



## **ANNUAL REPORT**

Innovation, Science and Economic Development (ISED)  
Canada

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## 1.0 Executive Overview

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### Context for CANARIE

CANARIE's role in Canada's innovation ecosystem was set out in its 1993 Articles of Incorporation, and re-iterated 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 23-year history, CANARIE has helped shape Canada's digital landscape by leading the following initiatives, among many others:

- 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;
- identifying the gap in research software in the ecosystem and championing the development of powerful research software tools to accelerate discovery;
- working with global peers to align international research and education infrastructures to support globally collaborative research; and
- developing the grid certificate authority in Canada that provides secure access to data generated from the Large Hadron Collider and other advanced digital technologies.

CANARIE's activities serve to continually advance Canada's digital research infrastructure ecosystem 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 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 2016, 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 2015-16 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);
- championing the development of research software 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 ecosystem, which is a critical lever driving social and economic gains that benefit all Canadians.

## Network Evolution

As the primary role of the CANARIE network is to provide inter-provincial 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. Through a governance structure where the top level is the NREN Governance Committee, this successful federal/provincial partnership manages the evolution of the NREN as a whole to ensure that Canada's research and education community 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. Data traffic increased almost 50% from FY15 to FY16, extending a trend of 50% year-over-year traffic growth that goes back to FY06

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. Of particular note is the creation and approval of the NREN Strategic Plan, the first such plan created for the NREN and a significant milestone in the strong federal-provincial partnership that is the cornerstone of Canada's NREN.

CANARIE continues to represent Canada to the international advanced networking community, participating actively in the NREN CEO Forum, the Global Lambda Integrated Facility (GLIF), a global consortium working on technical advances to improve the capacity of fibre networks, and GLORIAD, a network of networks that implements a fibre-optic ring around the northern hemisphere, enabling active, daily collaboration on common problems. CANARIE's participation in these initiatives ensures that Canada's digital research infrastructure evolves to enable

Canada's research and education community to participate and lead globally collaborative research.

CANARIE supports mission-critical research at a range of government laboratories. As well, a CANARIE representative sits on Shared Services Canada's IT Infrastructure Roundtable to provide unbiased information and expertise to assist Shared Services Canada in network and network-based services planning and execution. CANARIE is increasingly called upon to provide objective advice to government partners regarding new technology initiatives and opportunities for Canada.

### **Collaboration Tools**

CANARIE supports secure access to remote resources where users need only their home institution username and password. This enables Canadian students, staff and faculty access to protected online content, as well as seamless access to campus WiFi networks through *eduroam*. These services are offered under the Canadian Access Federation (CAF) umbrella. CANARIE continues to see significant growth in the use of these services and has upgraded the technical infrastructure to support Canada's increasingly mobile cohort of staff, students and faculty. Use of the *eduroam* service continues to grow rapidly, with individual users growing from 29,000 in 2012-13, to 386,000 in 2014-15, to 530,000 in 2015-16, with 118 million sign-ons to the service in 2015-16. CANARIE's CIO Advisory Committee plays a key role in guiding the evolution of these and other network services.

### **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 develop a robust toolkit of reusable software services that are widely adopted by Canada's research community. Through its Research Software program CANARIE has spearheaded the development of almost 70 reusable software tools. In order to maximize the efficiency of these investments, these software tools are available to any researcher. Members of CANARIE's Research Advisory Committee and Software Technology Advisory Committees, which have representation that includes the private sector, ensure CANARIE's investments in software are directed towards the most useful software tools, and that those tools meet rigorous technical standards.

### **Private Sector Innovation**

CANARIE enables users in the private sector to leverage its digital infrastructure to accelerate the commercialization process. The DAIR (Digital Accelerator for Innovation and Research) program has supported 648 small and medium-sized enterprises (SMEs) as they test and develop a range of novel ICT products, services and scalable virtual computer technologies. The DAIR program provides SMEs with an opportunity to benefit from the scale and agility of cloud resources (computing and storage resources that are located in distributed data centres). Deploying these advanced technologies provides businesses with an opportunity to test and develop innovative products without any capital expenditure, 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.

Through partnerships with the NRC's Industrial Research Assistance Program (IRAP), the Association of University Research Parks (AURP), the Funding Roadshow, colleges' applied research programs and business incubators, CANARIE continues to promote the use of DAIR

and the transformative power of cloud technologies. A range of case studies highlighting these businesses' use of DAIR was also created to demonstrate the tangible competitive value delivered through the use of cloud infrastructures.

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 a goal of accelerating the commercialization of Canadian networking technologies into the world ICT market. CANARIE provides the critical network infrastructure and connections to stakeholders in the private and public sectors that underpin the CENGN model.

A project to demonstrate new networking technologies, using the CANARIE infrastructure, was successfully completed in 2015. BTI Systems and Corsa Technologies leveraged the CANARIE network to test advanced software-defined networking (SDN) technologies when managing very large data flows (also called "elephant" flows).

### **Partnerships**

CANARIE continues to engage with a broad range of stakeholders to ensure its activities align with changing community needs. CANARIE is a member of the Leadership Council for Digital Infrastructure and is in regular contact with digital infrastructure partners and stakeholders, including the CFI and Compute Canada, the Council of Ontario Universities, Universities Canada, the U15, CUCCIO, Colleges and Institutes Canada, Genome Canada, and the granting councils. CANARIE's role in the digital research infrastructure ecosystem continues to solidify through premier events such as the CANARIE National Summit, speaking roles at events and conferences, and through ongoing updates to its corporate website and outreach/education materials.

In 2015, Industry Canada (as it was then called) launched a consultation on developing a strategy governing the digital research infrastructure ecosystem. CANARIE contributed to this consultation by working with key stakeholders on developing the consultation framework; submitting a comprehensive response to the consultation; and working with partners to craft and endorse the response developed by the Leadership Council for Digital Infrastructure.

A key recommendation from many community consultations over the past several years was to provide additional support to the research community in managing and making research data widely accessible. Starting in 2014, CANARIE provided funding support for Research Data Canada (RDC), an organization that had been informally incubated at the National Research Council.

Following CANARIE's 2015 mandate renewal, CANARIE now provides funding for Research Data Canada and its programs, enabling opportunities for greater integration of the elements of digital research infrastructure. An Executive Director was hired to oversee Research Data program development. RDC works with stakeholders to develop the policy frameworks and tools to enable reuse of research data resources. This initiative not only represents an opportunity to address a gap in the ecosystem, but research data management also leverages and informs CANARIE's Research Software, Canadian Access Federation, and DAIR programs.

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 and tools so that Canada can grow its innovation capacity and compete and win in the global digital economy.

## **2.0 Statement of Eligible Activities for 2015-16 and report on the extent to which CANARIE met the Expected Results**

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The overarching goal for CANARIE activities during its 2015 – 2020 mandate period is to strengthen Canada’s digital research infrastructure ecosystem. CANARIE activities throughout the first year of its mandate align to this goal, and further, contribute to a more integrated and accessible digital research infrastructure, tools and services.

CANARIE’s three 2015-16 Business Plan eligible activities are stated below. A report on the extent to which each eligible activity was achieved is contained in the paragraphs following.

### **1. Network Operations**

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#### **Evolve/extend Canada’s world-leading collaboration network**

In order to address the evolving needs of users in the 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:***

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#### **Overview of the Network Evolution Strategy**

To evolve and expand the CANARIE network in a flexible and cost-effective manner over the long-term, CANARIE’s vision is to deploy fibre from coast-to-coast across Canada. In high-use, high-growth network corridors, CANARIE has purchased fibre and therefore has the flexibility to add capacity and deploy transformative technologies at a considerably lower incremental cost. The alternative to this model is leased services from suppliers. In a leased services model, the cost/traffic curve is linearly much higher, and would become prohibitively expensive as network traffic continues to grow.

#### ***100G backbone completed***

CANARIE’s 100G (100 Gigabits per second, or 100 billion bits per second) backbone network was completed in August 2015, increasing network capacity to 100G on core network links from Montreal to Victoria. Continual upgrades in speed of this world-class infrastructure enables Canadians to participate in highly data-intensive research today and well into the future, and positions CANARIE among the world’s most advanced research and education networks.

*CANARIE network traffic continues to grow at ~50% annually, as globally collaborative research thrives. TRIUMF, University of Toronto, WestGrid, and McGill University are the top four users for 2015-16.*

The 100G upgrade also includes the links to three research and education (R & E) Open Exchanges: Pacific Wave in Seattle, StarLight in Chicago, and MANLAN in New York. Open Exchanges are meeting points that facilitate data movement to and from other countries and organizations.

#### ***Redundant core network infrastructure deployed***

This infrastructure was completed in August 2015, and offers redundant 100G (100 gigabits per second) capacity across most of the network, enabling CANARIE’s network operations to redirect network traffic during outages.

