 Business Plan

initiatives for FY24 to help better secure the research and education community.

Other Achievements – CanSSOC:

CanSSOC integration

In May 2022, CANARIE announced that CanSSOC's team and services would be integrated with CANARIE's existing cybersecurity services, creating a new cybersecurity and identity management operating department within CANARIE. The goal of this integration is to simplify processes and reduce the burden on institutional personnel to access national cybersecurity services; integrate data sources and scalable solutions to build actionable intelligence that secures the entire sector, regardless of an organization's size or cybersecurity capacity; develop a national talent strategy to ensure the size of an organization's team is no longer a barrier to their adoption of world class cybersecurity tools and services; amplify and integrate existing investments in technologies, processes, and people; and increase regional and national investments in cybersecurity.

Research Intensive Group (RIG)

As part of the CanSSOC integration, 14 research-intensive universities agreed to provide CANARIE with non-Contribution Agreement funding to support early-stage efforts to address current operational gaps, launch proofs of concept, and pilot projects to address advanced use cases deemed to be of high priority to institutions with significant research activity. A governance and funding model was established, and an annual operating plan was approved, including three pilot cybersecurity projects that reflect priority areas of investigation. Outputs from the RIG pilot projects will be used to inform ongoing federated security operations centre activities and potentially feed into initiatives for review by the Cybersecurity Advisory Committee (CAC).

Federated Security Operations Centre

Following the CanSSOC integration, CANARIE hosted several in-person and online workshops in the Fall of 2022 to obtain community input and develop alignment around the vision, value, and operational concepts for a federated SOC for the research and education sector. 192 individuals from 89 institutions attended these workshops, and the feedback gathered will help support the development of a proposed architecture and service delivery model. Additionally in spring 2023, Information Security leaders from CANARIE and the regional NREN Partners held a two-day working session to ensure shared understanding around role clarity and operating structures in a proposed federated SOC.

NREN Program:

Canada's National Research and Education Network (NREN) operates on a co-delivery model, as a partnership between CANARIE and its provincial and territorial NREN Partners. CANARIE provides interprovincial and international connectivity, while the regional partners provide connections to institutions and organizations within their jurisdictions. Data that travels out of a province or territory traverses CANARIE Network links to NREN Partners in other provinces or territories, or internationally via CANARIE links connecting Canada to the rest of the world.

A coherent technical and strategic evolution of the NREN is driven by a vision to ensure users coast-to-coast-to-coast have a comparable user experience within Canada, and to users of NRENs in other

countries. CANARIE's NREN Program enables NREN Partners to increase capacity and reliability of network equipment and infrastructure; to enable network management (tools and training); and to extend the reach of NREN Partner networks to more institutions.

Execution underway for projects defined in the NREN FY23 Operational Plan

The NREN Governance Committee (GC) continued to strengthen delivery capabilities through a review of project management processes and practices for NREN activities. Efforts focussed on developing and implementing a more systematic and cohesive approach that will be followed throughout project life cycles.

The NREN GC also developed draft Guiding Principles for the Canadian NREN, which will be used as the compass for updated strategic and operational plans and will guide investment priorities.

Additionally, the NREN Partners drafted a network roadmap for the federated network that will first focus on resiliency of the overall network. This initiative seeks to enhance adaptive capabilities to major disruptions (e.g. natural disasters) that could result in service outages.

Two public constituent consultations were organized to get feedback on approaches and opportunities for the NREN to offer direct cloud connectivity services. Building on these consultations, next steps may include the development of cloud connect services employing network automation.

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

The second competitive funding call for the NREN Program was launched on April 27, 2021. The purpose of this funding call, which provides $3.3M across 15 projects, is to enable NREN Partners to create, extend, or maintain network infrastructure and/or advanced network capabilities to support collaboration and research both nationally and internationally, and to enable increased access to, and use of, the NREN. All projects are now in final stages of implementation, including seven (7) in the project closure stage.

Increased reliability, capacity, and security on network segments shared by NREN Partners; and Development and launch of projects to enhance security

The NREN Partners continue to work together on the completion of projects to improve network operations and security, such as enabling Resource Public Key Infrastructure (RPKI) on NREN networks. The initial goal of the project is to assist each NREN Partner with ensuring each of their community member networks accessing the NREN have obtained the proper Route Origin Authorizations (ROA) certificates for their IP address spaces as a means of further securing the national network. Each NREN Partner will communicate with their connected institutions on the importance of enabling RPKI on the network and provide help and materials if needed. Other efforts include the elaboration of processes and mechanisms to ensure an NREN wide response to security incidents, the development of appropriate security metrics, and the launch of a training initiative to harness the capacity of cybersecurity analysts.

Increase NREN security through continuation of the NREN SIEM Project

Partners across the NREN participated in the NREN SIEM Project, which began with a joint, national

procurement of a Security Information and Event Management (SIEM) tool at nine NREN Partners. The project also incorporated the hiring of dedicated cybersecurity analysts at 11 NREN Partners, thereby creating a community of security practitioners across the country. This dedicated group of Cybersecurity Analysts continue to work together to protect the NREN community by efficiently leveraging resources and processes to create a national view of the NREN security posture with local implementation.

Continued progress towards the technical implementation of the Nunavut NREN Partner

CANARIE has been working closely with Nunavut Arctic College in the development of their R&E network, with a proposal for interprovincial connectivity to the territory going to the CANARIE Board of Directors in April 2023.

Organization of an NREN Assembly event to foster engagement between NREN Partners

CANARIE facilitated the fifth NREN Assembly in October 2022, bringing together staff from across the NREN. The event used a new "unconferenced" or "open space" approach to identify priorities areas for the next NREN Strategic Plan.

Other Achievements – NREN:

NREN Call 3

In anticipation of a Contribution Agreement amendment to provide funding for FY25, in December 2022 CANARIE launched an NREN Call 3 to strengthen the NREN's ability to deliver consistent, high-quality access to infrastructure and services for residents in Canada engaged in research, innovation, and education.

2.2   Technology Innovation:

Research Software Program:

To address gaps in research infrastructure and leverage existing investments in research software, CANARIE supports the creation of technologies to bring new collaboration capabilities, not previously offered, to the research community. The Research Software program currently focuses on three principles: funding software re-use and adaptation to minimize development efforts; promoting research software best practices; and supporting long-term software sustainability. These activities have transitioned to the Alliance, but CANARIE continued to support maintenance funding for projects in FY23.

Transition to the second maintenance portions of projects funded under platform Call 3

All projects funded under platform Call 3 successfully transitioned to the second maintenance phase in April 2022 and have progressed through this phase, with completion at the end of March 2023.

Transition to the final year of funding for in-institution research software development teams funded under Local Research Software Support Call 1

All projects funded under Local Research Software Support Call 1 successfully transitioned to the final

year of funding in April 2022 and have progressed through this phase, with completion at the end of March 2023.

