



CANADA'S DIGITAL TECHNOLOGY
SUPERCLUSTER

Business Plan

Canada-wide, Global Impact

November 24, 2017

A MESSAGE FROM THE CO-CHAIRS OF CANADA'S DIGITAL TECHNOLOGY SUPERCLUSTER.

Canada is poised to lead the world in the century of digital enterprises and data-driven economies.

This epic journey began over a year ago when a few leaders from British Columbia dared to ask the question: "What do we envision as the future of the province and the country in 20 years?"

From that small gathering grew dozens of roundtable discussions, townhall sessions, collaborations and partnerships that have unfolded through to today. It has involved hundreds if not thousands of people. Entrepreneurship, a pioneering spirit and a deep sense of community has fuelled this collaboration.

We would like to thank everyone who has helped to design and contribute towards the Digital Technology Supercluster effort. It has been a nation-building exercise - and through late nights, early mornings and full weekends, we managed to unlock the art of the possible.



Bill Tam
Co-Chair



Greg Caws
Co-Chair



CANADA'S DIGITAL TECHNOLOGY SUPERCLUSTER - FOUNDING MEMBERS

Back Row: Michael Gallad, Illumina; Steve Slater, Terramera; Mark Wlodyka, Urthecast; Brent Allison, TELUS; Robin Ciceri, Research Universities' Council of BC; Fadi Deek, Boeing; Hana Doubrava, Microsoft; Josh Blair, TELUS; Wendy Hansson, Providence Health; Jamie McDonald, TELUS; Sue Paish, Lifelabs; Elyas Kolia, Shoppers Drug Mart; Shawn Gervais, Premiers' Technology Council of BC; Shehzad Bharmal, Teck

Middle Row: Greg Caws, Premiers' Technology Council of BC; Ivone Martins, Providence Health; Evgueni Loukipoudis, Change Healthcare; Gail Murphy, UBC; Bill Tam, BC Tech Association; Steven Archer, Avcorp; Iain Evans, UBC; Warren Wall, D-Wave

Front Row: Don Bustin, AMPD; Jack Hsu, Boeing; Alexa Young, TELUS; Anthony Brown, AMPD; Laura Petrescue, Avcorp; David Trent, Canfor; Norma Biln, Augurex; Rob Gough, Timberwest; Robert MacDougall, Wavefront

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EXECUTIVE SUMMARY

Canada is poised to lead the world in the century of digital enterprises and data-driven economies.

If the prize resource of the 20th century was oil, the prize resource of the 21st century is data. Canada will be a global leader through a digital technology supercluster that unlocks the potential of data for the intelligent enterprise.

Starting from the West Coast and engaging with companies from across Canada, our supercluster will make the digital future a competitive advantage for Canada's industries.

The Time is Now

The digital technology space is unrivaled in terms of projected future growth. Many of its most promising components—such as virtual, mixed and augmented reality (VR/MR/AR), quantum computing, cloud computing and IoT—are expected to witness triple digit market growth in the years ahead.

For example, the global VR/MR/AR market—currently a small segment of the digital technology space—will generate just US\$11.4 billion in sales in 2017, and by 2021, global sales are forecast to hit as much as US\$215 billion, a twenty-fold increase.¹ Put another way, in just four years this segment of digital technology will go from being smaller than BC's forestry sector to twice as big as Canada's oil and gas industry, or bigger than the entire BC economy.^{2,3}

Similarly, consider the profound growth of data in business and society in recent years. More data has been created in the past two years than in the entire previous history of the human race. Moving forward, the global data inventory will quadruple by 2025 and worldwide revenues for big data and analytics are expected to exceed \$200 billion in 2020. This is driven by business leaders transitioning their companies into insights-driven organizations.

We're at the inflection point of unprecedented, enormous opportunity. Our digital technology supercluster has been designed to capitalize on these important trends.

¹ IDC. Worldwide Semiannual Augmented and Virtual Reality Spending Guide. 2017.

² Based on forestry data from the CPABC [Updated: Overview of the BC Forestry Industry]. Assumes crude prices of US\$60 and natural gas prices of US\$2/GJ at 2016 production levels.

³ BC's GDP in 2016 was roughly C\$264 billion, or US\$207 billion based on a CAD/USD of exchange rate of 1.27.

Data Volume is Exploding

1

More data has been created in the past two years than in the entire previous history of the human race.

2

Data is growing faster than ever before and by the year 2020, about 1.7 megabytes of new information will be created every second for every human being on the planet.

3

By 2020, our accumulated digital universe of data will grow from 4.4 zettabytes today to around 44 zettabytes, or 44 trillion gigabytes.

4

Within five years there will be over 50 billion smart connected devices in the world, all developed to collect, analyze and share data.

5

By 2020, at least a third of all data will pass through the cloud.

6

Less than 0.5% of all data is ever analyzed.

Emerging Technology & Innovation is Accelerating:

1

By 2021, the global VR/MR/AR market will grow from being smaller than BC's forestry sector to twice as big as Canada's oil and gas industry, or bigger than the entire BC economy.

2

By 2025, the quantum computing market is expected to have grown more than sevenfold, to US\$20 billion.

3

By 2021, the cloud computing market is anticipated to more than double in size, to US\$266 billion.

4

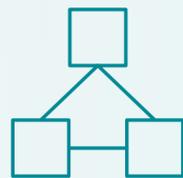
By 2022, the global IoT market size will grow to US\$19 trillion.

5

The global market for Precision Health is expected to reach \$87.3B by 2023, while total health care spending is projected to reach \$8.7 trillion by 2020.

6

The market for AI technologies in health care is expected to reach \$6.6B by 2021 – a 40% growth rate.



Build on our Strengths

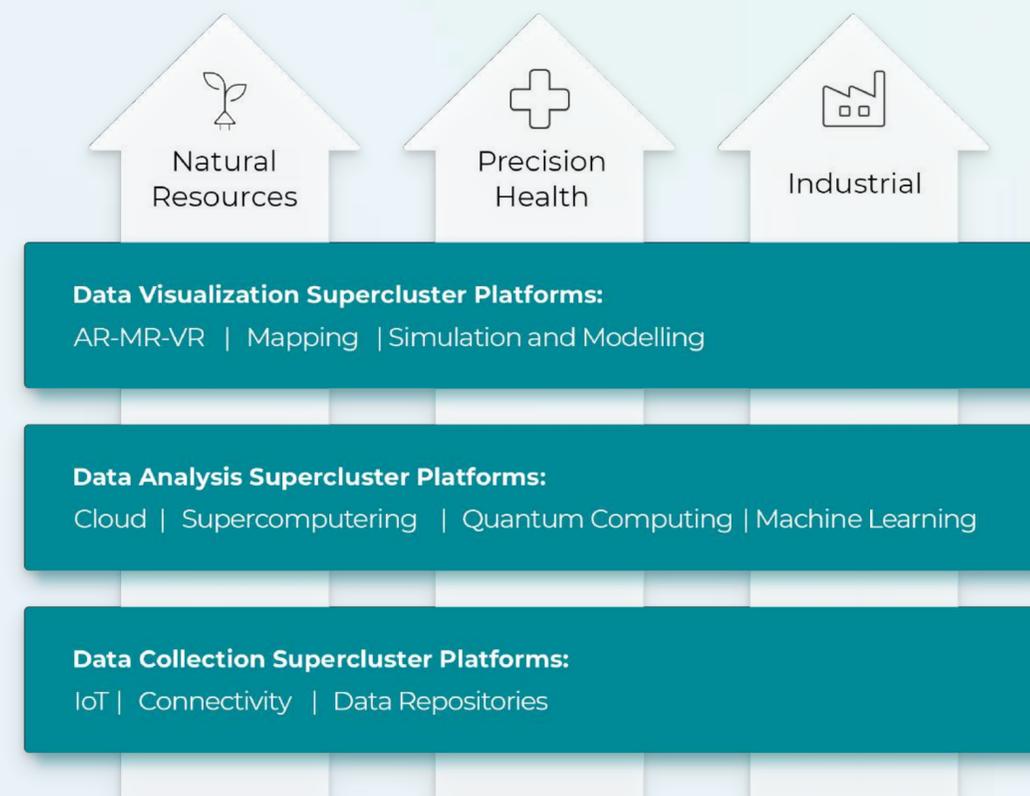
With over 200 private sector participants, 25 of BC's post-secondary institutions, leading universities and research institutes, and funding commitments exceeding \$500 million, we have the momentum necessary to build a world-class supercluster. Our supercluster includes over a dozen large corporate adopters including LifeLabs, Providence Healthcare, Shoppers Drug Mart, Teck Resources, Canfor, Avcorp, TimberWest, Microsoft, Urthecast, and TELUS - significant brands that can lead the adoption and success of new products and technologies.