### ***High-availability connection service deployed***

This service was deployed in December 2015, and provides CANARIE users with a connection service that automatically reacts to network outages in order to reroute traffic without manual intervention from CANARIE network operations.

### ***First release of network support portal deployed***

The beta launch of the network support portal went live in February 2016, with *eduroam* reports as the first service available through the portal.

### ***NREN Program:***

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Canada's National Research and Education Network (NREN) is a partnership between CANARIE and provincial/territorial Regional Advanced Networks (RANs). CANARIE provides interprovincial and international connectivity, while the RANs provide connections to institutions within their jurisdictions. NREN data that travels out of a province or territory is "co-delivered" by the NREN partners, as it traverses CANARIE network links and those of other provincial and territorial networks.

The coherent technical and strategic evolution of the NREN as a whole is critical to ensure that Canadians from coast to coast to coast have a comparable user experience with the NREN. CANARIE's NREN Program provides funding for RANs to increase the capacity and reliability of existing equipment and infrastructure; to enable network management (tools and training); and to extend the reach of RAN networks to more institutions.

### ***Increased reliability and capacity on network segments shared by RANs***

While this outcome is in progress, no projects focused on increased reliability and capacity will be contracted until FY17.

### ***Completion of first competitive funding call issued to meet RAN networks' requirements***

The first competitive funding call for the NREN program was completed in FY16. This call resulted in 12 approved projects across the country. These projects will connect more institutions to the NREN, and provide resources to deliver improved connectivity and resilience on existing network corridors.

### ***Interconnection Agreements executed with all CANARIE-approved RANs***

This activity is complete.

### ***Completion of a strategic plan to support the evolution of the NREN.***

CANARIE continues to collaborate with provincial and territorial network partners to evolve Canada's National Research and Education Network (NREN). The governing body of the NREN, the NREN Governance Committee, launched the development of a strategic plan to govern the evolution of the NREN for the next 5 – 7 years. This plan was developed collaboratively and approved by the NREN Governance Committee in March 2016.

The plan focuses on NREN Services, Organization and Relationships, and how the NREN can improve and expand in these areas to deliver maximum value to Canada's research and education community. It is important to note that this is the first strategic plan ever developed for the NREN, and is a testament to the commitment of the NREN Governance Committee members, who come from 13 organizations with 13 different mandates, governance structures and funding models. These representatives committed to the execution of the elements of the

strategic plan and to devote the necessary resources to continue to strengthen this national digital asset.

### ***Other Achievements – Network:***

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#### **Government of Canada**

CANARIE continues to provide connectivity to 48 government departments and agencies, supporting research collaboration among government departments and with global research partners. CANARIE monitors these connections closely to ensure there is an appropriate match between requirements and infrastructure, to ensure high service levels at a reasonable cost. CANARIE continues to sit on Shared Services Canada's Information Technology Infrastructure Roundtable, and provides context and information to government partners on a range of technology issues.

*Environment Canada and the National Research Council were among the top 10 users of the CANARIE network in 2015-16.*

#### **International Partnerships – ANA 200G**

CANARIE, in partnership with three of the world's leading research and education networks, funded and built the world's first redundant 100G transatlantic network. Named ANA-200G, this infrastructure enables scientists to take advantage of the ongoing wave of data being constantly created by sensor networks, research instruments, and people.

While fibre cuts in subsea cable systems are rare, if one occurs, the downtime on the cable system typically lasts for weeks, due to the complexity of repair processes and weather uncertainties. A reciprocal backup arrangement ensures that data flows from European and North American research instruments, institutions and individual researchers are not compromised should a cable cut occur on one of these networks. To further strengthen this infrastructure, in April 2015 the ANA consortium partnered with ESnet in the United States to provide reciprocal backup between ANA-200G and ESnet's 340G transoceanic infrastructure.

#### **International Partnerships – NREN CEO Forum**

CANARIE continues to participate as a member of the Global NREN CEO Forum. This forum brings together the CEOs of 16 national research and education networks to collaborate on the evolution of critical digital infrastructures and associated services.

*Another outcome of CANARIE's global collaborations is the launch of the [intheveldstories.net](http://intheveldstories.net) site, which highlights the role NRENs play in cutting-edge science and discovery.*

#### **International Partnerships – Global Lambda Integrated Facility**

CANARIE represents Canada at the Global Lambda Integrated Facility (GLIF). This is an international consortium that leverages the existing networks amongst NRENs to develop and pilot next generation technologies such as Science DMZ and Software Defined Networks (SDN) in order to maximize network throughput as link speeds increase.

#### **International Partnerships - GLORIAD**

CANARIE also led Canada's involvement in the Global Ring Network for Advanced Applications Development (GLORIAD). GLORIAD is a network of networks that implements a fibre-optic ring around the northern hemisphere, providing scientists, educators and students with advanced networking tools that improve communications and data exchange, enabling active, daily collaboration on common problems. CANARIE has been providing important connection

services linking research networks across Asia, North America and Europe, allowing scientific communities in three continents to move large volumes of scientific data effortlessly.

### **Marketing - Network**

To highlight the role of the CANARIE network in supporting Canadian research, education and innovation, a short video on the network was developed and distributed via CANARIE's web and social media channels.

## ***Network Services - Canadian Access Federation:***

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### **Overview of Strategy for Network Services**

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), which enables Canadian students, staff and faculty to access protected online content using their existing institutional credentials (i.e. home username and password) through its Federated Single Sign-On service (FSSO). Institutions participating in CAF also benefit from the *eduroam* wireless service, which provides students, staff and faculty with secure access to the WiFi network on the campus they are visiting, by using their home institution's credentials.

### **Increased adoption of CAF services**

In 2015-16, participation in the Canadian Access Federation increased to 131 organizations.

### **Other achievements – Canadian Access Federation**

#### ***eduroam Updates***

Participants continue to benefit from the *eduroam* service: more than half a million users were able to seamlessly log on to campus WiFi networks in Canada and around the world using their home institution's credentials. In 2015-16, CANARIE supported 118 million *eduroam* logins.

CANARIE also supports the ongoing deployment of *eduroam* as the default campus wireless network. Trent University, Concordia University and the University of Ottawa have all deployed *eduroam* as the default campus wireless network, realizing cost and process efficiency gains with this approach.

*CANARIE's delivery of eduroam is part of a global success story. In May 2016 eduroam logged 1 billion authentications.*

A package of marketing materials in both print and digital form was created and sent to all CAF participants to make it easier for institutions to provide staff, students and faculty with information about *eduroam*.

CANARIE also launched a beta version of a network services portal, with *eduroam* reports as the first service available. This portal provides participants with easy access to detailed monthly *eduroam* reports, and also reinforces the security and ease of the federated single sign-on (FSSO) model, as FSSO is used to manage access to the *eduroam* reports.

A CANARIE staff member acts as the Chair of the global *eduroam* governance committee. The committee is responsible for developing global standards and policies governing the use of *eduroam*, and CANARIE's leadership of this committee is a tangible demonstration of confidence in CANARIE's technical and strategic capabilities.

### **Technology and Process Upgrades**

CANARIE continues to manage the transition to the newest version of the open source software supporting federated single sign-on. CANARIE is also actively engaged with stakeholders in developing a standard set of principles governing attribute release. Attribute release is the foundation for enabling federated single sign-on, as institutions release attributes (a user's department or title, for example) to validate user permissions to access remote resources as well as to customize the user experience where needed.

## **2. Technology Innovation:**

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### **Deploy Research Platform Infrastructure**

In order to address gaps in research infrastructure and leverage existing investments in research “middleware” (software that provides services to software applications beyond those available from the operating system), CANARIE will support the creation of technologies to bring new collaboration capabilities not previously offered, to the research community. CANARIE will leverage previous investments in technology innovation projects and further evolve research software tools to enable increased access to data and tools and accelerate research outcomes.

### ***Research Software Program:***

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#### **Overview of Strategy For Research Platform Infrastructure (Research Software Program)**

In 2015-16, CANARIE continued to champion the development of powerful research software tools that will accelerate discovery and enable research funds to be focused on research activity, rather than software development. Research software enables users to seamlessly access digital infrastructure and resources without having expert knowledge of these infrastructures, thereby expanding use of these resources across many research domains.

Through its Research Software Program, CANARIE has overseen the development of almost 70 reusable software tools. These tools are made available via CANARIE's online research software portal <http://www.canarie.ca/software/>. The online portal is the first of its kind in Canada, where users find reusable software services and examine each service's availability and usage statistics. The purpose of the online portal is to create a nationally recognized clearinghouse for research software that provides seamless access to these tools to spur broad adoption by the research community.

*The GenAP research platform, funded by CANARIE in its previous mandate, is powerful software, enabling life scientists to easily explore genomic data using HPC resources. The platform is so powerful it was used to host data and resources for the International Human Epigenome Consortium (IHEC) Data Portal.*

The portal is managed by CANARIE's Research Software Development team, who bring technical competence in the development of science platforms through direct participation in platform infrastructure development and governance.

