INVESTMENT REPORT VOL. 3 | APRIL 2020

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Plus a community of Associates from small and large companies, not-for-profit organizations, governments, research organizations and educational institutions

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Our world is very different today than it was a few months ago. As COVID-19 makes its way around the globe, Canadians are looking at ways we can help in the fight against the pandemic. The Supercluster's COVID-19 program was launched at the end of March to develop solutions to problems created by COVID-19 and to do this in ways that are faster, can be deployed quickly and bring together industry, government and researchers in ways that have never been done before. We have committed $60 million to this program.

We've moved quickly to mobilize and support solutions that can improve the health and safety of Canadians. As part of this effort, we launched the Supply Hub, a platform that ensures that personal protective equipment gets to front line workers as fast as possible. A partnership between the Province of BC's emergency management division and the Business Council of BC, it was mobilized in less than a week by Traction on Demand.

We also are thrilled to have eight initial projects from the COVID-19 program

including a project to develop a global data-sharing platform to harness the latest understanding of the evolution of the virus and a project that applies artificial intelligence towards the discovery of new applications for existing drugs to treat COVID-19 patients.

In addition to our COVID-19 Program, on March 11th, our Board of Directors ratified a selection of projects from our Cycle 3 call. Those projects are included in this investment update.

Member Participation in Projects

Startups and SMEs are actively participating across all project cycles in our Supercluster participants. SMEs and large companies are equally represented in our projects, representing 44% and 45% of investment, respectively. SME organizations are the majority participants in our projects and comprise 46% of all organizations in our projects. We are both proud and grateful that project teams are comprised of partnerships between small and large firms enabling the combination of expertise to solve some of the biggest challenges facing industry and society.

Investment level in Projects by Organization Type (%)

Proportion of Project Participants by Type (%)
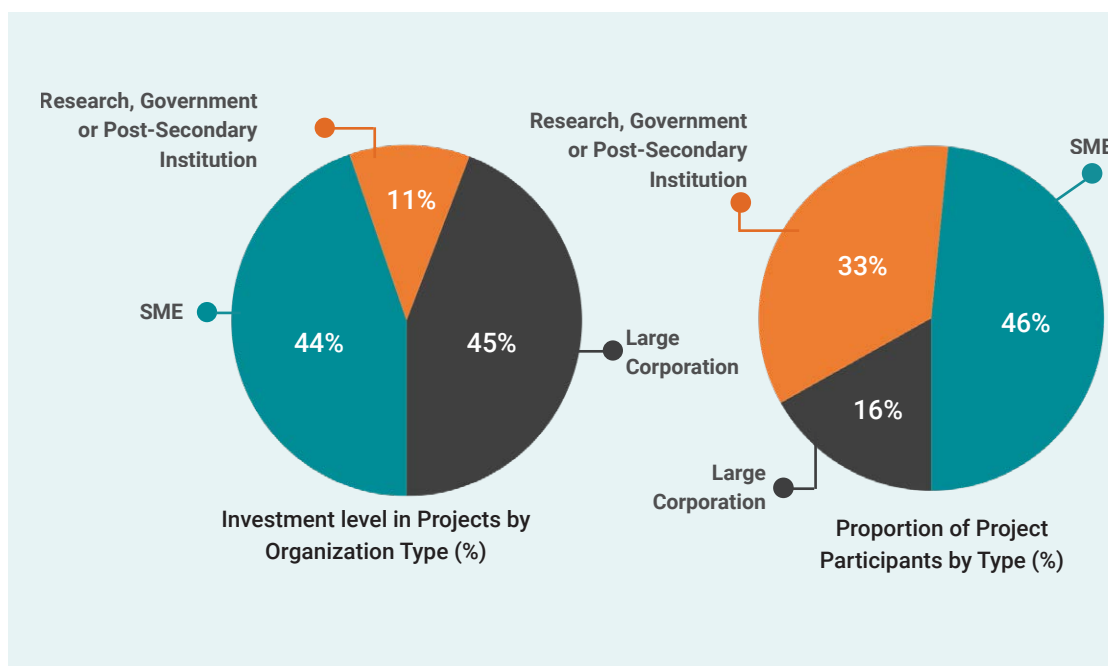
Investment Areas