Continued evolution of a research software community in Canada using Slack as an online collaboration tool for sharing lessons learned and best practices

This activity was stayed, as the program transitioned to the Alliance.

Other Achievements – Research Software:

Canadian Research Software Conference (CRSC) 2022

CRSC 2022 took place as an in-person event in Montreal, May 31-June 1. This marked the formal public handover of Research Software activities to the Alliance.

Research Data Management:

In response to consistent community feedback that identified the need to coordinate activities in research data management, CANARIE acted to provide funding to support Research Data Canada (RDC) in 2014. RDC's overarching goal was to improve the management of research data in Canada so that it is broadly available to support knowledge creation and innovation. Subsequently, CANARIE launched a Research Data Management (RDM) program in 2017-18 to fund the development of RDM tools. These activities have all transitioned to the Alliance as of the end of FY22.

Technical and financial audits of Call 2 funded projects completed as required

All final Call 2 development reviews have been completed, and CANARIE is finalizing minor outstanding issues.

Innovation Fund:

To support technology innovations and community needs identified during its mandate, CANARIE maintains an innovation fund, to test and validate pilot programs that support the research and innovation communities in Canada in line with our agreement with the Government of Canada.

Execution underway on the first identified project(s)
CANARIE collaborated with the community to develop a proposal for a National Innovation Platform and continues to work with the Government of Canada to review whether to move the project forward.

2.3   Private Sector Innovation

CANARIE seeks opportunities to leverage digital infrastructure and tools to facilitate increased use of transformative technologies by private sector enterprises and drive increased innovation and commercialization. CANARIE currently participates in two major initiatives to support ICT sector innovation and commercialization.

DAIR Cloud Program:

To leverage CANARIE resources and capabilities in support of private sector innovation, CANARIE's DAIR Cloud Program enables small and medium-sized enterprises (SMEs) to access and productively utilize powerful cloud computing resources to advance their ICT research and development efforts. DAIR provides an opportunity for entrepreneurs to accelerate time-to-market and de-risks the innovation process for SMEs by reducing their need to invest in large, in-house computing resources, and facilitates on-going communications among DAIR participants so that SMEs and entrepreneurs can freely exchange best practices and lessons learned with like-minded individuals. DAIR exposes SMEs to the power of cloud technologies to transform traditional business models and provides these businesses with an opportunity to adopt these technologies as part of their long-term growth strategy.

"With DAIR's cloud resources, we were able to make significant progress on our product (application) development. DAIR enables us to have multiple dev and testing environments, which is really amazing for our work." - Sam Jie Cai Xu, Samsonic Technologies

Increased usage of DAIR

By the end of FY23, the cumulative count of DAIR Cloud users grew to 1,905 and the total number of BoosterPack views grew to 3,265 (surpassing the mandate goal of 2,400).

New features added to the DAIR Cloud platform

Preparation and development work occurred during FY23 to create significant new service additions launching in FY24.

Content released to educate SMEs on cloud independence and security in the cloud

CANARIE released educational content related to the use of Graphical Processing Units (GPUs) in the DAIR Cloud.

Monitor ongoing cloud usage patterns of SMEs as they develop and test cloud-based applications and services

CANARIE monitors participant usage patterns and services in use to support program planning and prioritization for future enhancements to the DAIR Cloud. Based on usage patterns, CANARIE is launching a new model to support high-use participants.

Provide additional BoosterPack tutorials, to reduce the time and cost for SMEs to develop new technology skills

Three (3) new BoosterPacks were launched in FY23, including *Automated Data Pipeline*, produced by Intellius and *Cloud-based Platform for Geospatial Intelligence with Machine Learning*, produced by Ecosystem Informatics.

Further advance the partnership between DAIR and CENGN, making participant transitions between programs more apparent and seamless

CANARIE and CENGN continue to work collaboratively on joint referral opportunities for the SME community to highlight the transition routes between the two organizations' programs. In FY23, this included connecting CENGN referred companies to highly-demanded GPU resources to aid in product development of artificial intelligence companies.

Overview of CENGN

CANARIE is a founding partner in the Centre of Excellence in Next Generation Networks (CENGN), which was launched in 2015. CENGN is a consortium of industry (including Juniper, Cisco, Nokia, EXFO, Bell, TELUS), academic, and research leaders who are pooling their expertise and equipment to lower the barrier to market entry for SMEs and researchers.

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

CANARIE continues to play a key role in CENGN initiatives, as CANARIE Network resources are made available to support test-bed infrastructure for new product validation and testing as required.

2.4   Activities Supporting Equity, Diversity, and Inclusion

CANARIE embraces the diversity of the communities it serves, and as such, is committed to activities that advance Equity, Diversity, and Inclusion (EDI).

CANARIE continues to support the growth of a diverse workforce. All job postings commit to providing accommodations upon request by any candidate. CANARIE also strives for diversity in its Board composition supported by the CANARIE Board Diversity Policy. That policy states: "ensure the Board composition includes a diverse set of perspectives, which reflects our core stakeholders and the varied personal and demographic characteristics of Canadian society."

Measurement and targeting of diversity metrics on external CANARIE advisory committees; Updated committee Terms of Reference to reflect a commitment to diversity

New diversity-related clauses have been added to the terms of reference of all external advisory committees, and CANARIE has begun to track diversity metrics of members.

Creation of a staff EDI workspace and training catalogue
CANARIE launched the "Belonging" site within its document repository infrastructure, to share training materials and resources, and to facilitate staff interactions.

Other Achievements – EDI

In line with CANARIE's FY23 EDI Action Plan, CANARIE conducted several key activities during the year. These included:

- Completing a year-long engagement with an Indigenous knowledge keeper and storyteller, to engage staff on truth and reconciliation;
- Continued meeting as the Joint EDI (JEDI) group with the Alliance;
- Carried out "Inclusive Leadership" training for Staff, and foundational EDI training for the Board and NREN GC;
- Created a Supplier Code of Conduct;
- Launched the second annual Belonging survey; and
- Created a framework for Employee Resource Groups within CANARIE.

3. Statement of Eligible Activities for 2023-24 and for the Foreseeable Future

In 2023-24, CANARIE will continue to align its activities towards the goal of strengthening Canada's digital research infrastructure, with a focus on the three eligible activities, as laid out in the 2023-24 Business Plan.

3.1   Network Operations

3.1.1   CANARIE Network

Deployment of additional network capacity to support traffic growth

CANARIE will continue to improve the capacity, redundancy, and resiliency of the CANARIE Network to meet the needs of Canada's research, education, and innovation communities.

Improved commercial cloud support

CANARIE will continue to work with NREN Partners and connected organizations to understand their connectivity needs, building on the findings of CANARIE's pilot in FY22 and FY23.