British Columbia has the the fastest-growing technology sector in Canada. Canada's Digital Technology Supercluster will capitalize on distinct advantages in our region including our:

- Leadership in virtual, mixed, and augmented reality
- Leadership in data analytics and quantum computing
- Proximity to world's cloud computing epicenter in Cascadia
- Strong connections to First Nations communities and strong principles of diversity

Galvanized by the federal Innovation Superclusters Initiative, aligned behind a global vision, and

inspired by an ambitious strategy, we have targeted leading companies in the health, natural resources, and industrial sectors to support their digital transformations. We have engaged digital technology companies from across the spectrum of startups, small and medium enterprises (SMEs), large companies, multinationals (MNEs), large industry adopters, post-secondary institutions, and research institutions to address digital challenges by collaborating to create products and platforms that can lead the world.



Build on our Strengths Continued

Our approach consists of matching industry needs to the capabilities in our advanced digital technology sector. In doing so, we have designed collaboration and customer adoption into our supercluster strategy from the outset, ensuring that the resulting technology development will move the needle in terms of productivity and competitiveness for Canada's companies.

The result will be faster commercialization and export of products, platforms, and technologies that will simultaneously cultivate global leaders in digital technology and enhance the performance, competitiveness, and productivity of Canada's companies in multiple sectors of the economy. Our initial phase of projects includes several ambitious collaborations that will create data platforms that will reinforce Canada's leadership in precision health, natural resources and industrial sectors.

Our initial phase of projects includes several ambitious collaborations that will create data platforms that will reinforce Canada's leadership in precision health and natural resources.

Secure Health and Genomics Platform

This project builds the core infrastructure for a secure health and genomic platform that enables advanced cancer treatments through personalized onco-genomics. The over 25 partners in this project – including UBC, the Terry Fox Research Institute, GenXys, TELUS, and Shoppers Drug Mart – will collaborate on research that will ultimately lead to an estimated \$950 million in GDP impacts.

Earth Data Store

This project creates a digital twin of 85% of the world's land on a daily basis, providing a single source of geographic data for the resource sector along with the opportunity to mine an enormous amount of Earth data on a daily basis using various data analytics and visualization platforms. Bringing together 17 partners including Teck Resources, TimberWest, the First Nations Technology Council, TRIUMF Innovates, Urthecast, and D-Wave, this project will result in an estimated \$330 million in GDP impacts.

Digital Learning Factory

This project creates a 'teaching hospital for advanced manufacturing' where industry, innovators, and researchers will work together with a data advantage to take on the significant challenges in manufacturing. Partners – including Avcorp, Siemens, Microsoft, and Finger Food Studios – will collaborate to develop virtual environments that enable esign, rapid experimentation, and testing of cost-saving approaches at full operational scale without incurring full operational expenses. This project is estimated to result in \$220 million in GDP impacts.

Our ambitions also apply to projects focusing on talent development.

This project creates a training platform for Indigenous talent development and enterprise. We will work with Indigenous partners to devise development pathways that will be relevant and successful, develop criteria for participating companies around pathways for Indigenous students, and support Indigenous skills development like the First Nations Technology Council-led Bridging to Technology program. It will simultaneously build the jobs of the future, while preserving the cultural traditions of First Nations. It will offer entry level certification, advanced training, and work experience in six in-demand technology fields, providing in-community guidance and supporting the growth of First Nations enterprise. This project is estimated to result in \$30 million in GDP impacts, along with 1,000 work-integrated learning opportunities and 1,000 graduates from Indigenous communities.

Indigenous Talent Development

Our approach to collaboration has some inherent benefits for ensuring diversity and balance in participation. In combining the health sector - which is overwhelmingly represented by women - and the digital technology sector - in which men significantly outnumber women - we benefit from a balance of collaboration that will lead to a greater diversity in ideas. It also provides the opportunity for cross-over training, creating opportunities for women in health technology and leadership.

The Digital Technology Supercluster is different from other supercluster models that espouse a traditional industry-specific vertical focus. Instead, our supercluster will foster collaboration between industry adopters (across multiple verticals) and the digital technology ecosystem leading to compounding economic benefits for Canada.

The result will be new economy jobs, new products and platforms that position our companies to scale, and a growing number of startups and scale-ups that will attract talent and investment from around the world.

Current Portfolio of Projects Across Phase 1 Programs

Precision Health

Secure Health and Genomics Platforms

Build the core infrastructure for a secure health and genomic platform enabling cancer treatments through Personalized Onco-Geonomics

Tailored Health Therapies

Build a platform to implement cognitive analytics and machine learning technologies to create tailored health therapies for patients

Patient-Centric Care

Provide Canadians with their health data and insights to assist patients and caregivers in managing health and wellness

Data Commons

Earth Data Store

Earth Data Store creates a single source of geographical data for the resource sector and increases public understanding of large projects through the integration of various data analytics and visualization platforms

City-Scale Data Exchange

Develop technology with the ability to safely and anonymously share data at a scale that can provide new insights enabling organizations to monetize data-preserving privacy

Crowd-sourced Data Management

Creates a cloud based solution to establish a virtualized network for businesses to 'outsource' data transactional work to private data service providers who get paid through the platform

Digital Twinning

Digital Learning Factory

Provide a 'teaching hospital for advanced manufacturing' where industry innovators and researchers work together with a data advantage to take on the significant changes in manufacturing

Virtual Resource Management

Develop a virtual copy of any forest or mine, or potentially any natural resource, and update in near real time to enable sustainable resource management through virtual reality creating precise, data-driven decision making

Virtual Inspection and Maintenance

Develop an 'augmented reality' proof-of-concept that uses machine learning to allow engineers and operators to quickly and easily review and accurately record issues and repairs.

Ecosystem Development

Indigenous Talent Development

Create a training platform for Indigenous talent development and enterprise in six in-demand technology fields, providing in-community guidance and supporting the growth of Indigenous enterprise

Global Market Entry

Prepare Canada's SME's for success in global markets through training, targeted market connections and identification of global channel partners

Scaling Innovation Ecosystems

Enable growth of small companies with competitive world-class solutions by focusing activities on revenue growth, commercialization of research and adoption in local and regional markets

Digital Talent Magnet

Create a large, diverse and hyper-connected regional talent pool establishing a global advantage in human capital

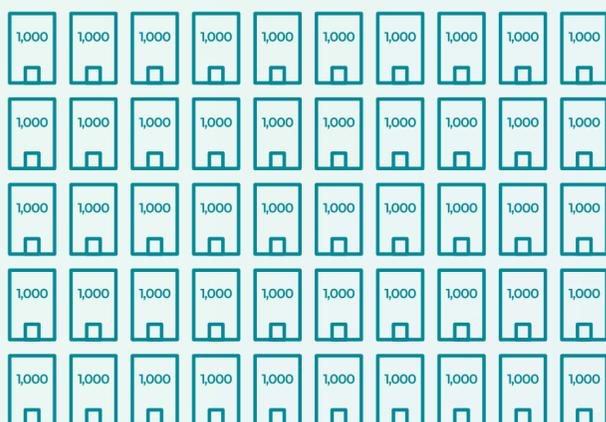
Economic Growth and Job Creation

Over the next ten years, participants may invest over \$1.4 billion into collaborative projects, involve more than 1,000 organizations, and fund more than 100 collaborations. This will yield outcomes of nearly \$10 billion in incremental GDP, create 50,000 new jobs, scale up more than 50 firms, and commercialize more than 50 products, applications, and platforms. The projected outcomes are illustrated in the following Supercluster Growth Map. It sets out the anticipated stages of the supercluster and the investment levels anticipated throughout the next decade.