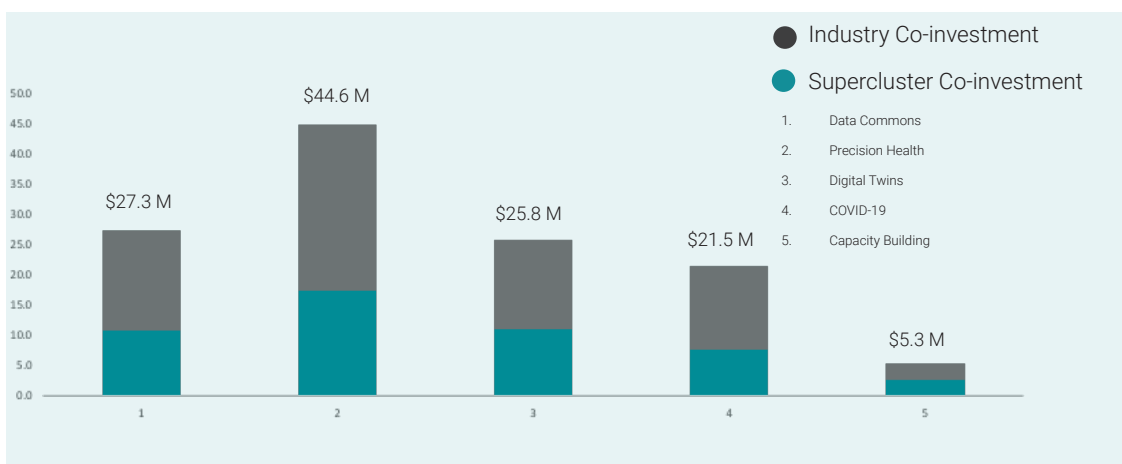| Our investments are directed through five programs.	COVID-19 Focused on unlocking solutions to protect the health and safety of all Canadians and our economy through the development, deployment, and scaling of digital technologies	PRECISION HEALTH Establishing Canada as a leader in data-driven health innovations that support disease prevention, early diagnosis, and personalized treatment.
DATA COMMONS Providing new digital solutions by aggregating data resources into shared platforms for exploration, machine learning, and innovative application development.	DIGITAL TWINS Using digital technologies to create virtual production environments for real-time operations management, simulation, modelling and training.	CAPACITY BUILDING Partnering with employers, educators and community organizations to build job ready, world leading talent

Cumulative Investment* to April 30, 2020

Total commitments

As of April 30th, we had selected 39 projects with total budgets of over $124.5M, attracting $75M from industry consortia. Total investment from the Supercluster was $49.5M. Since April 30th additional projects have been selected and investments have been made, both of which will be included in our next investment update.

Legend:
- ● Industry Co-investment
- ● Supercluster Co-investment

1. Data Commons
2. Precision Health
3. Digital Twins
4. COVID-19
5. Capacity Building

Bar values: $27.3 M, $44.6 M, $25.8 M, $21.5 M, $5.3 M

Technology R&D Program Portfolio

As of April 30, 2020, we have completed three calls for technology projects. The number of projects in our Precision Health, Data Commons and Digital Twins programs are eleven, six, and five, respectively. In addition, there are eight projects in the COVID-19 program. There is also on strategic project, the Supply Hub.

In our three regular programs, the 22 projects have total budgets of $97.7M, which includes $39.2M from the Supercluster. The COVID-19 program total investment as of April 30 was $13.3M of which $7.6M is from the Supercluster. In addition, the eight projects in the Capacity Building program represent a total investment of $5.3M of which $2.7M is from the Supercluster. The Supply Hub was a strategic investment of $40K of Supercluster funds towards a total project of $100K.

	DATA COMMONS	PRECISION HEALTH	DIGITAL TWINS
CYCLE 1	• Earth Data Store • Forest Machine Connectivity	• Tailored Health - Pharmacogenetics • Dermatology Point-of-Care • Secure Health & Genomics Platform	• Predictive Analytics for Manufacturing • The Learning Factory
CYCLE 2	• Precision Agriculture to Improve Crop Health • Fresh Water Data Commons	• Intelligent Point-of-Care Ultrasound Network • Personal Health Wallet • Reducing Opioid Use for Pain Management	• Augmented Reality for Maintenance and Inspection
CYCLE 3 **	• Protecting our Oceans • Satellite-based Climate Change Monitoring	• Workplace Brain Health • Autism Sharing Initiative • Trustsphere • Healthcare to Homecare • WayfindER	• Wellness.AI • Optimizing Healthcare Through Applied Digital Twinning
COVID-19 **		• Beacon - Realtime Global Data Sharing Network • Lifesaver - Predicting emerging pandemics • Feeding our Front Lines • Rapid Repurposing of Drugs for COVID-19 • CO-VID I/O: A Novel Biosensor for the Secure Movement of Goods and People • xrAI • Digital Telework Platform for Remote Physical Work • Intelligent Point-of-Care Ultrasound for COVID	