### ***Reduced software duplication through increased re-use of software previously funded by the program***

Many projects have moved to an open source code model and a proxy indicator of reuse is the frequency of download of the code. The “BrainBrowser” tool, a visualization tool that may be used in a range of research applications, has been downloaded over 500 times.

CANARIE continues to work with project participants to develop better methods for tracking reuse of software tools.

### ***Better alignment with other funders of research software (e.g. the CFI and Genome Canada)***

CANARIE continues to have ongoing discussions with the CFI and Genome Canada to ensure appropriate alignment between the Research Software program and programs developed by other funders in the ecosystem.

## **Other achievements – Research Software**

### ***First Call for Proposals***

CANARIE launched a \$3M call for research software in 2015, and the goal of the call was to invest in innovative research software tools and incent software development teams to collaborate with research teams in need of software development expertise.

This call resulted in 107 Expressions of Interest, three times the response for previous calls, indicating broader visibility and interest in this CANARIE program. Ultimately six research software projects were selected.

*In the first call for proposals for Research Software, CANARIE received proposals from 12 provinces and territories, spanning 32 research domains.*

In addition to these new projects, CANARIE created marketing outreach/education materials for the twelve research platforms created in the previous mandate to promote their reuse; launched a video explaining the purpose and benefits of the Research Software program; and pushed out multiple blog posts on topics related to research software.

## ***Research Data Management:***

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### ***Overview of Strategy for Research Data Management***

In response to consistent community feedback that identified the need to coordinate activities around the evolving field of research data management, CANARIE took action and provided funding to support Research Data Canada (RDC) in 2014. CANARIE was given the mandate to support RDC in its 2015 Contribution Agreement.

RDC’s overarching goal is to improve the management of research data in Canada so that it is broadly available to support knowledge creation and innovation.

### ***Support provided to advance research data management solutions***

CANARIE hired an Executive Director for RDC and this individual has led a number of initiatives, including the creation of the Research Data program charter, engagement with RDC stakeholders, and he has made considerable progress towards the development of a set of Research Data Management principles.

### 3. Private Sector Innovation

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#### **Stimulate ICT Innovation and Commercialization**

In order to leverage CANARIE resources to stimulate commercialization, CANARIE will deliver a cloud-based program, the Digital Accelerator for Innovation and Research (DAIR), that enables advanced ICT research and provides an opportunity for entrepreneurs to accelerate time-to-market.

#### **Overview of Strategy for ICT Innovation and Commercialization**

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

The first is CANARIE's DAIR program, which offers powerful cloud computing resources to small and medium-sized enterprises (SMEs) to accelerate their product development timelines and enable faster time to market. DAIR exposes users 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. The second is CANARIE's support for the Centre of Excellence for Next-Generation Networks (CENGN).

#### ***DAIR Program:***

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#### **Continued increase in the total number of DAIR users**

The aggregate number of DAIR users as of April 1, 2016 is 648.

#### **New features added to the DAIR cloud infrastructure**

In order to ensure DAIR services are current and respond to ever-evolving user needs, CANARIE continued to invest in updates to the DAIR infrastructure.

#### **Content released to educate SMEs on the efficient use of cloud services**

CANARIE developed a range of marketing materials to educate users on the most efficient use of cloud services, and to demonstrate how users are realizing competitive benefits through their use of DAIR. CANARIE developed and presented a comprehensive overview of cloud services and launched this through the Fundica Roadshow, which targets early-stage companies. CANARIE also distributed several blog posts on cloud technologies, and created several case studies that highlight the use of DAIR by a broad cross-section of users. A short video was also created to explain the DAIR program and how the use of cloud resources can strengthen the competitive positioning of Canadian companies.

To continue to raise the visibility of DAIR among small businesses and entrepreneurs, CANARIE developed strong partnerships with the Funding Roadshow, the IRAP Concierge program, the Association of University Research Parks, colleges, and a range of incubators across the country.

*DAIR user Mike Andersen of Echosec says, "the resources on DAIR give us the opportunity to really expand our thinking and test the limits of what our product can do in a risk-free, no-cost environment."*

## ***Centre of Excellence in Next Generation Networks (CENGN):***

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### **Centre of Excellence for Next Generation Technologies**

To support Canadian leadership in networking technologies, CANARIE is a founding partner in the Centre of Excellence in Next Generation Networks. CENGN is a consortium of industry (including: Juniper, Cisco, Alcatel-Lucent, BTI, EXFO, TELUS) academic (Algonquin College, McGill University, Université Laval, University of Alberta, among others) and research leaders who are pooling their expertise and equipment to lower the barrier to market entry for SMEs and researchers.

CENGN was awarded funding by NSERC's Centres of Excellence program in 2014 and created the governance structure and technical and staff infrastructure to take on projects beginning in mid-2015. CANARIE plays a key role in this initiative as it is the CANARIE network that connects all partners and provides the network test bed infrastructure for new product validation and testing.

### ***Connect CENGN facilities to the CANARIE network to support advanced technology research projects***

Bandwidth-on-demand is a network connectivity service that allows users to request bandwidth at desired levels when and where they need it. Bandwidth-on-demand services hold enormous appeal for small businesses that might occasionally need a higher-speed service for a short period of time. For example, stadiums and sporting arenas have drastically fluctuating needs for bandwidth, but no easy way to increase or decrease bandwidth based on those needs.

The project, which could be used to support bandwidth-on-demand applications, involved CENGN Member BTI Systems joining forces with Corsa Technologies to test and demonstrate Corsa's Software-Defined Networking (SDN) Elephant Flow Congestion Mitigation with Automatic Bandwidth Provisioning Proof of Concept.

The BTI/Corsa project was completed in September 2015 and that laid the groundwork for further engagement with potential customers for this bandwidth-on-demand technology.

### **3.0 Statement of Eligible Activities for 2016-17 and for the foreseeable future**

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In 2016-17, CANARIE will continue to align its activities towards the goal of strengthening Canada's digital research infrastructure ecosystem. In 2016-17, CANARIE plans to continue its focus on three strategic objectives.

#### **1. Network Evolution:**

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##### **Evolve/extend Canada's world-leading collaboration network**

In order to address the evolving needs of users in the 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:***

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##### ***Improved reliability***

CANARIE's engineering team has chosen to work first on the network redundancy of western regions, and is building the reliability of the Vancouver, Victoria and Seattle nodes. The engineering team is developing hardware requirements and project cost models.

##### ***Network security monitoring and measurement system implemented***

The objective of this security project is initially to detect and mitigate Denial of Service (DDoS) attacks. Work on this project is scheduled for the second and third quarters of this year.

##### ***Deployment of support tools accessible through the network services portal***

Following the beta launch of the network support portal, a full launch of the portal occurred in May 2016. Monthly *eduroam* reports are available to participants via this portal. CANARIE plans on launching network support tools on the portal throughout the year. The first project will see the redesign of existing network traffic maps to enhance the look and feel of mapping interfaces.

##### ***NREN Program:***

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##### ***Second competitive funding call issued to meet NREN requirements***

A second call is to be released in the summer of 2016. The deadline for the EOI for this call is June 1<sup>st</sup>; notification to EOI submitters scheduled for July 8; full proposals are due on September 8; and notifications to applicants will be sent on October 31<sup>st</sup>.

##### ***Increased reliability and capacity on network segments shared by RANs***

CANARIE has contracted with two RANs to increase the reliability and capacity on network segments in central Canada. These projects will contribute to improved network performance.

##### ***Strategic alignment of NREN partners on evolution of the NREN***

The NREN Strategic plan was approved by the NREN Governance Committee and work is underway on key elements of the plan. Four NREN Governance Committee members are executive sponsors for key deliverables identified in the plan, and work has begun on those specific elements.

## **Other initiatives – Network**

### ***Cloud Services***

CANARIE has been approached by a number of government and private sector partners to discuss how to best take advantage of recent private sector investments in cloud technologies (data centres) in Canada. Cloud technologies provide users with significant scale and agility benefits, as users may increase or decrease their use of these resources based on their needs at any given point in time, without having to make significant capital investments in equipment. A pilot project is underway with the Communications Research Centre (CRC). This project will provide valuable insight on how best to leverage private sector cloud services.

### ***NREN Joint Security Project***

CANARIE received approval from ISED for its NREN Joint Security proposal early in FY17, and will be working with partners to launch this project. The aim of the NREN Security project is to strengthen overall NREN security in the short term, and better understand its potential vulnerabilities.

In the short term the project will make institutions aware of network threats immediately and provide a better understanding of NREN and institutional network security issues. More importantly the project will create a national network security community, leveraging existing security communities that, beyond current security interactions, will collaboratively build and operate a shared monitoring infrastructure.

In the medium term, the community of practice will lead to a process for prioritizing future NREN and institutional security activities, resulting in a proposal for the long-term vision of collective national cybersecurity systems, including funding requirements for a National Network Security Program.