In Ten Years

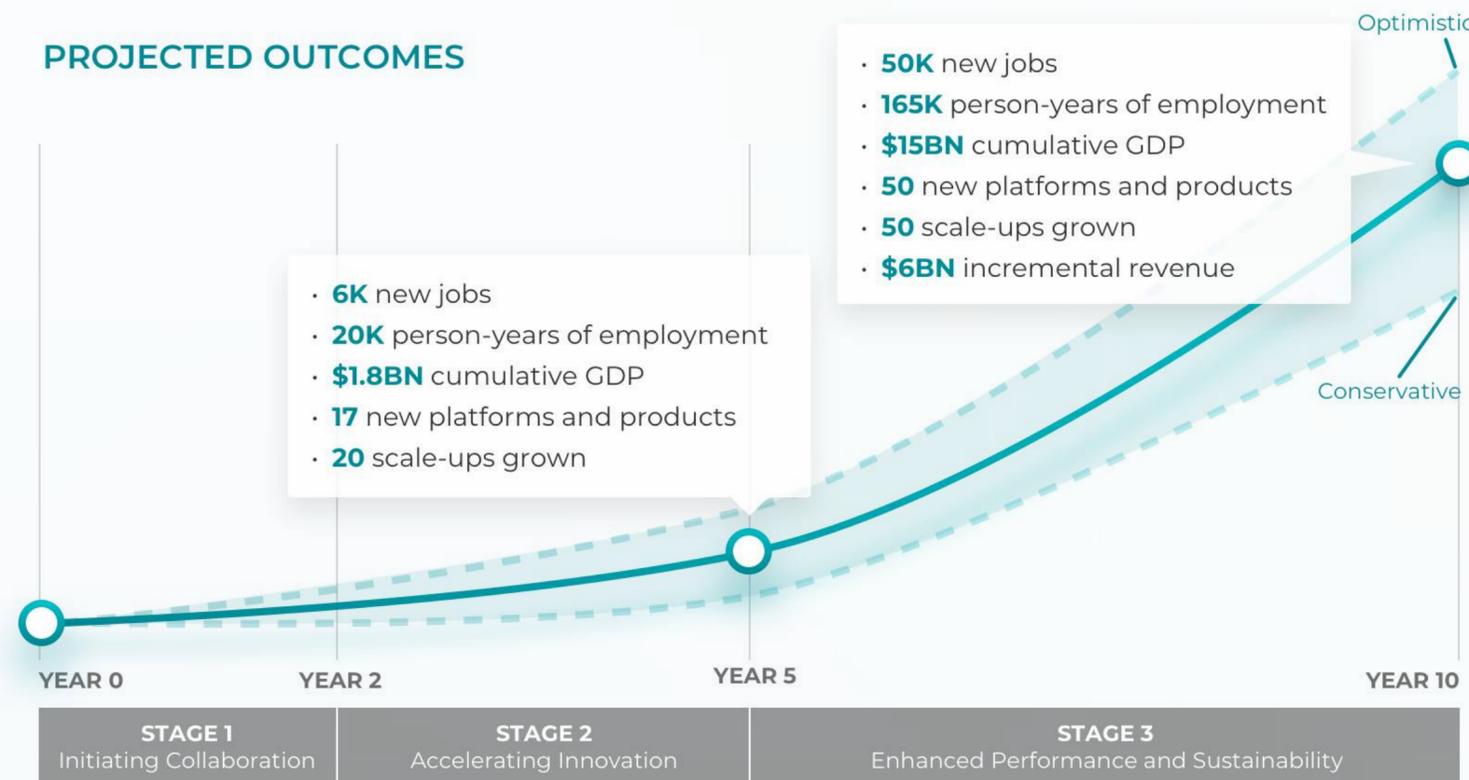


50,000 New Jobs



DIGITAL TECHNOLOGY SUPERCLUSTER GROWTH MAP

PROJECTED OUTCOMES



COLLABORATIONS & INVESTMENT



Entity Growth Map

Private-Sector Enterprises



Post-Secondary Institutions, Public-Sector and Not-for-Profit Organizations



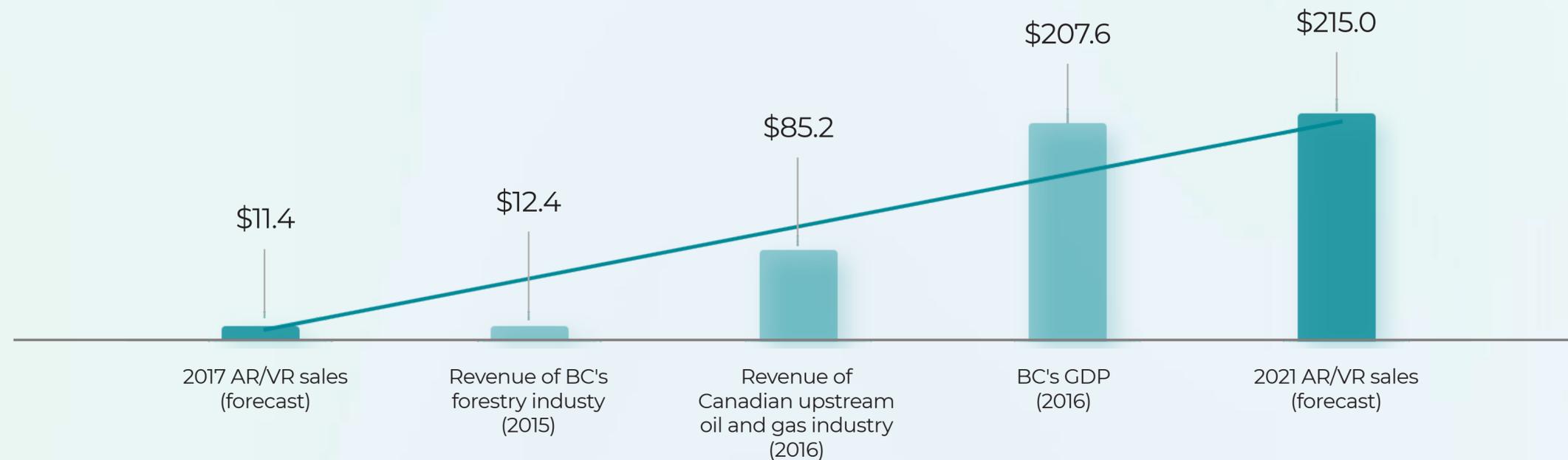
OPPORTUNITY OF A GENERATION

Market Trends – Timing is Everything

The digital technology space is unrivaled in terms of projected future growth. Many of its most promising components—such as VR/MR/AR, quantum computing, cloud computing and IoT—are expected to witness triple digit market growth in the years ahead.

For example, the global VR/MR/AR market—currently a small segment of the digital technology space—will generate just US\$11.4 billion in sales in 2017, and by 2021, global sales are forecast to hit as much as US\$215 billion, a twenty-fold increase.⁴

AR/VR is set to see 20x revenue growth between 2017 and 2021



All figures in billions of USD
Source: IDC, BCCPA, NEB, Deloitte Economics

Projected Revenue Growth in Global AR/VR Market Between 2017 and 2021

⁴IDC. Worldwide Semiannual Augmented and Virtual Reality Spending Guide. 2017.

Market Trends Continued

In just four years the VR/MR/AR segment of digital technology will go from being smaller than BC's forestry sector to twice as big as Canada's oil and gas industry, or bigger than the entire BC economy.^{5,6}

In quantum computing, the current global market size is estimated to be US\$2.7 billion.⁷ By 2025, the quantum computing market is expected to have grown more than sevenfold, to US\$20 billion. While slower than the anticipated growth in VR/MR/AR, simply keeping pace with this level of growth overall would see Canada's Digital Technology Supercluster add as much as \$34 billion to real GDP by 2025—a 13% increase relative to the size of the provincial economy today, not counting indirect or induced effects.⁸ Exceeding average quantum computing market growth would produce even higher returns.