• Supply Hub - Strategic project

** In-development

Investment Outlook

Many of the projects in our portfolio are proof-of-concepts showing how digital technologies can solve major challenges or present new market opportunities. To support multi-phase projects, successful projects are eligible to apply for follow-on investments to expand the scope and impact of an already successful project.
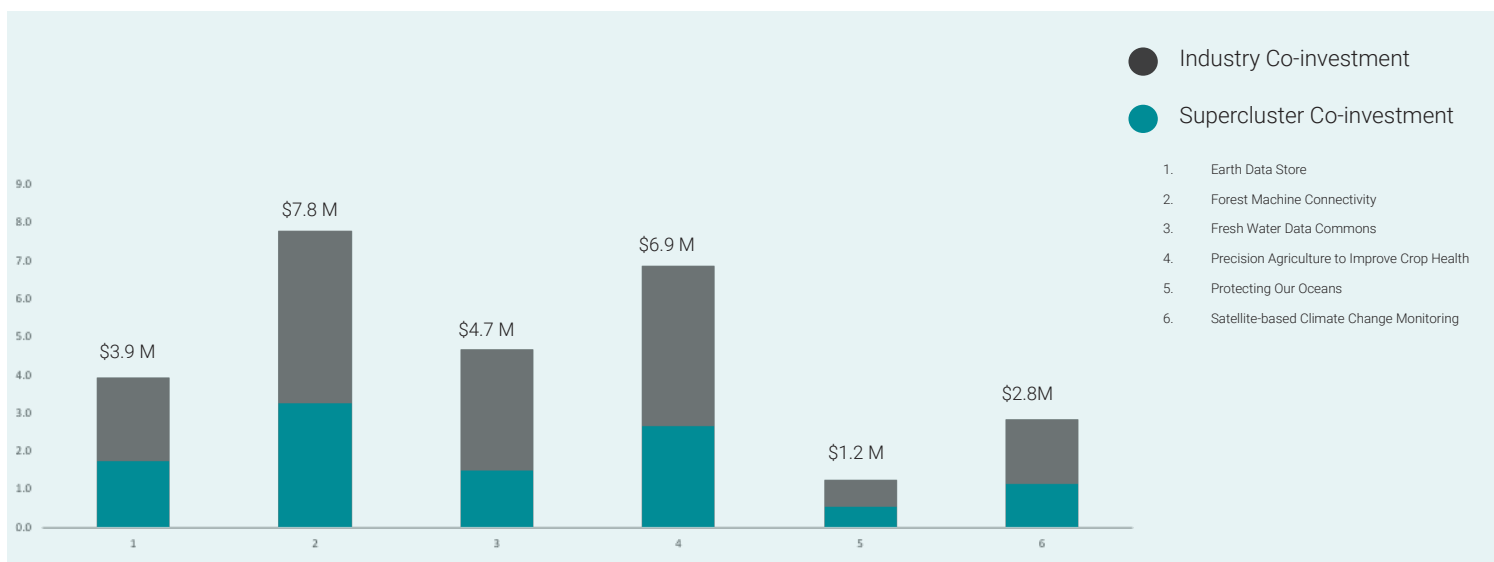
We continue to streamline our support of Members and project consortia, by bringing proposal teams together early in the proposal development timeline and by streamlining and accelerating the proposal development, review, selection and contracting stages so that the most promising proposals can launch quickly and start to deliver impact . We continue to welcome input and comment from Members about our approach to proposal development and selection as we prepare for a Cycle 4 call later this year. As our COVID-19 program evolves we will also be looking forward to mapping out further opportunities to support Canadians.

Investment Breakdown by Program

Data Commons
Total Investment: $27.3M

● Industry Co-investment

● Supercluster Co-investment

1.   Earth Data Store
2.   Forest Machine Connectivity
3.   Fresh Water Data Commons
4.   Precision Agriculture to Improve Crop Health
5.   Protecting Our Oceans
6.   Satellite-based Climate Change Monitoring

$3.9 M $7.8 M $4.7 M $6.9 M $1.2 M $2.8M

The Data Commons program is working to provide new digital solutions by aggregating data resources into shared platforms for exploration, machine learning, and innovative application development.

Earth Data Store

This project will collect, standardize, and secure data from multiple sources such as earth observation satellite imagery and environmental sensors, for predictive purposes. For example, better predicting where wildfires are most likely to occur and finding the most environmentally sensitive manner in which to construct a natural resource project. Through interactive visual maps and running deep learning algorithms, resource managers will be able to better observe and protect remote areas.