### ***NREN CEO Forum***

CANARIE's President and CEO continues to actively participate in the NREN CEO Forum, and this international group will convene in Vancouver in July 2016. In addition to the regular agenda, the group will visit TRIUMF, Canada's national laboratory for particle and nuclear physics.

### ***Global Lambda Integrated Facility – CANARIE President Co-Chair***

As the goals of the GLIF and the NREN CEO Forum are similar, a proposal was made to work towards closer alignment of these two organizations. To facilitate this, the CANARIE CEO and the Chief Technology Officer from AARNET, the Australian NREN, were appointed co-chairs of GLIF in April 2016.

## **2. Technology Innovation**

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### **Deploy Research Platform Infrastructure**

In order to address gaps in research infrastructure and leverage existing investments in research “middleware”, CANARIE will create technologies to bring new collaboration capabilities not previously offered to the research community. CANARIE will leverage previous investments in technology innovation programs and further evolve research software tools to enable increased access to data and tools and accelerate research outcomes.

#### ***Research Software Program:***

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***A 20% increase in visits to science.canarie.ca over 2015 levels.***

Science.canarie.ca is the online repository of reusable software tools that have been funded by CANARIE and that are available to all researchers.

While we do not have data for the full year, it is indicative to look at the number of visits to science.canarie.ca for the first four months of calendar 2016, compared to the first four months of 2015. From January – April 2015, there were 5,943 unique visits to the site; from January – April 2016, there were 7,669 unique visits, representing an increase of 29% in visits to the site over that time period.

***Contracts in place and execution underway for approved projects.***

The first call resulted in the approval of seven projects; one project declined the funding, one project is finalizing staffing and its agreement, and the other five are underway.

***Research Data Management:***

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***Support provided to advance research data management solutions***

Through the leadership of Research Data Canada (RDC), a set of Research Data Management governing principles was drafted. These are currently being reviewed by higher education stakeholders and RDC is working to have these broadly endorsed. RDC also made a submission to the Government of Canada's Open Data consultation, referencing these principles and making the case that there should be broad alignment to these principles from all stakeholders involved in managing and providing access to open data.

Work is ongoing in the creation of a research data management ecosystem map; development of a new RDC committee and working group model; collaboration with international agencies around the RDC glossary; ongoing content updates to the RDC website; and providing Canadian representation to the International Coalition on Science Gateways and the Research Data Alliance National Data Services Group.

**3. Private Sector Innovation:**

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**Stimulate ICT Innovation and Commercialization**

In order to leverage CANARIE resources to stimulate commercialization, CANARIE delivers a cloud-based program, the Digital Accelerator for Innovation and Research (DAIR), that enables advanced ICT research and provides an opportunity for entrepreneurs to accelerate time-to-market.

***DAIR program:***

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***New features added to the DAIR cloud infrastructure***

CANARIE continues to invest in new features to deliver a better user experience for DAIR users.

CANARIE plans to integrate the OpenStack Murano solution package catalogue to provide a richer set of tools to DAIR users. These solution packages enable DAIR users, including those not familiar with cloud applications, to integrate a pre-packaged solution into their products, accelerating development time.

In addition to these solution packages, CANARIE will add Graphic Processing Units (GPUs) to the DAIR cloud. These enable users to make use of highly specialized algorithms (typically used for graphic applications) and apply them to non-graphic applications.

***Content released to educate SMEs on efficient use of cloud services***

CANARIE is developing content for a cloud workshop and webinar, and will continue to develop new case studies highlighting businesses' use of DAIR and how it contributes to their overall competitive positioning.

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

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***Additional participants in CENGN beyond the FY16 pilot will be able to leverage the CANARIE network for commercialization of new ICT products and services***

There is a robust pipeline of new projects at CENGN that will likely leverage the CANARIE network. CANARIE continues to work with partners at CENGN to evolve the infrastructure to develop an enhanced level of capability.

In addition to its ongoing work with CENGN, CANARIE has been in a number of discussions with public and private sector stakeholders wishing to gain CANARIE's support for new network testbed initiatives. This interest indicates the critical role of advanced networking in supporting a range of strategic technology research and development projects. CANARIE will continue to work with its stakeholder partners and the Government of Canada to ensure that CANARIE's powerful network infrastructure is leveraged to support Canadian competitiveness in advanced technologies.

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Over the next year CANARIE will ensure that all activities that have been implemented to achieve these three objectives will be successfully completed in line with the terms and conditions of CANARIE's Contribution Agreement.

***4.0 Statement of CANARIE's investment policies, standards, and procedures***

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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 (see Appendix 1). For greater clarity, the determination of eligibility shall be made at the time of purchase. CANARIE will not be obliged to dispose of investments which become ineligible after the date of purchase, but will favour (subject to market conditions) disposing of such securities should assets need to be liquidated. (Refer to the Liquidity policy (s 7) in the Statement of Investment Policy.)

Within this context, CANARIE's official Statement of Investment Policy as adopted by the Board of Directors, and reviewed and approved in the year by the Audit & Investment Committee of the Board, is contained in Appendix 1.

## **5.0 Statement of Compensation**

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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 benchmarked against comparator organizations regularly by an external consultant.

For the fiscal year ending March 31, 2016, salary ranges for all officers and employees of CANARIE whose total compensation remuneration paid exceeded \$100,000 (including any fee, allowance or other benefit) are presented below.

### **Officers**

President and CEO  
*\$270,200 - \$371,800*

Chief Financial Officer  
 Chief Technology Officer  
 Vice-President, Business Development  
 Vice-President, External Relations  
*\$139,500 - \$280,000*

### **Employees**

Chief Engineer  
 Director, Finance  
 Director, Research Software  
 Executive Director, Research Data Canada  
 Senior Director, Technology Innovation  
*\$111,100 - \$220,200*

Senior Network Engineer  
*\$99,500 - \$177,800*

Manager, Analytics  
 Program Manager, Canadian Access Federation  
 Team Lead, Software Development  
 Technology Architect, Canadian Access Federation  
 \$69,600 - \$139,200

## 6.0 List of Eligible Projects, the funding provided detailed by Expenditure type, and a description of progress achieved to date

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### 6.1 Legacy Infrastructure Extension Program (Legacy IEP)

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The Legacy Infrastructure Extension Program primarily supports connections to federal government labs, including large users such as Environment Canada, Department of Fisheries and Oceans, and the National Research Council. These three are among the top 20 users of the CANARIE network.

Monitoring the IEP connection usage ensures that the connections are managed in a cost-effective manner. In cases where it is determined that the end user is not effectively using the existing connection and could be equally well-served with a commercial connection, CANARIE works with the user to transition to a more appropriate service or to downgrade the link.

In 2015-16, as part of CANARIE's cost recovery plan implemented under the last mandate, all non-government connections were required to pay 60% of the cost of their connection. The table below summarizes funding under the IEP Program and the number of connections:

**Table 6.1 Infrastructure Extension Program**

<b>IEP Connections</b>	
Federal Departments and Government Laboratories	50
Educational Institutions	12
Private Institutions	1
<b>Total</b>	<b>63</b>
<b>IEP Funding (in 000s)</b>	
Fiscal 2015-16	\$1,228

### 6.2 National Research and Education Network Program (NREN)

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The NREN program is the follow on program to the Network Alliance Infrastructure Program (NAI) of the last mandate and continues to support the advancement of Canada's National Research and Education Network (NREN). 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:

- Non-Directed, 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.

In FY16, \$220,000 in funding was paid out across the RANs for Interconnection and Co-delivery.

Table 6.2 details the projects that were approved for non-directed NREN funding in FY16. Project Agreements have been issued but not yet executed by Participants.

**Table 6.2 NREN Program – Non-Directed Funding**

<b>RAN Partner</b>	<b>CANARIE Commitment <i>(000s)</i></b>	<b>Mandate Funding to Date <i>(000s)</i></b>
ORION	\$539	
BCNET	504	
Cybera	287	\$109
MRnet	83	
RISQ	54	
SRNET	41	
<b>Total</b>	<b>\$1,507</b>	<b>\$109</b>

### **6.3 Research Software Program**

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The Research Software Program is the follow on to the NEP and NEP-RPI Programs of previous CANARIE mandates. This 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 providing researchers with the tools required to accelerate research.

In 2015-16 CANARIE launched a call for research software projects. The table below (table 6.3) details the projects that were approved for funding under that call. At March 31, 2016, Project Agreements had been issued but not yet executed by the Lead Contractors.

**Table 6.3 Research Software Program**

<b>Lead Contractor</b>	<b>CANARIE Commitment (000s)</b>
CRIM	\$600
Ocean Networks Canada	577
Bird Studies Canada	558
Ouranos	493
University of Calgary	376
University of Guelph	92
<b>Total</b>	<b>\$2,697</b>

## **6.4 Digital Accelerator for Innovation and Research (DAIR) Program**

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DAIR is an integrated virtual environment that leverages the CANARIE network to develop and test new ICT and other digital technologies. It combines advanced networking, cloud computing and storage resources to create an environment to develop and test innovative ICT applications, protocols and services, perform at-scale experimentation for deployment, and facilitate a faster time to market.