Cloud computing is expected to see sales hit US\$128 billion this year. By 2021, the cloud computing market is anticipated to more than double in size, to US\$266 billion.⁹ While Canada has yet to make more than a small dent in this market—just 2% of 2018 sales are forecast to go to Canadian firms, compared with 44% to US ones¹⁰—simply maintaining this level of market

share would allow Canadian companies to benefit from a \$5 billion revenue lift in just four years' time. Raising Canada's market share from 2% to 4% would see nearly an additional \$10 billion flow to Canada's firms—roughly the same value as all of Canada's exports of potash, iron and steel combined.¹¹ Perhaps no area in digital technology is expected to generate as much of an impact on the economy of the future as IoT. With a global market size that is estimated to be as big as US\$19 trillion in 2022 – of which Canada would account for roughly 2.6% (US\$500 billion)—the value of Canada gaining a strong toehold in the market early on appears enormous.¹²

Finally, the market opportunity in Precision Health, a key sector targeted by the proposed supercluster digital platforms and projects, is immense. The global market for Precision Health is expected to reach \$87.3B by 2023, while total health care spending is projected to reach \$8.7 trillion by 2020.^{13,14} The market for AI technologies in health care is expected to reach \$6.6B by 2021 – a 40% growth rate.¹⁵ As a result of the collaboration that includes companies like TELUS, Shoppers Drug Mart and LifeLabs, the supercluster will have market access to tens of millions of consumers.

⁵Based on forestry data from the CPABC [Updated: Overview of the BC Forestry Industry]. Assumes crude prices of US\$60 and natural gas prices of US\$2/GJ at 2016 production levels.

⁶BC's GDP in 2016 was roughly C\$264 billion, or US\$207 billion based on a CAD/USD of exchange rate of 1.27.

⁷Vancouver-based D-Wave Systems is the world's first-ever company to sell quantum computers commercially.

⁸I.e. based on the Digital Technology Supercluster's current real GDP of \$4.6 billion rising by a factor of 7.4.

⁹IDC. Worldwide Semiannual Augmented and Virtual Reality Spending Guide. 2017.

¹⁰Microsoft. Microsoft Cloud Landscape Update. 2015.

¹¹Based on Industry Canada trade data for 2016 (<https://www.ic.gc.ca/app/scr/tdst/tdo/crtr.html>)

¹²Canadian Business. The Internet of Things could be worth \$500 billion in Canada alone. 2014.

¹³Global Market Insights, 2016

¹⁴2015 Global health care outlook: Common goals, competing priorities. Deloitte, 2015

¹⁵Canada's Health and Biosciences Sector Diagnostique, Government of Canada, October 2017



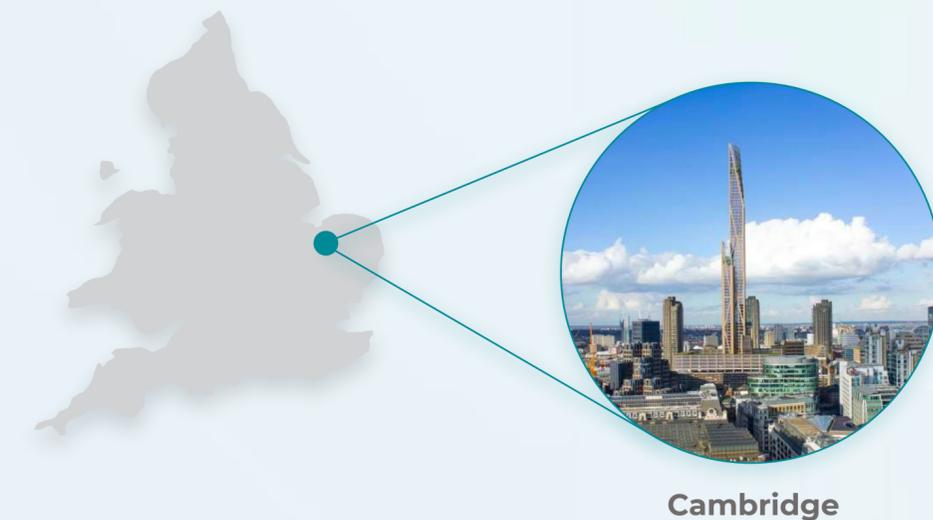
Global Models of Success

We recognize that the path to faster growth in Vancouver, British Columbia, and Canada lies in fuelling the connectivity among our ecosystem players and improving connections to customers.

Vancouver boasts impressive assets and expertise among its universities, large technology companies, small and medium-sized companies, and other innovation ecosystem members, however, these activities tend to be siloed. The connectedness is further hampered by the lack of technology adoption by domestic customers, further exacerbating the siloing effect. Domestic adoption matters. Proximity to large active customers and the resulting familiarity with their challenges and needs provides an information advantage to local technology companies that translates into faster innovation cycle times and rapid innovation.

The opportunity for Vancouver lies in emulating best-in-class clusters that have exemplified connectivity and leverage within their ecosystems. Two such examples of regional clusters include: Tel Aviv, Israel for its connectedness, and Cambridge, UK for its success at leveraging London's ecosystem assets.

Tel Aviv's technology ecosystem is the innovation engine for Israel, which boasts the most startups per capita and the highest R&D expenditure as a percentage of GDP in the world. It also has one of the most interconnected ecosystems in the world.





Success Factors in Israel:

Strong Collaboration Networks

Government, academia, and industry are aligned behind a mission to innovate. For example, the government's Office of the Chief Scientist funds 85% of incubator budgets, decreasing financial risk and investing when venture capital (VC) funding is not available.

Research is Driven by Industry

Universities commonly collaborate with industry. Technion and Tel Aviv University connect labs to the marketplace through offices that incorporate commercialization into their research strategies, engage in industry partnerships, and take stakes in spin-off companies, resulting in scores of startups and patents each year.^{16,17} Furthermore, Israel has leveraged its defense spending to make itself a global leader in cybersecurity expertise and related commercialized technology.

Ample Senior Talent

Nearly 300 multinational R&D centres in Israel grow generations of globally-networked senior talent that drive innovation strategies and can be recruited by proximate startups that are ready to scale.

¹⁶Technion (Israel Institute of Technology). T3 website. 2017.

¹⁷Ramot (Technology Transfer arm of Tel Aviv University). From the lab to the factory. 2017.

Global Models of Success Continued

Borrowing from this model, our strategy focuses on increasing connectedness throughout the ecosystem as a whole. Just as Israel strategically leveraged its defense spending to take a lead in cybersecurity, our strategy leverages Canada's health spending to become a global leader in precision medicine.

The second model for Vancouver is Cambridge. The city-region, with a population of less than 124,000 people, is home to a cluster of 4700 high technology businesses that employ over 60,000 people and generate over \$20 billion annually.

Cambridge Technology Ecosystem Success Factors

Leveraging of a large proximate ecosystem:

Cambridge has frictionless access to growth capital funds in London. While several VC funds operate in Cambridge to catalyze commercialization from the university, alternative growth funds are easily accessible, and researchers have multiple pathways to commercialization.

Multinational enterprise ("MNE") attraction:

Regional economic development activities are focused on research and innovation with the aim of attracting R&D-focused offices to the region.

Research and people:

Cambridge's foundation is based on talented people doing excellent research. Through their work, people at all levels of the university system are pushing the boundaries of knowledge.

Global Models of Success Continued

Cambridge's proximity to London offers the ability to leverage resources - investment, talent, and commercialization pathways - to amplify local capabilities, thereby accelerating the growth of their technology companies. The Cascadia Innovation Corridor offers a similar opportunity to Vancouver. Our proximity allows us to leverage Seattle's considerable resources and technology density to accelerate our growth.

Vancouver is poised to lead Canada - and the world - provided we invest now to take advantage of the opportunity. In the century of digital enterprises and data-driven economies, we have the opportunity to be among the global leaders if we can capitalize on the collaboration and connectedness of a supercluster that unlocks the potential of data in the era of the intelligent enterprise.

In order to do so, our journey needs to be expedited so that our innovators can create the products and platforms that position our companies to scale and foster the critical mass of growing startups that will attract talent and investment from around the world. Our strategy is designed to achieve just this, and the result of its execution will not only be an innovation hotbed in Vancouver, but economic benefits shared across the nation, a lift in productivity and competitiveness to Canada's industry adopters, and more jobs of the future for talented Canadians.