Protecting our Oceans - In development

Food security, regional economies and the health of our marine ecosystems are often at risk as a result of illegal fishing. This project will use machine learning, artificial intelligence and data visualization to identify, track and apprehend illegal fishing vessels in order to protect our global fisheries and marine ecosystems.

Satellite-based Climate Change Monitoring - In development

Climate change has accelerated the need to better monitor our planet. This project uses machine learning to automate and provide faster, more accurate geographic information through satellite imagery to better understand the health of the environment and to help mitigate against, and adapt to climate change.

Precision Agriculture to Improve Crop Health

In the face of climate change, increasing threats from pests and pathogens are impacting our environment and food security. This project will develop new antifungal products through the application of computational biochemistry, genomics, machine learning, and robotics, to manage disease in field crops, minimize the use of pesticides, and secure export markets.

Forest Machine Connectivity

This project will use an Industrial Internet of Things (IIoT) network of 'smart' devices to monitor, collect, exchange, analyze, and deliver valuable insights to contractors, machine operators, and managers in the timber harvesting supply chain. This data will improve productivity, efficiency, and competitiveness of Canada's wood products manufacturing industry.
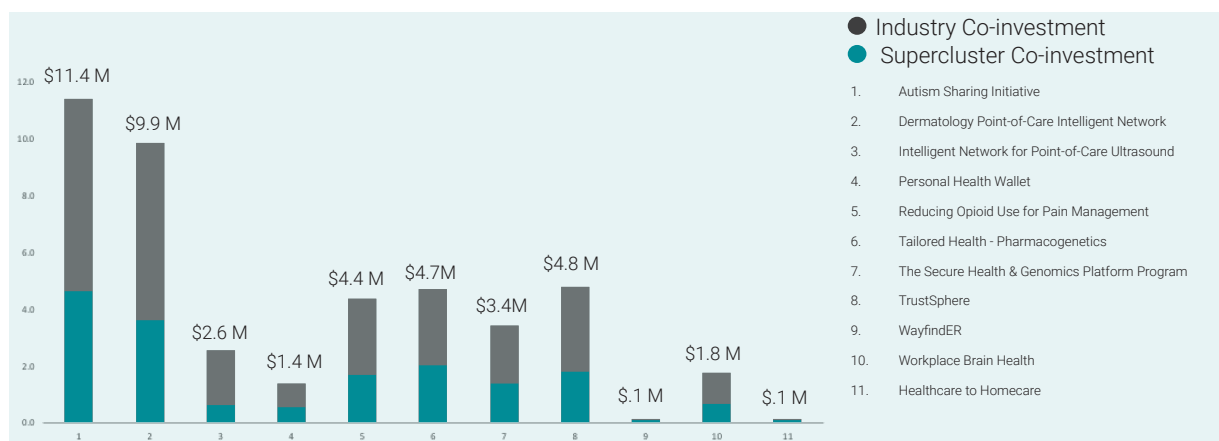
Fresh Data Water Commons

Water is a precious resource under significant pressure globally as a result of climate change, and human and industrial activities. The development of a platform integrating various sources of data to better understand ecosystem health, specifically of major water systems such as the Columbia Basin, will better inform water use, conservation, and management.

Investment Breakdown by Program

Precision Health
Total Investment: $44.6M

● Industry Co-investment
● Supercluster Co-investment

1. Autism Sharing Initiative
2. Dermatology Point-of-Care Intelligent Network
3. Intelligent Network for Point-of-Care Ultrasound
4. Personal Health Wallet
5. Reducing Opioid Use for Pain Management
6. Tailored Health - Pharmacogenetics
7. The Secure Health & Genomics Platform Program
8. TrustSphere
9. WayfindER
10. Workplace Brain Health
11. Healthcare to Homecare

Bar values: $11.4 M, $9.9 M, $2.6 M, $1.4 M, $4.4 M, $4.7M, $3.4M, $4.8 M, $.1 M, $1.8 M, $.1 M

The Precision Health program is working to establish Canada as a leader in data-driven innovations that improve disease prevention, diagnosis and personalized treatment by considering genomics, lifestyle, and environmental factors.

Dermatology Point-of-Care Intelligent Network

Early detection of skin cancer is critical to improving the chances of survival, yet there can be up to a six month wait to see a dermatologist. By using AI-powered medical imaging that incorporates dermatology and pathology data and images, patients can get diagnosed in days, rather than months, anywhere in Canada.