Continued work on the 400Gbps capacity upgrade

CANARIE has completed the procurement of 400Gbps routers and will begin installing them in FY24. CANARIE will also start the planning and procurement for the next phase of the router upgrade.

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

CANARIE continues the work to refresh these two key fibre corridors, which will support network speeds to 400Gbps and beyond, equipping the optical infrastructure to support traffic growth of intensive global scientific research.

Deployment of additional network capacity to support Northern connectivity
CANARIE will improve the capacity, redundancy, and resiliency of the CANARIE Network in Northern Canada, to meet the needs of Canada's research, education, and innovation communities in these regions.

Improvement of network security reporting, monitoring, and measurement system

CANARIE will continue to work with the NREN Partners on the NREN SIEM Deployment Project, to improve the security of both the CANARIE Network and the NREN, and to maintain a community of NREN security analysts across the country.

Launch of version 1 of the Global Research and Education Network (GREN) Map

CANARIE is collaborating with the international community in support of a full version 1 launch of the GREN Map.

Deployment of the Software Networking Applications

CANARIE will continue the collaboration of software development with global NREN partners in deploying Network Automation tools for streamlining network operational processes and improving alert notifications.

Deployment of support tools accessible through the user portal

CANARIE continues to develop features for the Network Support Portal to improve coordination and support of the Network with partners.

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

CANARIE continues working with Shared Services Canada to evaluate departmental needs in supporting the government science community.

3.1.2   Canadian Access Federation:

Increased adoption of CAF services

CANARIE will continue to promote the benefits of the Canadian Access Federation – both *eduroam* and Federated Identify Management – to the research and education community.

Increased number of eduroam logins per year

CANARIE expects to see continued growth in *eduroam* logins as more students, faculty, and staff return to campus following the COVID-19 pandemic.

Increased number of projects to upgrade the capacity/capability of the federation; and Increased number of interfaces, applications, and tools available to support CAF services

CANARIE will continue to investigate opportunities to extend the reach and expand the benefit of CAF identity services, including with the private sector, and to integrate CAF services with the broader cybersecurity portfolio offered by CANARIE.

3.1.3   Cybersecurity Initiatives Program and CanSSOC:

New initiatives deployed at eligible organizations

CANARIE will work with the Cybersecurity Advisory Committee and its standing committees to define future initiatives for launch in FY24, guided by the data collected from the CUCCIO Cybersecurity Benchmarking and National Cybersecurity Assessment initiatives.

Community cybersecurity event hosted

CANARIE will host a pilot community cybersecurity event in concert with the CANARIE Summit.

An incident response system deployed

Work towards an NREN incident response system will commence, with the aim of having a system in place in FY25.

3.1.4   NREN Program:

Execution underway for projects defined in the NREN FY24 Operational Plan; and Execution underway for all approved projects in NREN Call 2 for increased reliability, capacity, and resiliency of networks operated by NREN Partners; and Execution underway for all approved projects in NREN Call 3

Execution will either continue or commence on all approved projects.

Increase NREN security through continuation of the NREN SIEM project and continued development of the federated NREN Cybersecurity Analyst team

Agreements are executed, or in process, to extend the analyst team for FY24.

Development and launch of projects to enhance security

CANARIE is working with the NREN GC to prioritize and action cybersecurity initiatives to enhance security for the NREN, and for the member institutions of regional partners, with continued focused on the development of a federated Security Operations Centre for the sector.

Continued progress towards the technical implementation of the Nunavut NREN Partner

Work will continue, through the relationship established with Nunavut Arctic College, to establish an NREN connection to Nunavut.

Organization of an NREN Assembly event to foster engagement between NREN Partners

The NREN Assembly is now an annual event bringing together staff from various departments across the NREN, to foster engagement and understanding of our shared goals. The Assembly is planned as an in-person event to take place in October 2023 in Montreal, in concert with the CANARIE Summit.

3.2   Technology Innovation

3.2.1   Research Software Program:

Financial audit of participants in Research Software Platform projects; Final report for Research Software Platform projects; Financial audit of participants in Local Research Software Support Call 1; Final report for Local Research Software Support Call 1

All required audits and reports will be completed, following the successful transition of activities to the Alliance.

3.2.2   Research Data Management:

N/A

No activities are expected in FY24 following the successful transition of activities to the Alliance.

3.2.3   Innovation Fund:

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

CANARIE will continue to work with the Government of Canada to bring forward programs and projects which support the outcomes of CANARIE's Contribution Agreement.

3.3   Private Sector Innovation:

3.3.1 DAIR Program:

Increase usage of DAIR

CANARIE will continue to accept applicants and promote the DAIR Program and the benefits of cloud computing, to Canadian SMEs.

New features added to the DAIR Cloud platform

CANARIE will further leverage Canadian public cloud to speed up SMEs' access to new cloud services – including GPUs used for machine learning and artificial intelligence – based on availability, demand, and the ability to monitor and control spending within an allocated budget.

Content released to educate SMEs on cloud independence and security in the cloud

CANARIE will develop tutorials - published in the form of website documents, blog posts, or short videos - to increase participant knowledge in the areas of cloud independence, cloud development, and cloud security best practices.

Monitor ongoing cloud usage patterns of SMEs as they develop and test cloud-based applications and services

CANARIE will monitor and evaluate cloud usage patterns to inform stakeholders and provide valuable input for future strategic investments and direction in the DAIR Program.

Provide additional BoosterPack Tutorials, to reduce the time and cost for SMEs to develop new technology skills

CANARIE expects to release 3 new BoosterPacks during FY24.

3.3.2   Centre of Excellence in Next Generation Networks (CENGN):

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

CANARIE continues to work with partners at CENGN to identify projects that could leverage the CANARIE Network.

CANARIE also continues to participate in discussions with public and private sector stakeholders wishing to use the CANARIE Network to validate new products. CANARIE will continue to work with its stakeholder partners and the Government of Canada to ensure that its powerful network infrastructure is leveraged to support Canadian competitiveness in advanced technologies.

3.4   Activities Supporting Equity, Diversity, and Inclusion:

In 2023-24 CANARIE will continue to implement activities that support EDI. CANARIE plans to continue working with the Alliance, and our expected outcomes for 2023-24 include:

- Development of CANARIE's Commitment to Reconciliation (based on Call to Action #92)
- Execution of CANARIE's equity, diversity, and inclusion FY24 Action Plan
- Development of the FY25 Action Plan
- Engagement with submarine Arctic cable consortia to support Northern Connectivity

- Continued progress towards the technical implementation of the Nunavut NREN Partner
- CANARIE programs will specify EDI objectives and outcomes
- Increased number of CANARIE Employee Resource Groups
- Carrying out recommendations of a third-party review of CANARIE's corporate policies
- Continued compliance with the Board diversity policy, and compliance with the 50-30 Challenge

---

Over the next year, CANARIE will work to ensure that these activities are implemented, in line with the terms and conditions of CANARIE's Contribution Agreement.