DAIR's digital test bed allows users from Canada's small and medium-sized enterprise (SME) community to realize the benefits of cloud computing and adopt cloud computing technologies into their product development cycles and business plans. DAIR is also available to information and communications technologies (ICT) researchers who are developing next-generation network technologies and protocols.

During the first year of the mandate, CANARIE committed \$1.5M in funding to partners to manage the DAIR resources and ensure their availability and maintenance for the 2015 – 2020 mandate.

## **7.0 Criteria applied to select Eligible Projects**

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The published criteria used to select the projects under the programs with active funding calls in 2015-16 are provided in Appendices 2-4.

## **8.0 Summary of the results of audits and evaluations carried out during the year**

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**Financial Audit:** CANARIE annually provides for a Financial Audit undertaken by independent auditors 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 2015-16 Fiscal Year was completed in June 2016 by BDO Canada LLP, Chartered Accountants.

**Compliance Audit:** A compliance audit was undertaken in early February 2016 by Strategic Planning and Management Services, ITO on behalf of the Program Coordination Branch (PCB) of Innovation, Science and Economic Development (ISED) Canada. The audit was for the

period of April 1, 2014 to March 31, 2015, and was undertaken in accordance with the terms and conditions of the Contribution Agreement dated September 4, 2012. The draft audit report was received in May 2016, and CANARIE's response, including a Management Action Plan, was submitted to ISED in early June 2016.

**Recipient Audits:** In agreements with Eligible Recipients for Technology and Innovation 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.

CANARIE selected two audit firms to manage the recipient audits subsequent to an RFP that was issued for that purpose. The firms audited the projects where funding was provided during the last mandate, according to an audit plan that was developed to meet the requirements of the Contribution Agreement, and the Performance, Audit and Evaluation Strategy (PAES) developed for the last mandate. The following table reflects the audits performed in fiscal 2015-16.

**Table 8.1 Recipient Audits performed in fiscal 2015-16**

Program	Lead Contractor	Project
NAI	ACORN-NL	Extension of ACORN-NL into Labrador
NAI	SRNET	La Ronge - Air Ronge Extension
NAI	Cybera	Edmonton Urban Network Initiative
NAI	RISQ	Dorsale IP-MPLS
NAI	BCNET	Children's and Women's Hospital
NAI	ORION	York Region Fibre Install
NAI	ORION	Kingston Fibre Install
NAI	RISQ	100G MAN Montreal
NAI	ACORN-NS	10G Laterals
NAI	UNB	ORAN Extensions
NAI	MRnet	10 GbE Upgrade
NAI	Aurora College	Norman Wells Fibre Install
NAI	BCNET	UBC Point Grey Fibre
NEP-RPI	University of Victoria	HEP Data-Intensive Distributed Cloud Computing
NEP-RPI	Simon Fraser University	M+M Movement and Meaning Middleware
NEP-RPI	Ocean Networks Canada	Web-enabled Awareness Research Network
NEP-RPI	University of Victoria	Software as a Service for Big Data
NEP-RPI	Cybera	SKA Global Science Data delivery
NEP-RPI	Cybera	ArcticConnect
NEP-RPI	Simon Fraser University	iReceptor
NEP-RPI	Western University	Research and Education Activities in Laboratory Mechatronics (REALM)

NEP-RPI	McGill University	Genetics and Genomics Analysis Platform (GenAp)
NEP-RPI	Carleton University	SMARF
NEP-RPI	Centre de recherche Informatique de Montréal	Plateforme Vesta
NEP-RPI	University of Toronto	Green 2.0
NEP-RPI	Inocybe Technologies	BABELCLOUD
DAIR	Cybera	Management and maintenance of DAIR resources

## **Appendix 1: Statement of Investment Policy**

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### **Statement of Investment Policy**

#### **Purpose**

The purpose of this document is to establish an investment policy best suited to meet the needs and objectives of CANARIE's investment portfolio. This document is specifically intended to meet the requirements of ss 4.3, 4.4, 4.7, 4.8, 4.9, 4.10, and 4.11 of the Contribution Agreement between CANARIE Inc. and Her Majesty in Right of Canada dated October 9<sup>th</sup>, 2015.

All aspects of this Policy are governed by the Prudent Person Principle (refer to s 4.1 of the Contribution Agreement) and the principal objective of investment decisions shall be the preservation of capital to meet future disbursement requirements.

#### **Investment Policy**

##### **(1) Long-term return objectives and expectations:**

The long term objectives of the portfolio are twofold: (a) to provide funds on an "as needed" basis to meet the disbursement needs of CANARIE and (b) to maximize the investment income earned by CANARIE, subject to the Investment Strategy and Investment Policy adopted by CANARIE.

##### **(2) Ratings of Securities:**

The deemed rating (the "Rating") of any Eligible Security will be established, at the time of CANARIE's acquisition of the Eligible Security.

Reference to the "issuer" shall include the unconditional guarantor, if applicable.

The rating category for Investment Policy purposes shall be based on the ratings of at least two of the following four rating agencies: Dominion Bond Rating Service (DBRS), Standard and Poors (S&P) Rating Services, Moody's Investors Service and Fitch Rating Ltd.

##### *In the case of Commercial Paper and other short-term investments:*

To be included in the AAA category, the security must have at least two of the following, where two are available:

- (i) R-1 (high) from DBRS
- (ii) A-1+ from S&P and the issuer's bonds are rated "AAA" by S&P
- (iii) P-1 from Moody's and the issuer's bonds are rated Aaa by Moody's
- (iv) F-1+ from Fitch and the issuer's bonds are rated AAA by Fitch

To be included in the AA category, the security must have at least two of the following, where two are available:

- (i) R-1 (middle) from DBRS
- (ii) A-1+ from S&P
- (iii) F-1+ from Fitch
- (iv) P-1 from Moody's and the issuer's bonds are rated Aa by Moody's

*In the case of bonds and other longer term investments:*

To be included in the AAA category, the security must have at least two of the following:

- (i) AAA from DBRS
- (ii) AAA from S&P
- (iii) AAA from Moody's
- (iv) AAA from Fitch

To be included in the AA category, the security must have at least two of the following:

- (i) AA from DBRS
- (ii) AA from S&P
- (iii) Aa from Moody's
- (iv) AA from Fitch

(3) Diversification policy of the investment portfolio, including quantitative limits on investments:

Throughout the life of CANARIE's portfolio, CANARIE's investments in the securities of **any one issuer (or two or more affiliated entities)** will be limited to an aggregate market value limit based on the Rating of the security:

<b>Rating Security</b>	<b><u>AA</u></b>	<b><u>AAA</u></b>
Government Securities	no limit	no limit
Provincial / Municipal Financing Authority	10% of portfolio	10% of portfolio
Municipal Securities	10% of portfolio	10% of portfolio
Other Eligible Securities	10% of portfolio	10% of portfolio

Throughout the life of CANARIE's portfolio, CANARIE's investment in the securities of **any one category** will be limited to an aggregate market value limit of the category, as set out below:

<b>Rating Security</b>	<b><u>AA</u></b>	<b><u>AAA</u></b>
Government Securities*	30% of portfolio (minimum Government Securities is 10% of the portfolio)	no limit
Provincial / Municipal Financing Authority	70% of portfolio **	same 70%
Municipal Securities	70% of portfolio**	same 70%
Other Eligible Securities	70% of portfolio**	80% of portfolio

\* For greater certainty, the phrase "Government Securities" means all securities issued, guaranteed by, or that have the full faith and credit of the federal government or a provincial government.

\*\* The 70% constraint applies to the aggregate of AA securities

(4) Asset allocation strategy:

The portfolio will, at all times, be invested in Eligible Securities (refer to (5) below).

(5) Permitted investment instruments and trading activities:

CANARIE shall invest in Eligible Securities. Eligible Securities are defined as: bank certificates of deposit; banker's acceptances; treasury bills, commercial paper and other short-term securities, bonds and notes issued by the federal government, provincial governments, municipal governments and corporations; cash deposits in banks identified in Schedule I of the *Bank Act*; guaranteed investment certificates; and other fixed-income securities that carry the full faith and credit of the Government of Canada. For greater certainty, CANARIE shall not invest in derivatives, swaps, options or futures.

Any securities acquired shall have a Rating of at least AA.

All securities will be denominated in Canadian dollars.

The Investment Advisors/Managers, will have authorized power to recommend and execute all trades on behalf of CANARIE Inc. The Investment Advisors/Managers will notify CANARIE Inc. and include all details of all confirmations of trades.

The Board's Audit and Investment Committee will be advised of the transaction details by email or facsimile the same week that the transactions are authorized, or as soon as practical thereafter.