Secure Health and Genomics Platform

This proof-of-concept aims to address one of the biggest challenges and opportunities in healthcare—an effective system to collect, protect, secure, access, and use health data to improve the well-being of all Canadians.

Personal Health Wallet

By applying blockchain technology to personal health data, individuals will have full custody of their health data in a secure environment. This allows patients to determine with whom they will share their health data, while also providing informed consent for that sharing.

Tailored Health – Pharmacogenetics

With a simple cheek swab and pharmacogenetic tools, physicians and pharmacists can tailor for each patient, the type and dose for any of the 900+ most commonly prescribed medications.

Reducing Opioid Use for Pain Management

This active monitoring system will enable physicians to improve pain management, proactively manage opioid prescriptions for surgery patients, and minimize the risk of opioid addiction.

Intelligent Network for Point-of-Care Ultrasound

This project will combine portable ultrasound devices, imaging technology, and machine learning to enable family physicians to make accurate diagnoses regardless of where patients live.

TrustSphere - *In development*

Canadians want to manage their own health and wellness, TrustSphere aims to create a digital identity that enables each person to easily view, share and manage their own health data in a private, secure and informed manner.

Workplace Brain Health - *In development*

Mental health is of critical importance in the working lives of Canadians. This project takes a proactive approach to mental health with the development of a digitally-driven program to create a personalized wellness strategy for employees to lead happier and healthier lives.

Autism Sharing Initiative (ASI) -*In development*

Autism spectrum disorder (ASD) is a condition that affects brain development and is often characterized by difficulties in social interactions, communication, and repetitive behaviors. The ASI aims to build on Canada's leadership in autism research and treatment and create the first federated, data sharing network to provide better care for autism patients.

Healthcare to Homecare *(Feasibility study)*

This solution intends to reduce costs and optimize individual care by reducing the number of patients staying in hospitals and directing patients to clinics or to their homes based on rapid assessment of conditions and where the application of technologies to enable effective remote monitoring.

WayfindER *(Feasibility study)*

This solution aims to use machine learning to triage patients in emergency rooms (ER) and direct them to the appropriate department in order to reduce wait times and improve patient outcomes.

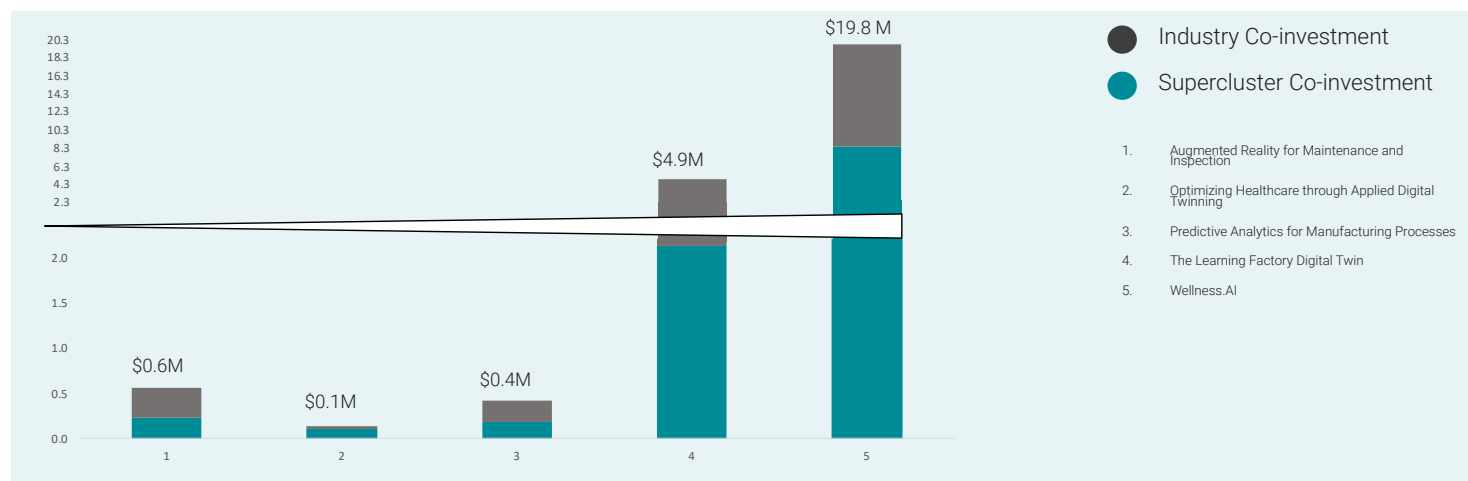### COVID-19 Supply Hub - *Strategic project**

Sourcing and distributing essential medical supplies and equipment for frontline health care workers is critical to fighting the coronavirus pandemic.