4. List of Eligible Projects and Funding Provided to Each

4.1 National Research and Education Network Program (NREN)

The NREN program continues to support the advancement of Canada's National Research and Education Network. The program's key objective is to strengthen the impact of Canada's co-delivery model and enable aligned strategic evolution of the NREN based on national priorities. Program objectives are achieved through a variety of initiatives:

- Competitive funding enables provincial/territorial network partners to upgrade network infrastructure and extend provincial network connections;
- Directed funding ensures that the National Research and Education Network evolves in a consistent, coherent, and strategic manner;
- Interconnection and Co-delivery funding ensures that provincial and territorial partners support co-delivery of the NREN and comply with the requirements of CANARIE's Interconnection Agreement; and
- Operating and Strengthening the NREN promotes the impact of Canada's co-delivery model.

Table 4.1 details the NREN Partners that utilized Competitive NREN funds.

Table 4.1 NREN Program – Competitive Funding Calls ($ 000s)

NREN Partner	Funding				
	2020-21	2021-22	2022-23	Commitments	Total
ORION	-	1,363	1,190	-	2,553
RISQ	-	-	87	726	813
BCNET	96	-	58	330	484
Cybera	17	128	39	172	356
SRNET	-	-	-	183	183
ACORN-NS	-	-	-	161	161
ECN-NB	-	-	-	130	130
MRnet	-	-	-	119	119
ECN-PEI	-	-	30	-	30
Total	**113**	**1,491**	**1,404**	**1,821**	**4,829**

In 2022-2023, the NREN Program extended the funding of the Cybersecurity Analyst at each of the NREN Partners. Table 4.1a details the utilization of the funds during the year.

Table 4.1a NREN Program – Directed Funding ($ 000s)

NREN Partner	2022-23
Yukon University	81
ORION	81
BCNET	79
Cybera	72
ECN-NB	60
SRNET	56
RISQ	52

ACORN-NS	30
MRnet	9
ACORN-NL	9
Total	**529**

In 2022-23, $0.073M of Directed Funding was utilized to secure the technical support for security infrastructure and renewal of server maintenance services for each of the NREN Partners.

In 2022-23, $.245M was paid to the NREN Partners for Interconnection and Co-delivery.

4.2   Cybersecurity Initiatives Program (CIP)

The CIP provides investments in initiatives that will strengthen cybersecurity efforts of the research and education sector with advanced technologies, improved processes, and broadened expertise. These initiatives are delivered to eligible organizations through the provincial and territorial partners in Canada's NREN.

The Intrusion Detection System (IDS) initiative was launched in 2020-21. Table 4.2 details the utilization of the funds for participating institutions and 3 IDS platform projects under that initiative.

Table 4.2   Intrusion Detection System ($ 000s)

Platform Projects	Funding				
	2020-21	**2021-22**	**2022-23**	**Commitments**	**Total**
Institutional Participation	129	192	231	452	1,004
Platform Projects					
Concordia University	28	99	133	214	474
University of Waterloo	50	75	95	155	375
McMaster University	50	27	38	42	157
Total	**257**	**393**	**497**	**863**	**2,010**

The Threat Feed initiative was launched in 2022-23. Table 4.2a details the utilization of the funds.

Table 4.2a   Threat Feed and National Security Analyst ($ 000s)

Initiative	Funding				
	2020-21	**2021-22**	**2022-23**	**Commitments**	**Total**
University of Toronto					
Threat Feed	498	863	285	154	1,800
National Security Analyst	-	157	-	-	157
Total	**498**	**1,020**	**285**	**154**	**1,957**

In 2022-23

1. $1.028M was utilized to secure CIRA DNS Firewall services for eligible organizations.
2. $.914M was utilized to support the Cybersecurity Benchmarking initiative.
3. $1.039M was utilized to support the National Cybersecurity Assessment.

4. $.646M was paid to the NREN Partners for community collaboration support.

4.3   Research Software Program

The Research Software Program leverages the services developed under previous mandates to drive collaborative development of reusable software services and adaptation of existing research platforms for use across multiple research domains.

The Research Software Program launched its first funding call of the current mandate in 2020-21. Table 4.3 details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.3   Research Software Program – Call 3 ($ 000s)

Lead Contractor	Funding				
	2020-21	2021-22	2022-23	Commitments	Total
University of Victoria	77	123	100	-	300
Ontario Institute for Cancer Research	100	99	100	-	299
University of Toronto	64	131	97	-	292
London Health Sciences Centre Research Inc.	97	80	96	-	273
McGill University	88	90	84	-	262
Queen's University	51	99	100	-	250
École de Technologie Supérieure	41	109	100	-	250
Université du Sherbrooke	50	100	100	-	250
University of Waterloo	50	99	100	-	249
Simon Fraser University	29	119	100	-	248
Bird Studies Canada	50	97	100	-	247
University of Waterloo	44	106	85	-	235
McGill University	41	74	90	-	205
Concordia University	25	49	85	-	159
Total	**807**	**1,375**	**1,337**	**-**	**3,519**

The Research Software Program launched the first local research software support call of the current mandate in 2020-21. Table 4.3a details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.3a   Research Software Program – Local Research Software Support - Call 1 ($ 000s)

Lead Contractor	Funding				
	2020-21	2021-22	2022-23	Commitments	Total
Simon Fraser University	90	307	203	-	600

University of Calgary	58	218	324	-	600
Sunnybrook Research Institute	126	190	284	-	600
University of Ottawa	34	305	260	-	599
University of Sherbrooke	71	214	290	-	575
University of Laval	73	240	196	-	509
Total	**452**	**1,474**	**1,557**	**-**	**3,483**

4.4   Research Data Management

The Research Data Management Program continues to support and enable national initiatives that advance the appropriate management of research data across Canadian sectors, fueling new discoveries and business opportunities.

The Research Data Management Program launched its first funding call of the current mandate in 2020-21. Table 4.4 details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.4   Research Data Management – Call 2 ($ 000s)

Lead Contractor	Funding			
	2020-21	2021-22	2022-23	Total
The Hospital for Sick Children	326	335	(38)	623
Indoc Research	248	251	-	499
Simon Fraser University	223	257	(2)	478
Total	**797**	**843**	**(40)**	**1,600**

4.5   Digital Accelerator for Innovation and Research (DAIR) Program

DAIR is an integrated virtual environment that leverages the CANARIE Network to enable SMEs to develop and test new ICT and other digital technologies.