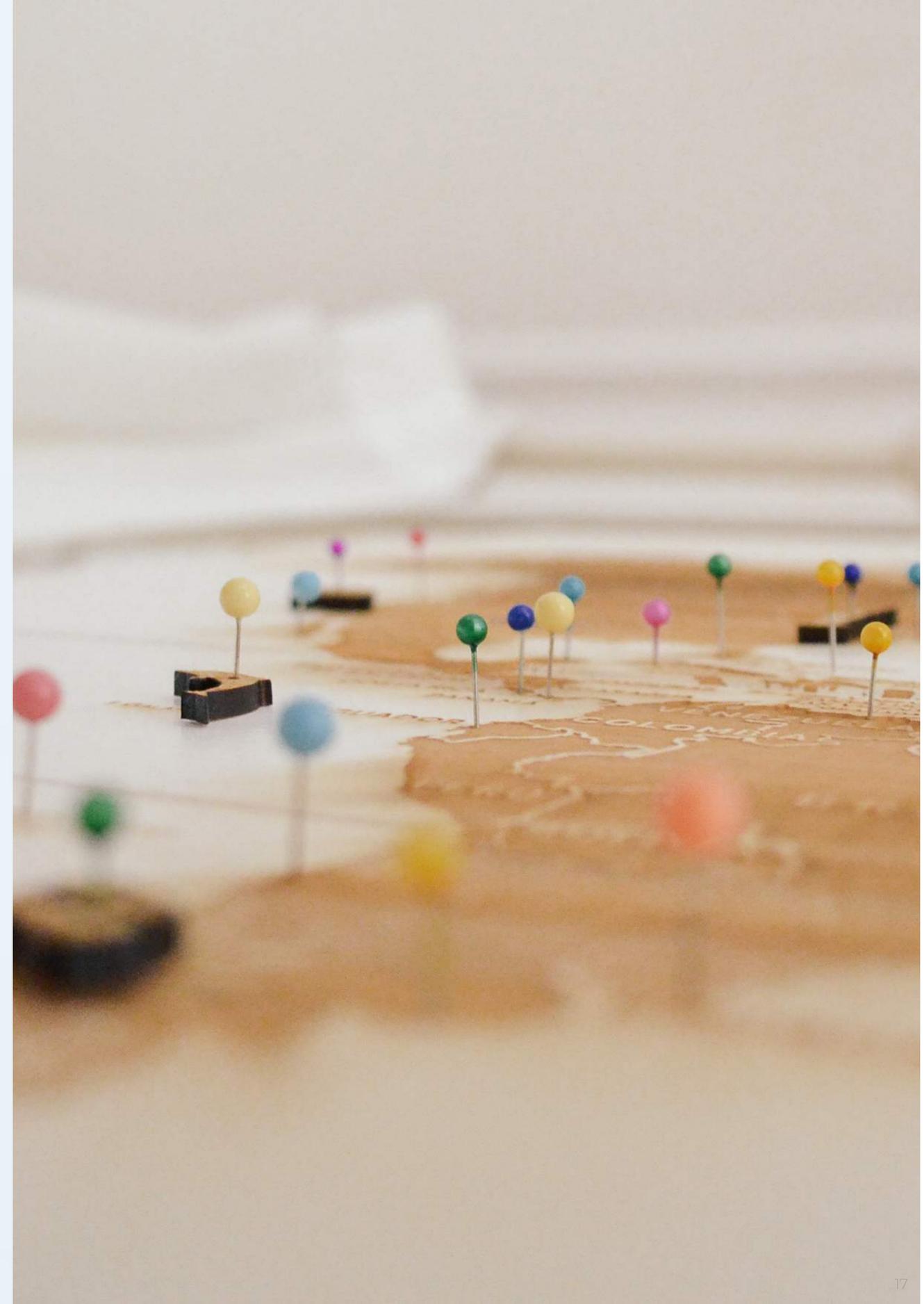
CANADA'S DIGITAL TECHNOLOGY SUPERCLUSTER

What is a Supercluster?

A technology supercluster is a geographical region, most commonly recognized as a city-region, that is home to an especially strong industrial cluster or clusters linked through their shared reliance on specialized inputs, including technologies, talent and infrastructure.

As compared to smaller or single-sector clusters, these innovation hotbeds benefit from stronger connections between firms and research talent, a long-term competitive advantage, global brand recognition, and an outsized impact on job creation and economic growth (GDP).

There have been several examples of globally successful superclusters. Among them are: Silicon Valley - High Tech & Internet; Tel Aviv - Security and Mobile; Boston - Life Sciences; and the Golden Triangle in the United Kingdom - Medical and Engineering.



Our Vision

Canada is poised to lead the world in the century of digital enterprises and data-driven economies.

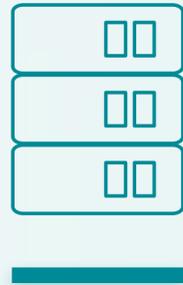
Our vision is to position Canada as a global leader in digital technology through a supercluster that unlocks the potential of data in the era of the intelligent enterprise.

Our Mission

To create a critical mass of world-leading digital technology companies in the Vancouver region that develop innovative products, platforms, and processes.

To transform Canada's industries through the digitization of business, prioritizing industry-specific needs, and delivering productivity gains and competitive advantages at the firm and industry levels.

To grow the economic benefits for the region and for Canada by generating new companies, scaling existing firms, enabling performance improvements in Canada's sectors of strength, and positioning Vancouver as a global hub for digital technology innovation.



The Data-Intelligent Enterprise

If the prize resource of the 20th century was oil, then the prize resource of the 21st century is data. Its mastery promises to be just as transformative.

Companies have a name for the successful command of this resource: digitization of the enterprise. Also referenced as digital transformation, it is a phrase ubiquitous in shareholder speeches, executive suites, and venture pitches the world over. However, with growing amounts of data coming from ever-more sources at an increasing velocity, mastery is a tall order.

Like any resource, there are value-adding steps between data's creation and its use by an end user. These steps are: collection, analysis, and visualization.

We are focusing our research and commercialization capabilities in the Data Stack on a pressing industrial challenge that exists across all industries: turning increasingly vast data into valuable insight.

We'll leverage emerging trends in advanced technology to turn increasingly vast data into valuable insight.

Data Visualization Supercluster Platforms:

AR-MR-VR | Mapping | Simulation and Modelling

Data Analysis Supercluster Platforms:

Cloud | Supercomputing | Quantum Computing | Machine Learning

Data Collection Supercluster Platforms:

IoT | Connectivity | Data Repositories

The Data Stack

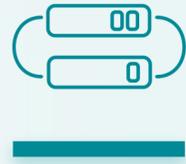
Data's increasing complexity, real-time analysis, and role in decision-making across the enterprise is driving demand for digital technology. The market for data visualization – making the insights derived from analysis suitable for human cognition – increased 50% annually between 2010 and 2015.¹⁸ Digital transformation is being identified as critical to all companies in all sectors. For mining companies in particular, poor digital capability was identified as the number one risk in 2018.¹⁹

Inspired by an ambitious strategy, we're targeting leading companies in the health, natural resources, and industrial sectors to support their digital transformations. We have engaged digital technology companies from across the spectrum of startups, small and medium enterprises (SMEs), large companies, multinationals (MNEs), large industry adopters, post-secondary institutions, and research institutions to address digital challenges by collaborating to create products and platforms that can lead the world.

¹⁸McKinsey Global Institute. The Age of Analytics: Competing in a Data-Driven World. 2016.

¹⁹EY. Top 10 Business Risks Facing Mining and Metals 2017-2018.