*The strategic investment in the Supply Hub is not illustrated in the graph above.

Investment Breakdown by Program

Digital Twins
Total Investment: $25.8M

The chart legend and items:
- ● Industry Co-investment
- ● Supercluster Co-investment

1. Augmented Reality for Maintenance and Inspection
2. Optimizing Healthcare through Applied Digital Twinning
3. Predictive Analytics for Manufacturing Processes
4. The Learning Factory Digital Twin
5. Wellness.AI

The Digital Twins program is using digital technologies to create real-time, virtual production environments for operations management, simulation, modelling and training.

Predictive Analytics for Manufacturing Processes

Quantum computing and advanced machine learning will analyze chemical, temperature, voltage and other critical data in the metal finishing manufacturing line for complex aircraft parts. This will provide new insights for the development of a digital twin and an optimized manufacturing process for large equipment such as aircraft components.

Learning Factory Digital Twin

A proof-of-concept to develop a digital twin of the manufacturing process of aerospace components. This will allow hands-on learning and research to drive continuous improvements through predictive maintenance, real-time monitoring, and quality control. The digital twin will also inform future work and create a new approach to advanced aerospace manufacturing.

Augmented Reality for Maintenance and Inspection

Imagine you are an engineer who needs to document damage on the surfaces of commercial aircraft or large shipping vessels. This project will create a tool to enable the display of data in an augmented reality view to improve the safety, accuracy and cost of inspections of these very large objects.

Wellness.AI - *In development*

Wellness.AI is a new model for tailored mental wellness. Using natural language processing and combined with other data from wearable technologies, the project will develop a model to assess an individual's emotional state of wellbeing, overcoming a major hurdle in tailoring mental health and wellness management.
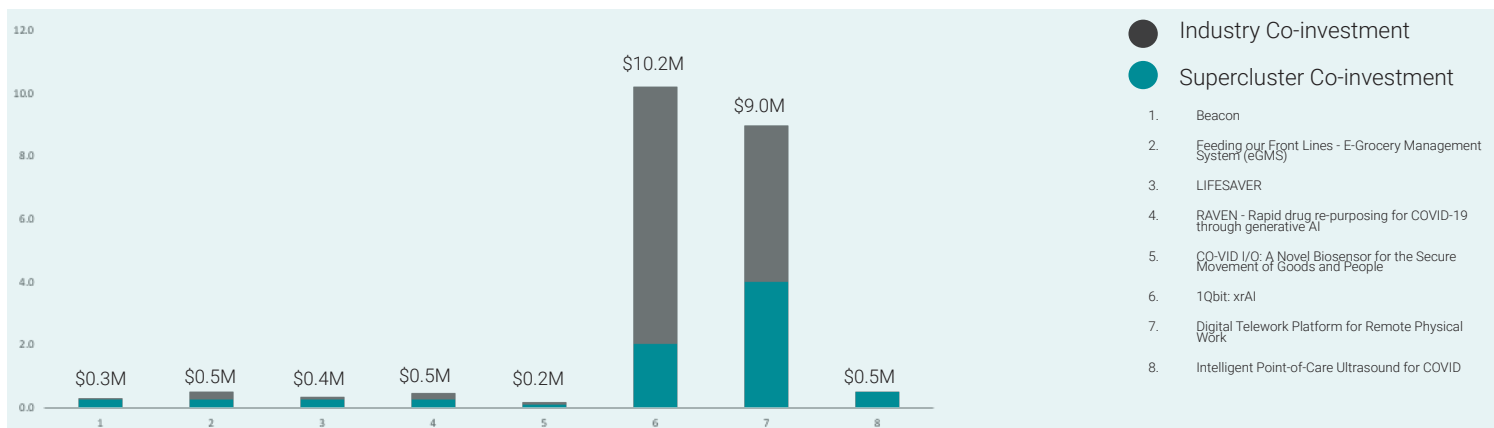
Optimizing Healthcare through Applied Digital Twinning - *In development*

Building a 'state-of-art' hospital is complex and needs to incorporate advances in biomedical research and innovation. This project is looking at the development of a digital replica of the new St. Paul's Emergency Department to optimize workflow and simulate operations to better inform upcoming design and construction.