(6) Prohibited investment instruments and trading activities:

Prohibited investments consist of all investments not defined as permitted investment instruments.

(7) Liquidity policy:

- (a) The maturities and terms of investments shall match the profile of CANARIE's forecasted disbursements. In cases where the timing of disbursements is unknown, investments shall be held in securities with term to maturity of one year or less.
- (b) Should an unexpected disbursement or series of disbursements made by CANARIE reduce the total market value of the portfolio, CANARIE shall immediately take the steps necessary to comply with the requirements set by the diversification policy (refer to (3) above) within a period of 60 days from the date as of which CANARIE first failed to meet those requirements. Under no circumstances shall CANARIE materially fail to comply with the diversification requirements of section 3 for a period of more than 90 consecutive days.

(8) Risk management policies:

The purpose of CANARIE's investment portfolio is to earn investment income until such funds are needed to finance CANARIE objectives. The principal risks therefore are liquidity and capital preservation. Both risks, and steps taken to manage such risks, are specifically addressed in CANARIE's Statement of Investment Policy and Statement of Investment Strategy. In addition to

the constraints contained in these documents, certain processes are in place to further manage these risks:

- On a monthly basis the Investment Advisor/Manager receives reports from CANARIE management regarding upcoming short term cash requirements. This is compared to the upcoming maturity schedule with corrective action, if any, being initiated.
- On an annual basis the Investment Advisor/Manager receives a long term projection of CANARIE liquidity requirements. This is compared to the long term maturity schedule. Based on the comparison of the two, corrective action, if any, is taken. Note that corrective action in this instance may be taken over an extended time period.
- On a quarterly basis the Investment Advisor/Manager reviews the credit ratings of all holdings. This is intended to act as an early warning as to potential, upcoming capital impairment issues.
- On a quarterly basis (or more frequently if necessary) the Investment Advisor/Manager reports to the Investment Committee on portfolio matters. Such matters include diversification compliance and potential capital impairment situations and recommended corrective actions.

(9) Policy on the lending of cash or securities:

The lending of cash or securities is not permitted.

(10) Performance measurement and monitoring procedures:

Performance is measured first by the prime objective of safety of investment and, secondly, by the ability of the investment portfolio to have funds on hand to meet all expenditure requirements. After those considerations in importance comes performance measurement. This will be addressed in ongoing fashion in reporting on new investments and reinvestments in terms of their yield relative to the Canada Curve (the yield that would be achieved from a benchmark Government of Canada bond of similar duration). Less attention will be paid to annual comparisons with other bond managers, unless they operate under similar constraints.

(11) Review:

This Statement of Investment Policy shall be reviewed at least once a year.

## Appendix 2: NREN Program Criteria

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Projects approved for funding under the NREN, Non-Directed Investment Calls will be selected through a competitive process. All project proposals will be reviewed relative to the mandatory criteria and the scoring criteria. Evaluation of proposals relative to these criteria will constitute the basis for the decision whether or not a project is to receive CANARIE funding. Projects that fail to meet the criteria, or fail to meet such criteria to an acceptable degree, cannot be funded.

These are the criteria against which proposals to the NREN program will be evaluated:

### ***Mandatory Criteria:***

1. Projects must strengthen the NREN's ability to deliver consistent, high quality access to infrastructure and services for Canadians engaged in research, innovation and education;
2. Projects must lead to infrastructure or results that will be ongoing after CANARIE funding terminates;
3. Projects must demonstrate an ability to meet any ongoing operational costs resulting from the project without the use of CANARIE funding (e.g. through membership fee revenue);
4. Projects must result in an operational service (e.g. projects involving acquisition of fibre must also include the lighting of that fibre);
5. Tail circuit projects must demonstrate a minimum of matching funds in the form of cash contributions equivalent to 50% of the total project cost;
6. The project must be based on a viable funding model;
7. The applicants must be capable of undertaking the project;
8. The project must be technically sound and methodologically feasible; and,
9. CANARIE funding must be necessary to deliver the results of the project or to ensure the timeliness of the delivery.

### ***Scoring Criteria:***

1. The advanced nature of the applications and services enabled by the project;
2. The extent of user demand and/or number of users impacted;
3. The cost effectiveness of the proposal, and the degree of financial and other contributions on the part of the RAN and other stakeholders;
4. The project's compatibility with, and contribution to, CANARIE's network and to its other objectives; and,
5. Identification of project risks which may impact project timeline (e.g. the number and scope of RAN projects in progress, permits required for rights of way, etc.)

Should CANARIE receive more eligible proposals than the funding allocation can support, projects that have a higher financial leverage factor will be favored.

All NREN projects are evaluated relative to the above scoring criteria by an internal evaluation team.

The CANARIE Board of Directors approves final awards on the recommendation of CANARIE management.

## **Appendix 3: Research Software Program Criteria**

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Project proposals will be reviewed relative to the mandatory criteria and the scoring criteria. Evaluation of proposals relative to these criteria will constitute the basis for the decision whether or not a project is to receive CANARIE funding. Projects that fail to meet the mandatory criteria, or fail to meet evaluative criteria to an acceptable degree, cannot be funded.

These are the criteria against which proposals will be evaluated:

### ***Mandatory criteria:***

1. The proposal must be consistent with the Expression of Interest submitted.
2. The proposed Platform or Software Service must make use of Canadian digital infrastructure (networking, compute, storage and/or sensors).
3. The proposed project must contribute to one or more of CANARIE's expected results:
  - (a) enhance opportunities for collaborative knowledge creation and innovation within Canada's research and education communities through the maintenance and development of the CANARIE Network and related tools and services;
  - (b) expand the research and education community's access to and utilization of the CANARIE network and the availability of tools and programming that increase the effectiveness of its use; and,
  - (c) enable the creation of innovative Information and Communications Technology (ICT) products and services and accelerate their commercialization in Canada.
4. The proposed Platform or Software Service must have no open source or affordable commercial equivalent that could be used.
5. Software development must be technologically and economically viable within the timeline of the program.
6. Software developed with CANARIE funding must be made available for other researchers to use at no cost, through the CANARIE Research Software Registry at: <https://science.canarie.ca> for a period of 5 years from the beginning of development, or until it is declared end-of life.
7. All funded work must be performed in Canada.
8. The Lead Contractor must be a Canadian university, college, corporation or other legally recognized entity.
9. No more than half of the membership and Board of Directors of the Lead Contractor can be composed of representatives or agents of the federal government.

### ***Scoring Criteria:***

1. Utility for advancing research in Canada
2. Number of researchers who will directly benefit from the software proposed
3. Re-use potential of proposed software
4. Number of collaborators
5. Reuse of existing software

## Appendix 4: Digital Accelerator for Innovation and Research (DAIR) Program Criteria

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Technology organizations in both the commercial arena as well as the academic research community spend a large part of their capital and people resources in building R & D environments to enable product design, prototyping, validation and demonstration. This is particularly true where the products or research involve large scale systems composed of many servers and many clients.

As services migrate to network-based services, the cost of building a suitable environment can consume 50 percent or more of an overall development budget. In an effort to speed time-to-market and reduce product development costs, CANARIE has augmented the existing Canada-wide high-speed network with computing and storage resources and additional network access technologies.

### ***DAIR Users Selection Criteria:***

User applications to the DAIR program will be evaluated to ensure that the proposed products and projects are a good technical fit for DAIR, that there are meaningful benefits to the applicant and that the applicant is qualified and able to use the services.

1. The applicant must be an entrepreneur or small or medium sized company (SME < 500 employees).
2. The applicant must be capable of using the requested resources in the identified time frame.
3. The proposed project must be a technical fit for the capabilities being delivered by DAIR.
4. The benefits to the applicant must be meaningful in terms of reducing capital and people costs and accelerating time to market.

In the event that the number of qualified applications exceeds the capacity of the DAIR system, applicants will be selected on a first-come, first-served basis.

## Appendix 5: Program Revenues Financial Summary - March 31, 2016

The following table presents CANARIE's program revenue projections by initiative for the 2015 – 2020 mandate compared to the approved budget.

	Projections	Budget <i>(in 000s)</i>	Variance
<b>PROGRAM REVENUES</b>			
Legacy - IEP	1,374	1,374	
CAF Participation Fees	1,120	1,036	84
DAIR User Fees	8	8	
<b>TOTAL PROGRAM REVENUES</b>	<b>2,502</b>	<b>2,418</b>	<b>84</b>
<b>MATCHING FUNDS</b>			
NREN	3,333	3,333	
DAIR	168	83	85
<b>TOTAL MATCHING FUNDS</b>	<b>3,501</b>	<b>3,416</b>	<b>85</b>
<b>IN-KIND CONTRIBUTIONS</b>			
Research Software	1,655	1,670	(15)
<b>TOTAL IN-KIND CONTRIBUTIONS</b>	<b>1,655</b>	<b>1,670</b>	<b>(15)</b>
<b>TOTAL</b>	<b>7,658</b>	<b>7,504</b>	<b>154</b>

**Appendix 6: CANARIE Inc. Financial Statements – March 31, 2016**

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~ attached ~

**CANARIE Inc.**  
**Financial Statements**  
For the year ended March 31, 2016

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BDO Canada LLP  
1730 St-Laurent Boulevard  
Suite 100  
Ottawa ON K1G 5L1 Canada

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## Independent Auditor's Report

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### To the members of CANARIE Inc.