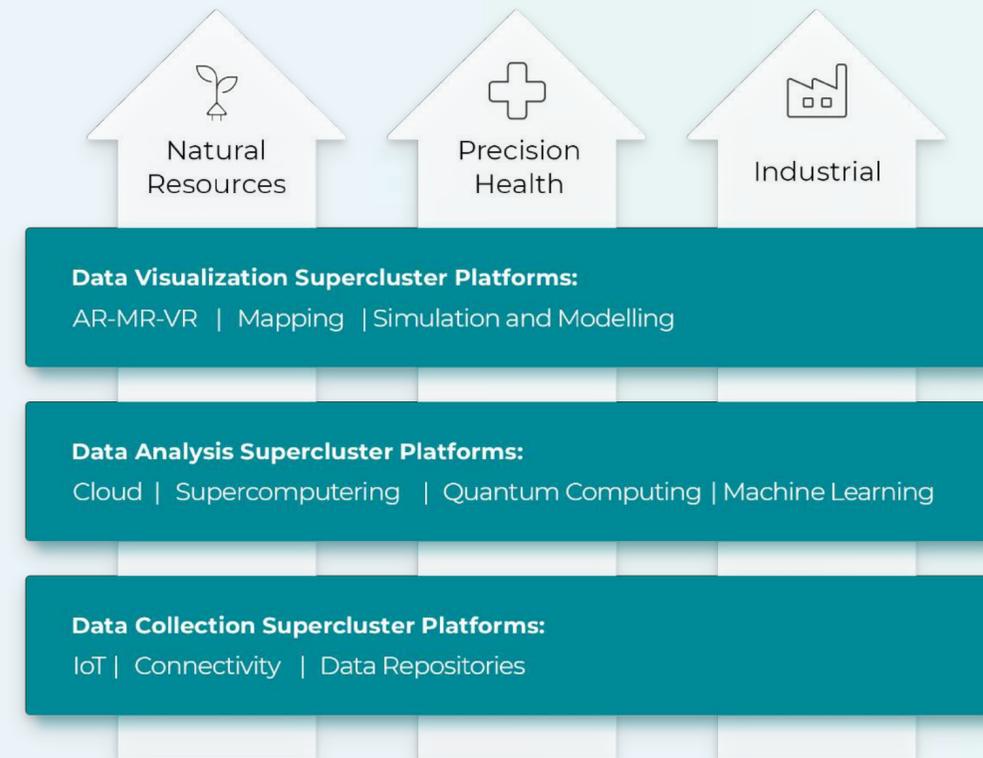




Industry-matched Collaboration

Our approach consists of matching industry needs to the capabilities in our advanced digital technology sector. In doing so, we have designed collaboration and customer adoption into our supercluster strategy from the outset, ensuring that the resulting technology development will move the needle in terms of productivity and competitiveness for Canada's companies.

Figure 3 illustrates the intersection of industry needs with the Data Stack. We selected health, natural resources, and industrial sectors as the starting point, recognizing the strength of these industry sectors in British Columbia. Over time, we will extend the digital technology capabilities to an increasing number of industry sectors, applying key platform technologies, products, and processes to well-defined industrial challenges in each. The scalability to multiple industries - raising productivity and competitiveness across Canada's most important sectors - makes our strategy unique.



The Intersection of Industry with the Data Stack

We have designed collaboration and customer adoption into our supercluster strategy.

CROSS-SECTORAL LEADERS AND POTENTIAL PARTNERS

Digital Transformation for Natural Resources

Digital Transformation for Health and Biotech

Digital Transformation for Industrial

Data Visualization

Data Analytics

Data Collections



Why BC?

Today, BC is home to a vibrant, diverse, and successful technology-enabled economy that has been building momentum since the 1960s. BC has:

01

The fastest-growing technology sector in Canada.

BC leads Canada in technology-sector GDP growth and job creation and boasts Canada's #1 startup ecosystem, 3 of 5 Canadian billion-dollar startups, and 2 of Canada's top 3 universities in software development.

02

A long history of pioneering technological innovation.

Companies in BC introduced the world's first cellular radio, developed the technology that powered the first broadband internet networks, and commercialized the world's first quantum computer.

03

Global companies increasingly attracted to BC.

A strong roster of the world's leading tech companies—including Microsoft, Amazon, Boeing, Cisco, Disney, Electronic Arts, GE, Sony, and SAP—as well as homegrown successes like Avigilon, Bardel, BuildDirect, Hootsuite, Slack, and Vision Critical all call BC home.



Strong Foundations

Our strategy is fortified by exceptional capabilities and unique attributes within our ecosystem, including:

Leadership in Virtual, Mixed, and Augmented Reality

World-leading expertise and resources in data visualization exist here - particularly in virtual, mixed, and augmented reality (VR/MR/AR), and including experience drawn from a dense cluster of 3D animation, special effects, and creative companies. Fortune Magazine noted that “there’s not yet a global capital for VR and AR,” and Vancouver could “go for the global crown in this category”²⁰

Leadership in Quantum Computing

First-rate expertise in quantum computing technology exists in organizations such as UBC’s Quantum Matter Institute, D-Wave Systems, and IQBit.

Proximity to the World’s Cloud Computing Epicenter in Cascadia

The region’s centrality in the Cascadia corridor offers significant leverage for our technology sector, particularly in the critical areas of cross-border talent access, capital access, and distribution/market access to the largest technology market in the world, the US.

Vancouver is home to Canada’s number one startup ecosystem. Within the region – comprised of Vancouver, its bordering cities, Victoria, and Kelowna – is a vibrant, diverse, and successful technology-enabled economy that has been building momentum since the 1960s. Comprised of five subsectors - information and communications technology, life sciences, cleantech, interactive and digital media, and engineering services – the technology sector is the origin of three of five Canadian billion-dollar startups.

²⁰Fortune: Why Vancouver Is Becoming North America’s Next Big Tech Scene, July 2017

Strong Foundations Continued

What makes Vancouver unique is the strong history of innovation that has resulted in foundational strengths that will propel the city to become a global leader in digital technology. These strengths include:

World-class Creative and Digital Media Talent.

Visual effects for the world's top-grossing films (such as Star Wars) and the world's #1-selling video games (including FIFA soccer) are produced in the region. Vancouver is nicknamed Hollywood North due to its dense cluster of visual effects and animation studios.

World-leading Data Analysis Capabilities and Infrastructure

Fortified by top researchers in data science and Big Data analytics, major companies like Finning, Fortinet, Schneider Electric, Boeing, and SAP have set up global centres of excellence in the province. Research institutes such as Genome BC, TRIUMF, Ocean Networks Canada, the Quantum Matter Institute, and the Herzberg Institute's Canadian Astronomy Data Centre are integral to this world-class data infrastructure.

A Global Centre of Excellence in Connectivity and the Internet of Things (IoT)

Vancouver is home to TELUS, Canada's fastest-growing national telecommunications company and developer of Vancouver's successful 5G Living Lab. The company provides all manner of advanced communications products and services to millions of Canadians. Also founded and headquartered in Vancouver, Sierra Wireless is the global leader in connectivity hardware and devices for IoT. Also headquartered in Vancouver is Wavefront, Canada's national centre of excellence for IoT, which is leading the efforts in the commercialization and adoption of IoT innovations.

Post-secondary Institutions That Produce World-class Talent and Generate World-class Research

BC universities attract over \$800 million a year in research funding and account for more than 25% of all US patents derived from post-secondary research in Canada. Engineering and computer science program spaces in BC universities increased by 57% between 2006 and 2015, with the University of Victoria boasting the largest graduate co-op placement program in the country. The region that is also home to two of Canada's top three universities in software development.

Strong Foundations Continued

An Export Advantage as Canada's Gateway to Asia

BC leads Canada in trade with Asia, and benefits from strong economic and cultural connections that allow the province to cultivate unparalleled market access to the world's fastest-growing economies. 57% of Vancouver's startup customers are foreign, the second highest proportion of any startup ecosystem in the world. Programs such as the China Canada Commercialization and Acceleration Network and Zone Startups India increase access.

A Stellar International Brand

Vancouver ranks 1st in Canada for quality of life (5th best globally) and is the number one startup ecosystem in Canada rising three positions globally in the past year to #15 globally.^{21,22}

A Pool of Highly-skilled Talent

Approximately 2900 university students graduate from engineering, technology, and computer science annually. 85% of these graduates remain in the province. The top four occupations in BC's technology sector: information systems analysts; computer programmers and interactive media developers; advertising, marketing and public relations specialists; and graphic designers.

An Emerging Venture Capital Market

Over \$860 million was invested in BC's technology sector in 2016, and over \$100 million in angel investment was invested in 2015.²³ The province announced the \$100 million BC Tech Fund to fill the gap between early and later stage funding.

²¹Mercer. 2017 Quality of Living Rankings.

²²Startup Genome. 2017 Global Startup Ecosystem Report.

²³BC Tech Association, BCTECHBASE Insights. BC's Capital Ecosystem 2016.