DAIR committed funding to partners to manage the DAIR resources and ensure their availability and maintenance for the duration of the mandate. Table 4.5 details the utilization of the funds in the year.

Table 4.5 Digital Accelerator for Innovation and Research (DAIR) Program ($ 000s)

Lead Contractor	Funding				
	2020-21	2021-22	2022-23	Commitments	Total
Cybera	151	258	155	181	745
Total	**151**	**258**	**155**	**181**	**745**

In 2022-23, $.130M was paid to support the BoosterPack Tutorials and $.439M paid to support the cloud platform.

5. Summary of Spending on Eligible Expenditures

Total Eligible Expenditures in 2022-23 were $32.602M. Table 5.0 details the expenditures.

Table 5.0   Eligible Expenditures ($ 000s)

Expenditures	Audited Financial Statements	Accounting Adjustments *	Total Eligible Expenditure 2022-23
PROGRAM			
Network Operations			
Network Infrastructure & Services	11,460	(406)	11,054
Network Security	789	15	804
Joint Security Project (CIP)	6,953	52	7,005
NREN	3,211	9	3,220
Technology Innovation			
Research Software	3,152	137	3,289
Research Data Management	23	-	23
Research Data Canada	-	-	-
Private Sector Innovation	1,548	86	1,634
Total Program	**27,136**	**(107)**	**27,029**
Operating Expenses	5,816	(243)	5,573
Total	**32,952**	**(350)**	**32,602**

*Accounting adjustments include timing differences for assets purchases and related amortization.

6. Statement of Total Funding Received

In 2022-23, CANARIE received $38.695M in total funding to support Eligible Activities. Table 6.0 details the funding sources.

Table 6.0   Total Funding Received ($ 000s)

Funding Received	2022-23
ISED Funding	37,500
User Fees	619
Interest Income	576
Total	**38,695**

Table 6.0a details the 2022-23 Cost Recovery from CANARIE programs in the current mandate.

Table 6.0a   Total Cost Recovery ($ 000s)

Cost Recovery	2022-23
Matching Funds	
NREN	960

DAIR	13
Total Matching Funds	**973**
In-Kind Contributions	
Research Software	527
Research Data Management	30
Total In-Kind Contributions	**557**
Total	**1,530**

7. Criteria Applied to Select Eligible Projects

Project proposals are reviewed relative to the mandatory criteria and the scoring criteria for each program. These criteria are approved by the CANARIE Board of Directors. Evaluation of proposals relative to these criteria constitute the basis for the decision whether a project receives CANARIE funding. Projects that fail to meet the mandatory criteria or fail to meet evaluative criteria to an acceptable degree, are not funded.

8. Statement of Compensation

Directors on CANARIE's Board, including officer positions such as Chair, Vice-Chair and Secretary/Treasurer, receive no compensation beyond reimbursement for any reasonable out-of-pocket expenses incurred while performing their duties or attending CANARIE meetings.

The President and CEO of the organization has a compensation package that is benchmarked regularly against external comparatives by an external consultant and overseen by the HR (Executive) Committee of the Board. All other staff positions at CANARIE are classified according to a structured system that assigns a salary range to each position. The system and staff salaries are regularly benchmarked against comparative organizations by an external consultant.

For the fiscal year ending March 31, 2023, salary ranges for all officers and staff of CANARIE whose total compensation remuneration paid exceeded $100,000 (including any fee, allowance, or other benefit) are presented below.

Officers

President and CEO
$337,500 - $468,700

Chief Financial Officer
Chief Technology Officer
Vice President, Business Development
Vice President, Cybersecurity Programs and Services
Vice President, External Relations
Vice President, Legal and Corporate Governance
$198,000 - $304,000

Staff

Chief of Network Engineering
Director, Cybersecurity
Senior Director, Applications
Senior Director, CanSSOC Services
Senior Director, Corporate Strategy
Senior Director, Cybersecurity Programs
$153,000 - $243,800

Director, Communications
Director, Cybersecurity Engineering
Director, Cybersecurity Operations
Director, Finance
Director, IT
Director, NREN Cybersecurity Services
Director, Program Operations
Director, Strategic Policy
Senior Architect, Network Engineering
$115,700 - $198,000

DevOps Specialist
Finance Manager
Financial Systems Manager
Manager, Analytics
Manager, Cybersecurity
Manager, Financial Processes
Manager, Human Resources
Manager, Network
Manager, Program Accounting
Manager, Program Adoption
Manager, Project Management Office
Manager, Software Development
Network Architect
NREN Coordination Manager
Program Manager, Cybersecurity Initiatives Program
Senior Cybersecurity Analyst
Senior Program Operations Coordinator
Senior, Program Analyst
Software Developer
Solution Architect
Technical Writer
Technology Architect, CAF
$105,000 - $159,000

Cybersecurity Analyst

Financial Reporting Officer
Identity Access Management Support Specialist
Program Manager, Private Sector Innovation
Project Manager
Senior IT Specialist
Software Developer
Software Test Lead
Support Specialist, Cloud
$100,000 - $127,500

9. Statement of CANARIE's Investment Policies, Standards, and Procedures

CANARIE's investment strategy is specifically tailored to the duration and quality constraints in terms of investment options imposed by the Statement of Investment Policy and the Contribution Agreement with Innovation, Science and Economic Development Canada. These constraints, while deemed appropriate and necessary to meet the overall objectives of CANARIE, preclude a more active approach to investment management.

Rather than active investment management, the strategy adopted by CANARIE is "buy and hold", based on the following framework:

- Investment maturities will, wherever possible, match the forecasted cash requirements of CANARIE.

- The quantitative limits on investment holdings provide ample structural liquidity to meet the needs of CANARIE. It is appropriate, therefore, to hold less liquid types of approved investments. Value added will be achieved by moving out the "liquidity curve" when possible.

- At all times, CANARIE will hold investments deemed eligible under the Statement of Investment Policy.

Within this context, CANARIE's official Statement of Investment Policy is adopted by the Board of Directors and reviewed and approved in the year by the Audit & Investment Committee of the Board. It was last reviewed and approved in October 2022. There were no changes to the Policy, standards, or procedures during the year.

10. Summary of the Results of Audits and Evaluations Carried Out During the Year

Financial Audit: CANARIE annually provides for a Financial Audit undertaken by independent auditors who are approved each year by CANARIE's membership and overseen by the Audit and Investment Committee of the Board. The results of this Audit are provided to the Minister as part of each year's Annual Report to the Minister. The Financial Audit for the 2022-23 Fiscal Year was completed in June 2023 by BDO Canada LLP, Chartered Professional Accountants.