Investment Breakdown by Program

COVID-19 Program*
Total Investment: $21.5M

Chart legend:
- Industry Co-investment
- Supercluster Co-investment

1. Beacon
2. Feeding our Front Lines - E-Grocery Management System (eGMS)
3. LIFESAVER
4. RAVEN - Rapid drug re-purposing for COVID-19 through generative AI
5. CO-VID I/O: A Novel Biosensor for the Secure Movement of Goods and People
6. 1Qbit: xrAI
7. Digital Telework Platform for Remote Physical Work
8. Intelligent Point-of-Care Ultrasound for COVID

Chart values: 1: $0.3M, 2: $0.5M, 3: $0.4M, 4: $0.5M, 5: $0.2M, 6: $10.2M, 7: $9.0M, 8: $0.5M

The COVID-19 Program is focused on solving some of the biggest challenges created by COVID – 19 and developing solutions to protect the health and safety of all Canadians and our economy through the development, deployment, and scaling of digital technologies. As of the date of printing this report there have been over 450 submissions to the program.

Beacon - Realtime Global Data Sharing Network

Securely sharing data and knowledge about the genetics of the COVID-19 virus in real time over a cloud-based global network is critical to the rapid development of treatments and therapies. This project will allow scientists and researchers to do just that - improving our knowledge at a speed and scale that isn't otherwise possible.

Lifesaver - Predicting emerging pandemics

Knowing where the virus will strike next and rapidly identifying outbreaks will be invaluable to decision-makers in the deployment of first responders and related resources. This project will develop a forecasting platform using a dataset optimized for predictive modelling, that can aggregate data from public sources, health authorities and medical institutions, in addition to weighing weather and travel conditions.

Rapid Repurposing of Drugs for COVID-19

It takes decades and costs millions to develop and deploy new drugs to treat disease. As COVID-19 makes its way around the globe, doctors are looking at repurposing approved drugs in an attempt to quickly identify effective treatments. This project uses artificial intelligence to rapidly establish links between drugs that have the potential to combat the effects of COVID-19 and fast-track life-saving treatment for patients.

XrAI

X-rays are a critical tool in identifying COVID19 patients. This project uses artificial intelligence to identify lung abnormalities on chest x-rays in real-time, enabling clinicians at the 'front line' in emergency rooms and rural hospitals to better identify COVID-19 patients. In the hands of clinicians, this AI tool will improve patient outcomes and save lives.

Feeding our Front Lines

Delivering fresh, high quality food to front line workers and patients while maintaining food security for Canadians during the crisis is essential during the COVID-19 crisis. This project will develop a proof of concept and e-grocery management system that manages food quality and freshness, while optimizing packing and deliveries, creating confidence that those most in need have fresh food while protecting our food security.

CO-VID I/O: A Novel Biosensor for the Secure Movement of Goods and People

As the country looks towards getting the workforce back to work, a key challenge will be to monitor public health by testing for COVID-19. There will be many approaches to testing and this project will assess the performance and efficacy of low-cost biosensors for screening of the COVID-19 virus and a secure database ensure the health of the public.

Digital Telework Platform Technology For Remote Physical Work – recently approved

Physical interactions in labour intensive environments such as healthcare contribute to the spread of COVID-19 across healthcare workers and to vulnerable populations. This project aims expand beyond the existing use of video and audio technologies for the virtual work environment and test the use of robots using 4G/5G networks and digital medical tools such as digital stethoscopes and biometric monitoring to will improve patient care, patient outcomes and the work environment for our healthcare teams.