A NEW SUPERCLUSTER ENTITY

Guiding Principles – Who are we?

The following principles align different members of the Supercluster towards the attitudes needed to form a shared, high performance environment.



01

It starts with a world-class mindset.

The supercluster is aimed at helping the region be a leader in the global innovation system, attracting talent, investment and leadership. Members think bigger than their own individual projects and interests.

02

Market-oriented, industry led and membership-driven.

The supercluster is a membership based organization focused on opportunities of interest in industrial sectors. Members are eager to capture market share in countries around the world.

03

A collaborative operation.

The supercluster is a place where industry, government and academia can work together in collaborative development projects in transformative programs. Members recognize the value of partnerships and alliances and are willing to invest in building the necessary relationships.

04

An inclusive, respectful community.

The supercluster is a safe, creative place of innovation for a diverse range of people and organizations. People are treated with respect. Members reinforce these principles and support initiatives that provide under-represented groups with opportunities to expand their participation in digital enterprise.



Thematic Goals

Over the course of the strategy, the Entity will pursue activities in four themes: Technology Leadership, Partnerships for Scale, Diverse and Skilled Talent Pools, and Global Advantage.

01

Technology Leadership

We intend to undertake collaborative research and development projects that will create integrated platforms, aggregate data from disparate sources, combine multiple applications across multiple levels, and connect machines, devices, and sensors to deliver superior service experiences and performance for users and customers. This will drive collaboration across participants and connect solutions to customers that directly enhance their productivity, performance, and competitiveness.

02

Partnerships for Scale

We intend to create opportunities for small and medium-sized enterprises and startups to accelerate their growth. By providing access to industry adopters, collaborations with other companies, connections to investors and access to support programs to scale their operations, SMEs, and startups will benefit from improved connectivity to the resources that they need to grow.

03

Diverse and Skilled Talent Pools

We intend to broaden the base of talent by upskilling Canadians in traditional industry sectors, and growing a deep and diverse digital technology talent pool that includes women and underrepresented groups. We will focus on preparing the people in the workforce for the digital jobs of the future. Also, increased activity and better opportunities will help slow the flow of talent to other regions.

04

Global Advantage

We intend to position the ecosystem at the forefront of the global economy, taking a global leadership position in digital technology. This will raise the profile of Canada's innovation strategy, and reinforce our brand as a destination for global talent and the home of globally competitive companies.



Entity's Strategic Objectives

Our strategy will supercharge Vancouver's vibrant digital technology ecosystem, transforming it into a global hub of digital technology and data-related research, development, and commercialization with all the hallmarks of a world-class innovation centre: hyperconnectedness, extraordinary collaboration and inclusion, and a virtuous cycle of innovation, investment activity, and talent attraction that results in accelerated venture creation, scale-ups, and high-paying job creation.

With over \$700 million in anticipated investments over five years, our non-profit Entity will undertake activities that meet its key objectives and fulfill the objectives of the ISI program.

01 Building Powerful Partnerships and Alliances

02 Scaling up Small and Medium-sized Enterprises and Increasing Ecosystem Performance

03 Developing Globally-competitive Companies

04 Increase the Breadth and Diversity of Talent

Entity's Strategic Objectives Continued

01 Building Powerful Partnerships and Alliances

The Entity will purposefully build collaborative relationships that enable members to pursue global business opportunities, productivity improvements, and innovation capacity-building through powerful partnerships and alliances. To achieve this, the Entity will:

Bring academia and business together to plan and commercialize research that addresses real industry needs

Create collaboration opportunities for SMEs and MNEs

Introduce large companies in sectors of strength to technology SMEs and MNEs to provide digitization solutions to the former and procurement opportunities to the latter; and

Create the conditions for the serendipity that occurs in a diverse, capable, and highly connected community.

02 Scaling up Small and Medium-sized Enterprises and Increasing Ecosystem Performance

The Entity will pursue activities that lead to the scaling up of digital technology companies, resulting in increased ecosystem performance, defined as “startup output, exits, valuations, early-stage success, growth-stage success, and overall ecosystem value.”²⁴ To achieve this, the Entity will:

Favour technology leadership activities that include collaborative R&D projects, and projects with benefits to multiple firms including SMEs

Link SMEs with large strategic partners and customers through its projects, and

Pursue supply chain integration efforts with local anchor firms.

²⁴Startup Genome. Global Startup Ecosystem Report 2017.

Entity's Strategic Objectives Continued

03 Developing Globally-competitive Companies

The Entity will pursue activities that contribute simultaneously to the development of global leaders in digital technology and the enhanced performance, competitiveness, and productivity of Canada's companies in multiple sectors of the economy. To achieve this, the Entity will:

Favour the development and commercialization of data-related processes, products, and technologies that target identified industry challenges that exist globally, enabling Vancouver companies to capture sales from markets around the world;

Promote the development of cutting edge data visualization products and processes - with a special focus on virtual reality - that advance the technology as a whole and;

Promote the adoption of digital technology innovation by companies in Canada's sectors of strength, and improve the competitiveness of Canada's trading sectors, such as mining, forestry, and manufacturing.

04 Increase the Breadth and Diversity of Talent

The Entity will invest heavily to increase the diversity of our talent pool to elevate supercluster company performance while enabling more Canadians to participate in the innovation sector. The Entity will:

Include diversity as a high-priority element in determining Entity leadership,

Promote initiatives to upskill Canadians in traditional industry sectors, creating pathways to new jobs,

Co-create opportunities with individuals who are part of underrepresented groups, with particular focus on women and First Nations individuals,

Work with ecosystem companies to increase and encourage understanding of the positive relationship that exists between increased diversity and company performance, and

Improve awareness among all supercluster organizations of the current best practices regarding inclusion and diversity.



Market-Driven Projects

Our emphasis will be on collaborative projects that are guided by defined industry needs and challenges, and will draw upon capabilities from participants in the supercluster that address different levels of the Data Stack to co-develop the required solutions. We believe the solutions developed for one industry sector will ultimately be transferable to other industries, providing economies of scale and scope.

- Clearly-defined target customer versus a generic market category.
- Clear path to sales identified versus only an aggregated market potential.
- Estimated time-to-market so that a launch pipeline can be established with platform launch goals for each year.

Global Focus

- Strategic alliances with other research-technology organizations in North America, Asia, Europe, Africa and South America. These alliances will act as ecosystem bridges that facilitate relationship building between members of the ecosystem and members of global innovation hubs around the world.
- Second, the Entity will allocate funds to a special project type for in-market platforms called Global Scale that supports the development of customers outside Canada and the US. This will be developed in partnership with Federal and Provincial trade ministries, and will leverage Canada's trade relationships to drive export sales.
- Third, the Entity will use its global expertise in data-driven innovation to attract at least four global technology MNEs to shift or establish the nexus of a strategic business unit/global development centre to Vancouver. By bringing organizations with established global networks into the local ecosystem, it will be easier to provide SMEs with opportunities to explore global markets. At this point, many of the collaborative structures put in place come into play.



Creating Business Opportunities

The Digital Technology Supercluster will connect a range of digital technology market participants, from startups and innovative SMEs to postsecondary institutions to large multinational corporations. In short, it will play a vital link between technology developers and adopters in the BC, Canada's and global economy.

The supercluster is designed to serve four functions for its members and associates:

01 Promote the accelerated growth of the Digital Technology Sector by supporting ambitious projects that create the potential for knowledge spillovers and spinoffs;

02 Facilitate risk sharing on ambitious projects by developing collaborations with a consortium of businesses and organizations to share in expertise, investment and risk;

03 Increase access to innovation, research and technology by fostering partnerships between Canada's postsecondary research institutions and the private sector to expedite the commercialization of innovative projects and enhance the availability of a skilled, job-ready workforce; and

04 Develop links with large multinational corporations to improve global value chain integration opportunities for Canada's digital technology firms.