We have audited the accompanying financial statements of CANARIE Inc., which comprise the statement of financial position as at March 31, 2016, and the statements of operations, changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

### Management's Responsibility 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.

### Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements 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 the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.



**Opinion**

In our opinion, the financial statements present fairly, in all material respects, the financial position of CANARIE Inc. as at March 31, 2016, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

*BDO Canada LLP*

Chartered Professional Accountants, Licensed Public Accountants

Ottawa, Ontario  
June 23, 2016

**CANARIE Inc.**  
**Statement of Financial Position**

March 31	2016	2015
<b>Assets</b>		
<b>Current</b>		
Cash	\$ 765,945	\$ 228,900
Short-term investments (Note 2)	7,257,014	12,679,390
Accounts receivable	305,058	478,637
Prepaid expenses and deposits (Note 3)	4,019,550	2,786,723
	12,347,567	16,173,650
<b>Prepaid expenses and deposits (Note 3)</b>	2,302,194	2,028,200
<b>Tangible capital assets, assets under capital leases and intangible asset (Note 4)</b>	12,065,041	11,911,365
	\$ 26,714,802	\$ 30,113,215
<b>Liabilities and Net Assets</b>		
<b>Current</b>		
Accounts payable and accrued liabilities (Note 5)	\$ 1,229,748	\$ 2,641,571
Deferred membership revenue	12,500	-
Deferred funding (Note 6)	3,238,250	5,525,686
Current portion of obligation under capital lease (Note 8)	196,732	180,672
	4,677,230	8,347,929
<b>Deferred funding (Note 6)</b>	2,265,694	1,991,700
<b>Deferred capital funding (Note 7)</b>	12,009,952	11,839,926
<b>Obligation under capital lease (Note 8)</b>	1,558,934	1,944,198
	20,511,810	24,123,753
<b>Commitments (Note 9)</b>		
<b>Net Assets</b>		
Unrestricted	544,762	474,413
Internally restricted royalty fund	2,299,398	2,281,534
Internally restricted for windup of operations	3,358,832	3,233,515
	6,202,992	5,989,462
	\$ 26,714,802	\$ 30,113,215

On behalf of the board:

Catherine Mudditt Director

 Director

The notes are an integral part of these financial statements.

**CANARIE Inc.**  
**Statement of Changes in Net Assets**

For the year ended March 31	Unrestricted	Internally Restricted Royalty Fund (Note 10)	Internally Restricted for Windup of Operations (Note 10)	2016	2015
<b>Balance,</b> beginning of the year	\$ 474,413	\$2,281,534	\$3,233,515	\$5,989,462	\$5,956,455
Membership	225,529	-	-	225,529	208,178
Royalties	-	-	-	-	1,521
Investment income	3,741	17,864	25,317	46,922	75,258
Expenses	(58,921)	-	-	(58,921)	(251,950)
<b>Excess of revenues over expenses</b>	170,349	17,864	25,317	213,530	33,007
	644,762	2,299,398	3,258,832	6,202,992	5,989,462
<b>Interfund transfers</b>	(100,000)	-	100,000	-	-
<b>Balance, end of the year</b>	\$ 544,762	\$2,299,398	\$3,358,832	\$6,202,992	\$5,989,462

The notes are an integral part of these financial statements.

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**CANARIE Inc.**  
**Statement of Operations**

<b>For the year ended March 31</b>	<b>2016</b>	<b>2015</b>
<b>Revenues</b>		
Industry Canada / ISED funding	\$ 17,146,942	\$23,946,974
Membership	225,529	208,178
Investment income	46,922	75,258
Royalties	-	1,521
	<hr/>	<hr/>
	17,419,393	24,231,931
<b>Expenses (Schedule)</b>		
Program	14,610,557	20,572,230
Operating	2,510,349	3,374,744
Corporate	58,921	251,950
Joint Security Project	26,036	-
	<hr/>	<hr/>
	17,205,863	24,198,924
<b>Excess of revenues over expenses</b>	<hr/> <b>\$ 213,530</b>	<hr/> <b>\$ 33,007</b>

**CANARIE Inc.**  
**Schedule of Expenses**

<b>For the year ended March 31</b>	<b>Program</b>	<b>Operating</b>	<b>Corporate</b>	<b>Joint Security Project</b>	<b>2016 Total</b>
Direct program	\$ 9,124,665	\$ -	\$ -	\$ -	\$ 9,124,665
Employee and consultants	2,822,305	1,603,461	19,985	25,426	4,471,177
Marketing and promotion	273,452	65,630	17,679	-	356,761
Travel	175,989	68,352	130	610	245,081
Rent	-	321,274	-	-	321,274
General office and supplies	22,726	133,946	-	-	156,672
Meetings and conferences	45,807	58,614	-	-	104,421
Equipment, software and maintenance	32,869	71,612	-	-	104,481
Professional fees	103,275	35,175	2,541	-	140,991
Interest on obligation under capital lease	87,134	-	-	-	87,134
	12,688,222	2,358,064	40,335	26,036	15,112,657
Plus: amortization	1,922,335	152,285	18,586	-	2,093,206
	<b>\$14,610,557</b>	<b>\$ 2,510,349</b>	<b>\$ 58,921</b>	<b>\$ 26,036</b>	<b>\$17,205,863</b>

The notes are an integral part of these financial statements.

**CANARIE Inc.**  
**Schedule of Expenses**

<b>For the year ended March 31</b>	<b>Program</b>	<b>Operating</b>	<b>Corporate</b>	<b>Joint Security Project</b>	<b>2015 Total</b>
Direct program	\$16,084,117	\$ -	\$ -	-	\$16,084,117
Employee and consultants	2,562,387	2,115,296	183,950	-	4,861,633
Marketing and promotion	114,032	281,697	49,866	-	445,595
Travel	242,224	187,289	-	-	429,513
Rent	-	347,890	-	-	347,890
General office and supplies	15,383	147,814	-	-	163,197
Meetings and conferences	34,010	89,262	-	-	123,272
Equipment, software and maintenance	45,580	56,787	-	-	102,367
Professional fees	2,630	36,317	561	-	39,508
Interest on obligation under capital lease	27,040	-	-	-	27,040
	19,127,403	3,262,352	234,377	-	22,624,132
Plus: amortization	1,444,827	112,392	17,573	-	1,574,792
	<b>\$20,572,230</b>	<b>\$ 3,374,744</b>	<b>\$ 251,950</b>	<b>\$ -</b>	<b>\$24,198,924</b>

The notes are an integral part of these financial statements.

**CANARIE Inc.**  
**Statement of Cash Flows**

**For the year ended March 31**

**2016**

**2015**

**Cash flows from operating activities**

Industry Canada / ISED funding	\$ 15,000,000	\$ 26,400,000
Membership	238,029	200,678
Program - interest	41,472	252,842
Program - user fees	199,775	189,517
Investment income - Corporate	3,741	46,927
Investment income - Royalty Fund	17,864	28,331
Investment income - Windup of Operations	25,317	-
Program expenses	(15,015,116)	(18,362,113)
Operating expenses	(2,296,185)	(3,284,620)
Corporate expenses	(20,572)	(201,556)
Joint Security Project expenses	(26,036)	-
Royalties	-	1,521
	<u>(1,831,711)</u>	<u>5,271,527</u>

**Cash flows from investing activities**

Acquisition of tangible capital assets and intangible asset	(2,518,164)	(2,984,603)
Proceeds on disposal of tangible capital assets	155	24,800
(Increase) decrease in short-term investments	5,422,376	(6,806,870)
	<u>2,904,367</u>	<u>(9,766,673)</u>

**Cash flows from financing activities**

Repayment of obligation and interest under capital lease	(535,611)	(79,190)
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**Net increase (decrease) in cash**

537,045      (4,574,336)

**Cash, beginning of the year**

228,900      4,803,236

**Cash, end of the year**

\$ 765,945      \$ 228,900

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**1. Significant Accounting Policies**

<b>Purpose of Organization</b>	<p>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.</p> <p>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).</p>
<b>Basis of Accounting</b>	<p>The financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations.</p>
<b>Use of Estimates</b>	<p>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 leases and intangible asset.</p>
<b>Deferred Funding</b>	<p>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 leases and intangible asset.</p> <p>When tangible capital assets, assets under capital leases 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 leases and intangible asset.</p>

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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

**Revenue Recognition** 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 leases 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 leases and intangible asset.