Recipient Audits: In agreements with Eligible Ultimate Recipients for Eligible Projects, CANARIE is required to provide for the conduct of an audit of:

(i) any Eligible Project where CANARIE's contribution exceeds $1M,

(ii) any Eligible Project where CANARIE deems that an audit is appropriate, and

(iii) a representative sample of projects to which CANARIE has contributed less than $1M,

according to the terms and procedures set out in the Performance and Risk Framework and the Contribution Agreement.

CANARIE includes in its contracts with Eligible Ultimate Recipients a requirement for the conduct of an audit by an auditor selected by CANARIE for all funded projects, regardless of the amount of CANARIE funding received. This provides CANARIE with the ability to audit projects, where warranted or deemed appropriate, and to perform representative sample audits.

Through a competitive procurement process CANARIE selected two audit firms to manage the recipient audits. The firms audited the projects where funding was provided during the current mandate, according to an audit plan that was developed to meet the requirements of the Contribution Agreement, and the Performance and Risk Framework developed for the current mandate.

The following tables reflects the audits performed in fiscal 2022-23 by program.

Table 10.0a Recipient Audits – Research Data Management

Lead Contractor	Project
Indoc Research	Patient Data Gateway
Simon Fraser University	Towards Systems Immunology: Integrating FAIR data into the iReceptor Platform
The Hospital for Sick Children	A distributed system for clinical and genomics data

Table 10.0b Recipient Audits – NREN

Lead Contractor	Project
Cybera	Calgary Core Router Upgrade
ORION	Sudbury – York Transport Overhaul
ORION	Upgrading IP and Transport Capacity in At-Risk Locations

Appendix 1: CANARIE Inc. Financial Statements – March 31, 2023

~ attached ~

CANARIE Inc.
Financial Statements
For the year ended March 31, 2023

	Contents

Independent Auditor's Report

**To the members of
CANARIE Inc.**

Opinion
We have audited the financial statements of CANARIE Inc., which comprise the statements of financial position at March 31, 2023 and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of CANARIE Inc. as at March 31, 2023 and its financial performance and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion
We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of CANARIE Inc. in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements
Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing CANARIE Inc.'s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate CANARIE Inc. or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing CANARIE Inc.'s financial reporting process.

2

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of CANARIE Inc.'s internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on CANARIE Inc.'s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause CANARIE Inc. to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.
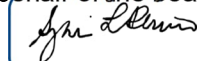
BDO Canada LLP

Chartered Professional Accountants, Licensed Public Accountants

Ottawa, Ontario
June 28, 2023

CANARIE Inc.
Statement of Financial Position

March 31		**2023**		2022
Assets				
Current				
Cash	$	2,459,680	$	2,708,935
Investments (Note 2)		23,034,972		14,459,635
Accounts and other receivable		722,348		710,008
Prepaid expenses and deposits (Note 3)		5,400,420		5,194,036
		31,617,420		23,072,614
Investments (Note 2)		384,227		362,674
Prepaid expenses and deposits (Note 3)		5,344,826		5,676,637
Tangible capital assets, assets under capital lease and intangible asset (Note 4)		14,898,317		15,399,150
	$	52,244,790	$	44,511,075
Liabilities and Net Assets				
Current				
Accounts payable and accrued liabilities (Note 5)	$	4,652,748	$	4,126,308
Deferred revenue		65,000		2,874
Deferred funding (Note 6)		18,790,831		11,228,782
Current portion of obligations under capital leases (Note 8)		709,293		222,114
		24,217,872		15,580,078
Deferred funding (Note 6)		5,344,826		5,676,637
Deferred capital funding (Note 7)		10,645,119		10,923,838
Obligations under capital leases (Note 8)		3,543,905		4,253,198
		43,751,722		36,433,751
Commitments (Note 9)				
Net Assets				
Unrestricted		82,111		103,580
Internally restricted royalty fund		2,510,084		2,467,621
Internally restricted for windup of operations		5,900,873		5,506,123
		8,493,068		8,077,324
	$	52,244,790	$	44,511,075

On behalf of the board:

_____ Director

_____ Director

The notes are an integral part of these financial statements.

4

For the year ended March 31	Unrestricted	Internally Restricted Royalty Fund (Note 10)	Internally Restricted for Windup of Operations (Note 10)	2023	2022
Balance, beginning of the year	$ 103,580	$2,467,621	$ 5,506,123	$ 8,077,324	$ 7,716,604
Membership	348,125	-	-	348,125	338,958
Investment income	1,783	42,463	94,750	138,996	15,045
Recovery (expenses)	(71,377)	-	-	(71,377)	6,717
Excess of revenues over expenses	278,531	42,463	94,750	415,744	360,720
	382,111	2,510,084	5,600,873	8,493,068	8,077,324
Interfund transfers (Note 10)	(300,000)	-	300,000	-	-
Balance, end of the year	$ 82,111	$2,510,084	$ 5,900,873	$ 8,493,068	$ 8,077,324

The notes are an integral part of these financial statements.

5

CANARIE Inc.
Statement of Operations

For the year ended March 31	**2023**	2022
Revenues		
Industry Canada / ISED funding	$ 32,952,797	$ 30,229,275
Membership	348,125	338,958
Investment income	138,996	15,045
Research Intensive Group funding	257,491	-
	33,697,409	30,583,278
Expenses (Schedule)		
Program	27,136,648	25,235,200
Operating	5,816,149	4,994,075
Corporate (recovery)	71,377	(6,717)
Research Intensive Group	257,491	-
	33,281,665	30,222,558
Excess of revenues over expenses	$ 415,744	$ 360,720

The notes are an integral part of these financial statements.

For the year ended March 31	Program	Operating	Research Intensive Group	Corporate	2023 Total
Direct program	$ 16,358,042	$ -	$ 113,818	$ -	$ 16,471,860
Employee and consultants	7,561,385	3,839,656	143,034	60,913	11,604,988
Marketing and promotion	83,592	83,606	639	-	167,837
Travel, meetings and conferences	243,941	180,441	-	-	424,382
Rent	-	605,719	-	-	605,719
General office and supplies	14,696	302,150	-	10,464	327,310
Computer software and supplies	153,728	278,858	-	-	432,586
Professional fees	62,883	38,240	-	-	101,123
Interest on obligations under capital leases	163,067	-	-	-	163,067
	24,641,334	5,328,670	257,491	71,377	30,298,872
Plus: amortization	2,495,314	487,479	-	-	2,982,793
	$ 27,136,648	$5,816,149	$ 257,491	$ 71,377	$ 33,281,665

The notes are an integral part of these financial statements.