Intelligent Network for Point-of-Care Ultrasound Expansion for COVID-19

Increased testing of potential COVID-19 cases is necessary to increase our understanding of community infection and spread, beyond our 'outbreak' situations. This project aims to use handheld ultrasound devices for the rapid diagnosis of COVID-19, with an initial focus on rural and remote communities and institutional settings such as long-term care homes and prisons. The project will also develop virtual training tools and a clinician support system to support deployment.
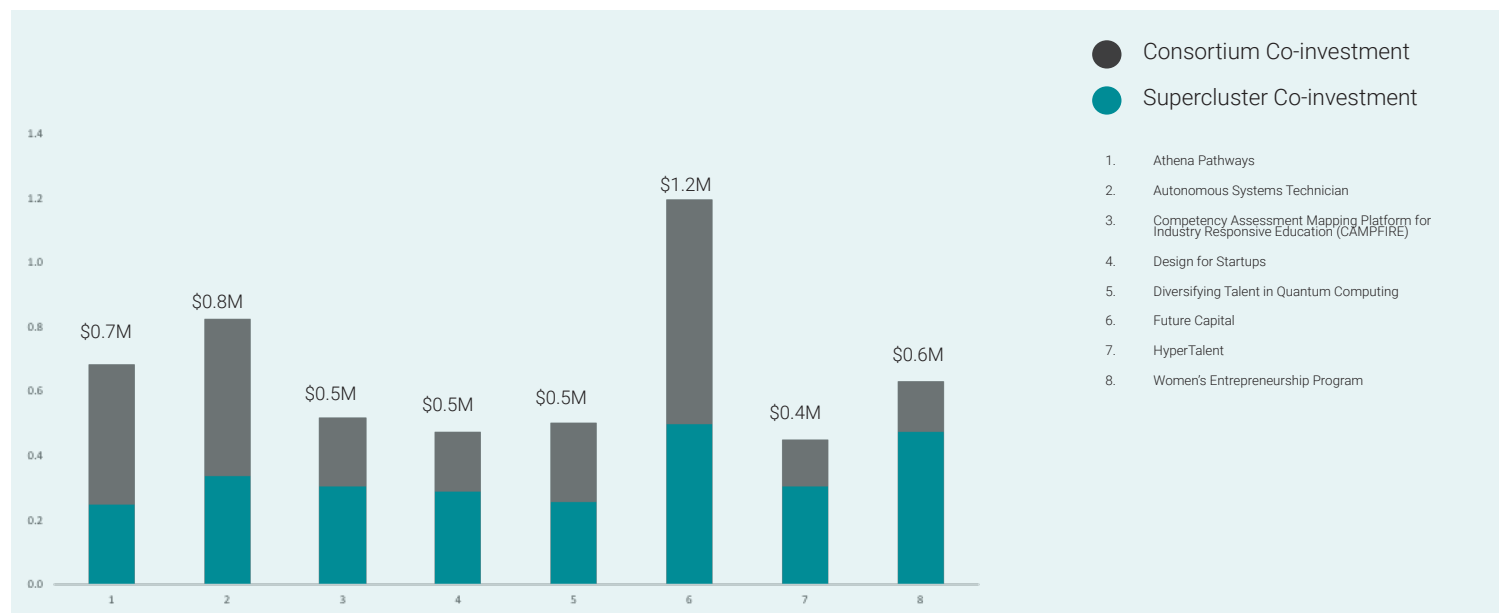
Capacity Building Program Portfolio

The Capacity Building program complements the Technology R&D Programs by recognizing that talent development, inclusion, diversity and ecosystem development are critical to the success of a high-quality R&D portfolio. The projects have cross-cutting impacts across a number of target groups and apply different approaches to talent development.

Investment Breakdown by Program

Capacity Building
Total Investment: $5.3M

Legend:
- Consortium Co-investment
- Supercluster Co-investment

1. Athena Pathways
2. Autonomous Systems Technician
3. Competency Assessment Mapping Platform for Industry Responsive Education (CAMPFIRE)
4. Design for Startups
5. Diversifying Talent in Quantum Computing
6. Future Capital
7. HyperTalent
8. Women's Entrepreneurship Program

Diversifying Talent in Quantum Computing

This project will deliver a quantum computing outreach and diversity program designed to attract women to the field. The program provides ready-to-use education kits for high schools and UBC "Geering Up" engineering- themed summer programs in First Nations communities in B.C., along with public forums on quantum computing.

Design for Startups

This regional program integrates design students into startups to improve the development of digital products, platforms, and services. The project will also increase connectivity between the creative, technology and industry sectors.

Athena Pathways

This joint industry-academic initiative is focused on creating and delivering programming in AI, machine learning and data science for women at the high school and post- secondary levels.

Competency Assessment Mapping Platform for Industry Responsive Education (CAMPFIRE)

This project will develop a comprehensive online competency assessment system and reskilling platform supporting mid-career workers who are shifting into new high-demand Careers.

HyperTalent

This project will help build digital talent among K-12 educators by increasing their exposure to technology knowledge and career options, while also including a program focused on the development of Indigenous talent.

Future Capital

This talent development program supports the growth of female-led companies and provides leadership development opportunities across high-growth SMEs in the digital industry.

Autonomous Systems Technician

The project will develop and deliver a diploma certification program training technicians in the digital skills required for installing and maintaining telecommunications systems to better meet the needs of natural resource companies and increase employment opportunities for local citizens.

Women's Entrepreneurship Program

This regional entrepreneurship development Program, designed by women for women, will support female entrepreneurs from a diverse range of backgrounds by incorporating mentorship, access to seminars and workshops, development of initial products, and support for entrepreneurship for K-12 across Greater Victoria.