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 short-term investments which it chose to measure at fair value. Changes in fair value are recognized in the statement of operations.

Financial instruments measured at amortized cost are cash, accounts receivable and accounts payable and accrued liabilities.

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.

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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

<b>Tangible Capital Assets and Intangible Asset</b>	<p>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:</p> <table><tr><td>Computer equipment</td><td>3 years straight-line basis</td></tr><tr><td>Equipment</td><td>3 years straight-line basis</td></tr><tr><td>Leasehold improvements</td><td>over the term of the lease</td></tr><tr><td>Furniture</td><td>5 years straight-line basis</td></tr><tr><td>Network equipment</td><td>5 years straight-line basis</td></tr><tr><td>Computer software</td><td>2 years straight-line basis</td></tr></table>	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
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												
<b>Impairment of Tangible Capital Assets and Intangible Asset</b>	<p>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.</p>												
<b>Leases</b>	<p>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.</p> <p>Assets under capital leases 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 leases.</p>												
<b>Contributed Services</b>	<p>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.</p>												
<b>Presentation of Expenses</b>	<p>Program development, design and implementation activities are classified as program expenses. Activities for specific security initiatives in support of research and education are classified as Joint Security Project expenses. Activities which are not directly in support of Programs or security initiatives are classified as operating expenses. Activities not eligible for funding under the current contribution agreement are classified as either corporate or royalty fund expenses.</p>												

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**2. Short-Term Investments**

Short-term investments consist of Canadian government treasury bills with annual yields ranging from 0.33% to 0.36% and maturities ranging from May 2016 to June 2016, guaranteed investment certificates with annual yields ranging from 0.80% to 0.87% and maturities ranging from May 2016 to February 2017, and cash held in investment savings accounts with annual yields at 0.75%.

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**3. Prepaid Expenses and Deposits**

	<u>2016</u>	<u>2015</u>
Program prepayments and deposits	\$ 6,174,214	\$ 4,722,680
Operating prepayments	111,030	55,743
Rental deposit	36,500	36,500
	<hr/>	<hr/>
Balance, end of the year	6,321,744	4,814,923
	<hr/>	<hr/>
Current portion	4,019,550	2,786,723
	<hr/>	<hr/>
Long-term portion	\$ 2,302,194	\$ 2,028,200
	<hr/>	<hr/>

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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

	2016		2015	
	Cost	Accumulated Amortization	Cost	Accumulated Amortization
Computer equipment	\$ 346,351	\$ 262,853	\$ 321,277	\$ 196,325
Equipment	117,441	80,786	117,441	46,395
Leasehold improvements	464,519	392,035	464,519	370,777
Furniture	207,592	152,503	205,354	133,916
Network equipment	9,999,200	5,820,789	9,576,671	4,469,744
Fibre under capital leases	8,461,796	1,713,406	5,086,039	1,162,605
Fibre under capital leases under construction	865,703	-	2,455,738	-
Computer software	87,611	62,800	84,445	20,357
	<u>\$20,550,213</u>	<u>\$ 8,485,172</u>	<u>\$18,311,484</u>	<u>\$ 6,400,119</u>
Net book value		<u>\$12,065,041</u>		<u>\$11,911,365</u>

During the year, computer equipment with a cost of \$8,155 (2015 - \$2,298) and accumulated amortization of \$8,155 (2015 - \$2,298) was disposed and removed from the total cost and total accumulated amortization.

During the year, furniture with a cost of \$Nil (2015 - \$9,012) and accumulated amortization of \$Nil (2015 - \$7,049) was disposed and removed from the total cost and total accumulated amortization.

During the year, network equipment with a cost of \$Nil (2015 - \$704,448) and accumulated amortization of \$Nil (2015 - \$704,448) was disposed and removed from the total cost and total accumulated amortization.

Accounts payable and accrued liabilities include purchased tangible capital assets with a cost of \$Nil (2015 - \$270,468).

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**5. Accounts Payable and Accrued Liabilities**

	<u>2016</u>	<u>2015</u>
Accounts payable and accrued liabilities	\$ 1,204,021	\$ 2,629,209
Government remittances payable	25,727	12,362
	<u>\$ 1,229,748</u>	<u>\$ 2,641,571</u>

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**6. Deferred Funding**

Pursuant to Funding Agreements signed on October 9, 2015, September 4, 2012, March 28, 2007, and March 28, 2002, the organization received funding of \$15,000,000, \$62,000,000, \$120,000,000 and \$110,000,000 respectively from Innovation, Science and Economic Development Canada ("ISED") (formerly known as Industry Canada) for the design, development, deployment, improvement and operations of the CANARIE network and programs.

In 2015, the organization was granted permission from Industry Canada / ISED to retain \$817,821 from an HST recovery to support the Joint Security Project.

The balance of the funds has been reflected as follows:

	<u>2016</u>	<u>2015</u>
<b>Balance, beginning of year</b>	\$ 7,517,386	\$ 7,208,637
Industry Canada / ISED funding received	15,000,000	26,400,000
HST recovery	-	817,821
Program - user fees	262,054	239,166
Program - interest	41,472	252,842
Direct program and operating expenses	(15,046,286)	(22,389,755)
Transfer to operating for the acquisition of tangible capital assets, assets under capital leases and intangible asset	(2,244,646)	(5,011,325)
Joint Security Project expenses	(26,036)	-
<b>Balance, end of year</b>	<u>5,503,944</u>	<u>7,517,386</u>
<b>Current portion</b>	<u>3,238,250</u>	<u>5,525,686</u>
<b>Long-term portion</b>	<u>\$ 2,265,694</u>	<u>\$ 1,991,700</u>

Deferred funding consists of the following amounts:

	<u>2016</u>	<u>2015</u>
Industry Canada / ISED funding	\$ 4,712,159	\$ 6,699,565
HST recovery	791,785	817,821
	<u>\$ 5,503,944</u>	<u>\$ 7,517,386</u>

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

**7. Deferred Capital Funding**

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

	2016	2015
<b>Balance, beginning of year</b>	\$11,839,926	\$ 8,385,820
Funding received related to the acquisition of tangible capital assets, assets under capital leases and intangible asset	2,244,646	5,011,325
Amortization of program and operating assets	<u>(2,074,620)</u>	<u>(1,557,219)</u>
<b>Balance, end of year</b>	<u>\$12,009,952</u>	<u>\$11,839,926</u>

**8. Obligation Under Capital Lease**

	2016	2015
Capital lease for infeasible rights of use of fibre, 4.35%, due December 2024, payable by monthly instalments of \$23,317, principal and interest.	\$ 1,944,198	\$ 2,124,870
<b>Less:</b> advance payments made in the year	<u>188,532</u>	<u>-</u>
	1,755,666	2,124,870
<b>Less:</b> current portion	<u>196,732</u>	<u>180,672</u>
	<u>\$ 1,558,934</u>	<u>\$ 1,944,198</u>

Minimum lease payments required in the next years under the capital lease are as follows:

2017	\$ 267,805
2018	267,805
2019	267,805
2020	267,805
2021	267,805
Subsequently	<u>724,226</u>
	2,063,251
<b>Less:</b> interest included in minimum payments	<u>307,585</u>
	<u>\$ 1,755,666</u>

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**9. Commitments**

The organization is currently committed to a lease for its premise which expires on August 31, 2019. 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:

2017	\$ 338,893
2018	338,893
2019	338,893
2020	141,205
	<hr/>
	\$ 1,157,884

As at March 31, 2016, the organization had commitments of \$4,888,665 with respect to the Network and DAIR programs and non-binding commitments of \$4,095,257 with respect to the NREN and Research Software programs.

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**10. Internally Restricted Net Assets**

**Royalty Fund**

During the 2007/2008 fiscal year, Industry Canada granted CANARIE Inc. the authority to retain royalties collected after March 31, 2007 and to use these funds in a manner to be determined by CANARIE Inc. and its legal counsel. Annual allocations to the fund include royalties received of \$Nil (2015 - \$1,521) and investment income of \$17,864 (2015 - \$28,331). 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, CANARIE Inc. 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 pay operating expenses. The objective was to allocate to the fund an amount between 50% and 75% of the organization's annual operating budget. Management performs an annual review of the sufficiency of this fund and confirms that its objective is met. Annual allocations to the fund include investment income of \$25,317 (2015 - \$Nil). At March 31, 2016, the organization transferred \$100,000 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.

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**CANARIE Inc.**  
**Notes to Financial Statements**

**March 31, 2016**

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**11. Economic Dependence**

On October 9, 2015, ISED entered into a contribution agreement with CANARIE Inc. to contribute funding totaling \$105,000,000. Of the total contribution, \$15,000,000 was received on November 10, 2015. The current contribution agreement will end on March 31, 2020. Should this funding not be continued or it cannot be replaced, the organization would not be able to continue its operations at the current level.

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**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 risk associated with investments is reduced to a minimum since these assets are invested in short-term maturities.