7

CANARIE Inc.
Schedule of Expenses

For the year ended March 31	Program	Operating	Research Intensive Group	Corporate	2022 Total
Direct program	$ 16,240,330	$ -	$ -	$ -	$ 16,240,330
Employee and consultants (recovery)	6,158,446	3,389,483	-	(8,860)	9,539,069
Marketing and promotion	117,978	86,768	-	-	204,746
Travel, meetings and conferences	23,571	25,209	-	-	48,780
Rent	-	565,119	-	-	565,119
General office and supplies	12,757	257,546	-	2,143	272,446
Computer software and supplies	97,138	223,212	-	-	320,350
Professional fees	73,382	32,844	-	-	106,226
Interest on obligations under capital leases	35,173	-	-	-	35,173
	22,758,775	4,580,181	-	(6,717)	27,332,239
Plus: amortization	2,476,425	413,894	-	-	2,890,319
	$ 25,235,200	$ 4,994,075	$ -	$ (6,717)	$ 30,222,558

The notes are an integral part of these financial statements.

8

For the year ended March 31	**2023**	2022
Cash flows from operating activities		
Excess of revenues over expenses	$ 415,744	$ 360,720
Items not affecting cash:		
Amortization expense	2,982,793	2,890,319
Amortization of deferred capital funding	(2,982,793)	(2,890,319)
Gain on disposal of tangible capital assets	(210)	(150)
	415,534	360,570
Changes in non-cash working capital:		
Accounts and other receivable	(12,340)	265,934
Prepaid expenses and deposits	125,427	407,762
Accounts payable and accrued liabilities	526,440	(1,421,630)
Deferred revenue	62,126	(37,126)
Deferred funding	7,230,238	(546,848)
	8,347,425	(971,338)
Cash flows from investing activities		
Deferred capital funding received to purchase tangible and intangible capital assets	2,481,960	1,923,803
Acquisition of tangible capital assets and intangible asset	(2,481,960)	(1,923,803)
Proceeds on disposal of tangible capital assets	210	150
Purchase of investments	(36,596,890)	(26,565,488)
Proceeds from disposal of investments	28,000,000	29,000,000
	(8,596,680)	2,434,662
Cash flows from financing activities		
Repayment of obligations under capital leases	(222,114)	(611,723)
Deferred capital funding received related to the payment of obligations under capital leases	222,114	611,723
	-	-
Net (decrease) increase in cash	(249,255)	1,463,324
Cash, beginning of the year	2,708,935	1,245,611
Cash, end of the year	$ 2,459,680	$ 2,708,935

The notes are an integral part of these financial statements.

1. Significant Accounting Policies

Purpose of Organization

CANARIE Inc. was incorporated on March 5, 1993 as a non-profit organization without share capital under Part II of the Canadian Corporations Act. CANARIE Inc. was continued under section 211 of the Canada Not-for-profit Corporations Act on November 19, 2013. The objective of CANARIE Inc. is to support the development of the communications infrastructure for a knowledge-based Canada.

As a corporation constituted exclusively for the purpose of carrying on or promoting scientific research and experimental development, CANARIE Inc. is exempt from the payment of income taxes under Section 149(1)(J) of the Income Tax Act (Canada).

Basis of Accounting

The financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations.

Use of Estimates

The preparation of financial statements in accordance with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from management's best estimates as additional information becomes available in the future. Areas of significant estimates include useful lives of tangible capital assets, assets under capital lease and intangible asset.

Deferred Funding

Deferred funding relates to (1) funding received, including interest earned on funding, user fees collected and other recovered eligible costs, in advance of the funding period; (2) funding received for future service; and (3) funding received with respect to the purchase of tangible capital assets, assets under capital lease and intangible asset.

When tangible capital assets, assets under capital lease and intangible asset are disposed, the proceeds increase the deferred funding balance and the net book value decreases the deferred funding balance related to tangible capital assets, assets under capital lease and intangible asset.

March 31, 2023

1. **Significant Accounting Policies** (continued)

Revenue Recognition   CANARIE Inc. (the organization) follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Funding related to tangible capital assets, assets under capital lease and intangible asset is deferred and recognized as revenue in the same year as the amortization expense of the related tangible capital assets, assets under capital lease and intangible asset.

Service contracts are recognized over the period of the services provided.

Membership fees are recognized over the period of membership.

Financial Instruments   *Measurement*
The organization initially measures its financial assets and liabilities at fair value. The organization subsequently measures all its financial assets and liabilities at amortized cost, except for investments which it chose to measure at fair value. Changes in fair value are recognized in the statement of operations.

Impairment
Financial assets measured at amortized cost are tested for impairment when there are indicators of impairment.

Transaction costs
The organization recognizes its transaction costs in the statement of operations in the year incurred for financial instruments measured at fair value. Financial instruments that are subsequently measured at amortized cost are adjusted by the transaction costs in the initial measurement of the asset or liability.

March 31, 2023

1. **Significant Accounting Policies** (continued)

Tangible Capital Assets and Intangible Asset

Tangible capital assets and intangible asset are stated at cost less accumulated amortization. Amortization is provided on the basis of their useful lives using the following methods and annual rates:

Computer equipment	3 years straight-line basis
Equipment	3 years straight-line basis
Leasehold improvements	over the term of the lease
Furniture	5 years straight-line basis
Network equipment	5 years straight-line basis
Computer software	2 years straight-line basis

Impairment of Tangible Capital Assets and Intangible Asset

When a tangible capital asset or intangible asset no longer has any long-term service potential to the organization, the excess of its net carrying amount over any residual value is recognized as an expense in the statement of operations.

Leases

Leases are classified as capital or operating leases. A lease that transfers substantially all of the benefits and risks incidental to the ownership of property is classified as a capital lease. All other leases are accounted for as operating leases wherein rental payments are expensed as incurred.

Assets under capital lease are stated at cost less accumulated amortization. They are amortized on a straight-line basis over the expected useful life of the asset to the organization, not to exceed twenty years, which currently corresponds to the term of the lease.

Contributed Services

During the year, voluntary services (including donated time and travel of board and committee members) were provided. Because of the difficulty of determining their fair value, contributed services are not recognized in the financial statements.

Presentation of Expenses

Activities eligible for funding in the ISED contribution agreement are classified as program or operating expenses. Program development, design and implementation activities are classified as program expenses. Activities which are not directly in support of Programs are classified as operating expenses. Activities not eligible for funding under the ISED contribution agreement are classified as corporate expenses or Research Intensive Group expenses.

2. Investments

Investments consist of Canadian government bonds with annual yields of 2.40% maturing in December 2023, short-term provincial government coupon bonds with annual yields ranging from 1.93% to 3.40% and maturities ranging from April 2023 to December 2023, short-term guaranteed investment certificates with annual yields ranging from 2.38% to 5.07% and maturities ranging from April 2023 to March 2024 and cash held in investment savings accounts with an annual yield of 4.05%.

Investments include a long-term provincial government coupon bond with an annual yield of 3.75% maturing in September 2024.

3. Prepaid Expenses and Deposits

	2023	2022
Program prepayments and deposits	$10,382,185	$10,570,721
Operating prepayments	326,561	263,452
Rental deposit	36,500	36,500
Balance, end of the year	10,745,246	10,870,673
Current portion	5,400,420	5,194,036
Long-term portion	$ 5,344,826	$ 5,676,637

4. **Tangible Capital Assets, Assets under Capital Lease and Intangible Asset**

	2023			2022	
	Cost	**Accumulated Amortization**	Cost	Accumulated Amortization
Computer equipment	$ 1,193,011	$ 724,080	$ 874,043	$ 639,970
Equipment	366,152	290,629	337,151	210,253
Leasehold improvements	902,936	437,487	862,920	210,931
Furniture	247,365	123,337	247,365	73,864
Art	2,139	-	2,139	-
Network equipment	20,123,680	15,704,165	18,126,488	14,285,840
Fibre under capital lease	15,505,114	6,185,646	15,505,114	5,217,637
Computer software	364,739	341,476	349,790	267,365
	$38,705,137	$ 23,806,820	$36,305,010	$ 20,905,860
Net book value		$ 14,898,317		$ 15,399,150

During the year, computer equipment with a cost of $81,833 (2022 - $15,727) and accumulated amortization of $81,833 (2022 - $15,727) was disposed and removed from the total cost and total accumulated amortization.

During the year, the organization acquired fibre under capital leases with a cost of $Nil (2022 - $2,792,203).

5. Accounts Payable and Accrued Liabilities

	2023	2022
Accounts payable and accrued liabilities	$ 4,650,498	$ 4,126,308
Government remittances payable	2,250	-
	$ 4,652,748	$ 4,126,308

6. Deferred Funding

Pursuant to Funding Agreements signed on July 6, 2019, October 9, 2015, September 4, 2012, and March 28, 2007, the organization received funding of $96,400,000, $113,658,824, $62,000,000 and $120,000,000 respectively from Innovation, Science and Economic Development Canada (ISED) for the design, development, deployment, improvement and operations of the CANARIE network and programs. In 2023, the organization received funding of $1,400,000 from the Research Intensive Group (RIG) to support early-stage research and development for the Research & Education sector cybersecurity tools and services.

The balance of the funds has been reflected as follows:

	2023	2022
Balance, beginning of year	$16,905,419	$17,452,267
ISED funding received	37,500,000	28,700,000
RIG funding received	1,400,000	-
Program - service fees	685,923	564,485
Program - interest	575,884	63,149
Direct program and operating expenses	(29,970,004)	(27,338,956)
RIG expenses	(257,491)	-
Transfer to operating for the acquisition of tangible capital assets, assets under capital lease and intangible asset	(2,481,960)	(1,923,803)
Transfer to operating for payments of obligations under capital lease	(222,114)	(611,723)
Balance, end of year	24,135,657	16,905,419
Current portion	18,790,831	11,228,782
Long-term portion	$ 5,344,826	$ 5,676,637

7. Deferred Capital Funding

Deferred capital contributions represent amounts funded by ISED for the purchase of tangible capital assets, assets under capital lease and intangible asset. Deferred funding related to tangible capital assets, assets under capital lease and intangible asset is summarized below:

	2023	2022
Balance, beginning of year	$10,923,838	$11,278,630
Funding received related to the acquisition of tangible capital assets, assets under capital lease and intangible asset	2,481,960	1,923,803
Funding received related to the payment of obligations under capital leases	222,114	611,723
Amortization of program and operating assets	(2,982,793)	(2,890,318)
Balance, end of year	$10,645,119	$10,923,838

March 31, 2023

8. **Obligations Under Capital Leases**

	2023	2022
Capital lease for indefeasible rights of use of fibre, renewed, 3.00%, due March 2032, payable by monthly installments of $23,825, principal and interest.	$ 2,034,366	$ 2,256,480
Capital lease for indefeasible rights of use of fibre, 3.83%, due April 2025, payable by 3 installments of $201,870, $278,646 and $1,985,636, principal and interest.	2,218,832	2,218,832
	4,253,198	4,475,312
Less: current portion	709,293	222,114
	$ 3,543,905	$ 4,253,198

Minimum lease payments required under the capital lease are as follows:

2024	$ 766,414
2025	2,271,535
2026	285,898
2027	285,898
2028	285,898
Subsequently	857,695
	4,753,338
Less: interest included in minimum payments	(500,140)
	$ 4,253,198

9. Commitments

On November 20, 2019, the organization entered into a lease agreement for an office space commencing on April 1, 2020, which expires March 31, 2025. Future minimum annual lease payments under this operating lease (which includes base rent and the current charge for additional rent) for the premise are due as follows:

2024	$ 630,352
2025	630,352
	$ 1,260,704

As at March 31, 2023, the organization had commitments of $6,033,480 with respect to its programs.

10. Internally Restricted Net Assets

Royalty Fund
During the 2007/2008 fiscal year, Industry Canada granted the organization the authority to retain royalties collected after March 31, 2007 and to use these funds in a manner to be determined by the organization and its legal counsel. Annual allocations to the fund include investment income of $42,463 (2022 - $4,802). Disbursements from the fund represent payments to approved funded projects. The fund cannot be reallocated without the approval of the Board of Directors.

Windup of Operations
During the 1998 fiscal year, the organization established a fund for the eventual wind up of its operations or for the transition to a new mode of business. In either event, the fund will be used to cover outstanding operating expenses and obligations should a wind up or transition occur. Management performs an annual review of the sufficiency of this fund. Annual allocations to the fund include investment income of $94,750 (2022 - $10,130). At March 31, 2023, the organization transferred $300,000 from its unrestricted net assets to Windup of Operations to maintain the fund. The fund cannot be reallocated without the approval of the Board of Directors.

11. Economic Dependence

On July 6, 2019, ISED entered into a contribution agreement with the organization to contribute funding totalling $137,000,000 from April 1, 2020 to March 31, 2024. Of the total contribution, $30,200,000 was received in fiscal 2021, $28,700,000 was received in fiscal 2022 and $37,500,000 was received in fiscal 2023.

12. Financial Instruments

Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. Fixed rate instruments subject the organization to a fair value risk while variable rate instruments subject it to a cash flow risk. The organization is exposed to this risk for its short-term investments. The interest rate risk has increased in comparison to the previous year due to interest rate increases announced by the Bank of Canada.

13. Comparative Information

The comparative information has been reclassified where applicable to conform to the financial statement presentation used in the current year.

14. Statement of Cash Flows

Investing and financing activities that do not have a direct impact on current cash flows are excluded from the statement of cash flows. The following summarizes significant non-cash transactions during the year:

	2023	2022
Acquisition of assets under capital lease	$ -	$ (3,778,259)
Increase in obligations under capital leases	$ -	$ 3,778,259