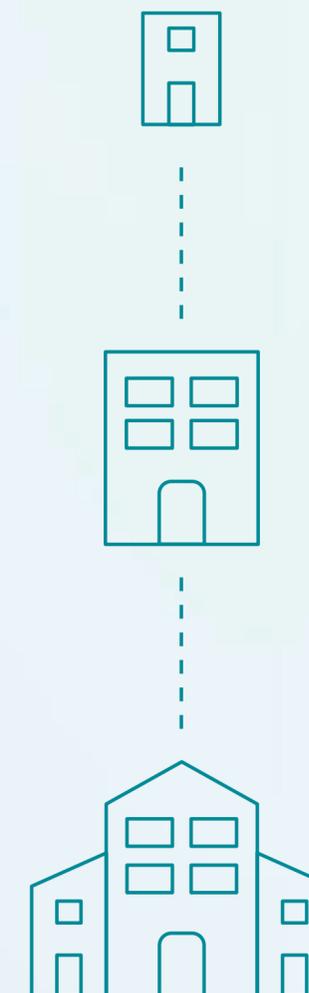


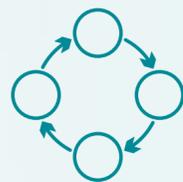
Growing Canadian SMEs

In the sections that follow, attributes and business opportunities presented by the digital technology sector are explored in relation to both the supercluster and the individual supercluster participants.

The Digital Technology Supercluster will connect a range of digital technology market participants, from startups and innovative SMEs to postsecondary institutions to large multinational corporations. In short, it will play a vital link between technology developers and adopters in the BC, Canada's and global economy.

All of the projects proposed by the supercluster have been specifically designed to allow and promote the participation of both SMEs and larger firms. This type of collaboration will bring significant benefits to both, ultimately translating into faster supercluster growth and a more balanced distribution of firms. Larger firms will benefit from the agility and fresh thinking of smaller SMEs, while SMEs will benefit from the assets, process maturity and global experience of their large digital technology counterparts.





A Stronger Ecosystem

When we convene partnerships to tackle larger-scale challenges, great things happen at scale. By enabling collaboration among a broader base of participants, we can capitalize on the assets and capabilities of technology leaders across the Data Stack.

Our approach to incenting cooperation and collaboration is based on a combination of open membership, flexible program design, and relationship building structures.

Membership in the consortium is open to any organization interested in data-driven innovation. That means large companies, small companies, researchers, government ministries and post-secondary institutions can join. By not focusing on a single industry or sector, we create a unique, collaborative space in which organizations that may not normally come into contact with each other can discover common goals and shared strategic interests.

To ensure accessibility, there is no cost to joining as an associate. Often a consideration for smaller organizations, non-profits, and SMEs, this provides a risk-free entry point into the organization.

Also, beyond a commitment to a certain level of collaborative development activity, organizations that enter the consortium have a minimal set of obligations. This creates an open space where members have the time and freedom to explore opportunities before deciding what commitments make sense for their organizations.

To engage members across disciplines and sectors, the Entity uses a flexible program management system that operates in two six-month phases every year. This approach enables the Entity to respond to opportunities as they emerge. New programs enable the Entity to drive conversations around ambitious goals.

Ambitious Goals

The Goal is a Compelling, Global Opportunity

The Goal is Big Enough to Require Collaboration Across Multiple Projects Featuring a Cross-section of Supercluster Members

The Goal is Future Focused, a Clear Stretch Over the State of the Art

A Stronger Ecosystem Continued

Our initial programs have been framed to focus on opportunities that leverage our regional strengths, are unique to our region, and provide strategic alignment with other shortlisted superclusters. Once the initial programs have launched, we will begin discovery work to frame a second set of programs.

The other advantage with our program based approach is that it helps organization across the country understand how their strategic interests connect with the supercluster, leading to engagements with new members. For example, Shoppers Drug Mart, the Ontario Brain Institute and University Health Network are some of the many new members that have joined from outside BC.

Our project selection criteria reward partnership and collaboration. We fund collaborative, team-based projects, not companies or technologies.

We also make it easier to create large scale collaborative projects through the use of Master Project Agreements (MPAs). Rather than defining projects around a narrow scope of work that leaves little room for other partners, we use the agreement to define relationships. Then, through one or more statements of work, a broader range of different organizations can be added to the MPA in one or more stages of work.

We have also entered into collaborations with other superclusters across Canada. With the Ocean supercluster, we are collaborating on a project to provide real time data analysis and integration of ocean ecosystem data. We also entered into a collaboration agreement with Next Generation Manufacturing Canada in Ontario to collaborate on programs that strengthen the outcomes of the ISI program.





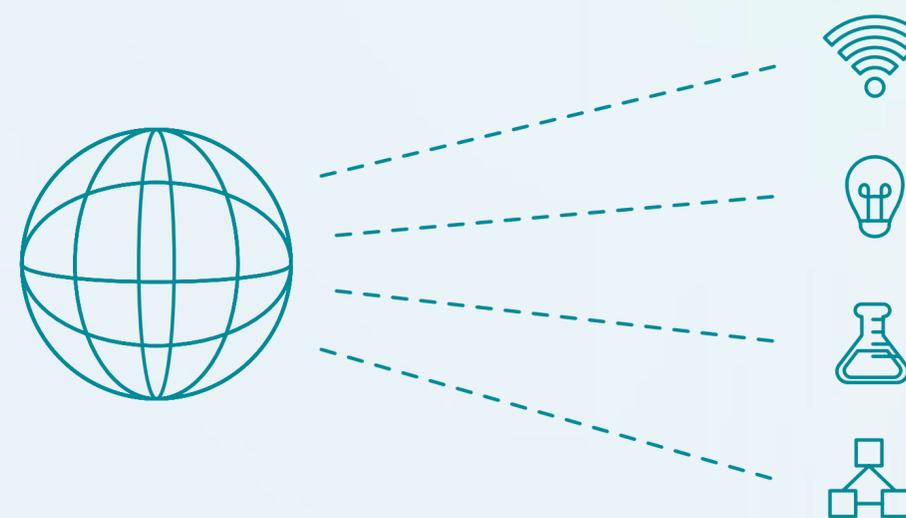
Participation Opportunities in Value Chains

Broadly, there are two types of value chain integration opportunities that are visible in the Digital Technology Supercluster. The first, involving firms within the supercluster, concerns the natural partnerships that have already begun to form as a result of the initiative, and that are expected to accelerate going forward. The second, which extends far outside the supercluster, arises as a result of the “horizontal” (i.e. cross-cutting, from a sectoral perspective) nature of several of the data projects, notably those consisting of data platforms.

As an example, a future project called the City Scale Data Exchange will provide a direct value chain integration opportunity to the SMEs and large companies involved with the project. By helping businesses access, use and share data, the platform will provide a point of entry for partnerships within the supercluster, from the biggest partner firms to the smallest ones. Furthermore, the participation of Wavefront, a business accelerator in the mobile and IoT space, will help to provide value chain integration opportunities to young, innovative firms as well as startups.

As an example of the latter, the Earth Data Store involves a partnership with UrtheCast that will enable a Vancouver-based analytics pipeline to access next-generation multispectral satellite imagery to provide insights to a wide range of industries. The prospective clients of this project are, at least initially, likely to be large, multinational corporations in agriculture and natural resources, not only in North America but also in other parts the world.

The global focus of this project, as well as the connection to a broad range of multinational corporations, will enable digital companies to connect with global value chains (especially in the natural resources and agricultural space).





A Thriving Business Environment

The Strategy will create a thriving business environment for Canada's firms by promoting collaboration and enabling the enhanced success of the country's digital technology talent.

Already, BC has the fastest growing technology sector and workforce in Canada. Using the broader high technology definition used by BC Stats, the sector has grown over 90% in the past 15 years, and its 9,500 companies support over 240,000 jobs across the region.²⁵ As a result of the sector's impressive growth and strength, Vancouver is now ranked as the top technology cluster in Canada and one of the top 15 technology clusters in the world. The execution of the Strategy in Canada's fastest-growing technology sector will propel Canada as a global leader in digital technology.

In addition to thriving local firms, global companies are increasingly attracted to BC. Today, six of the top 10 global technology companies by market cap (i.e. Microsoft, Amazon, Facebook, IBM, Oracle Microsystems, and SAP) have a physical presence in BC. BC is also home to large multinational companies

such as GE, Cisco, McKesson, Intel, and Samsung. Vancouver is home to digital entertainment giants Sony Pictures Imageworks, Industrial Light and Magic, Bandai Namco, Nintendo, and Double Negative.

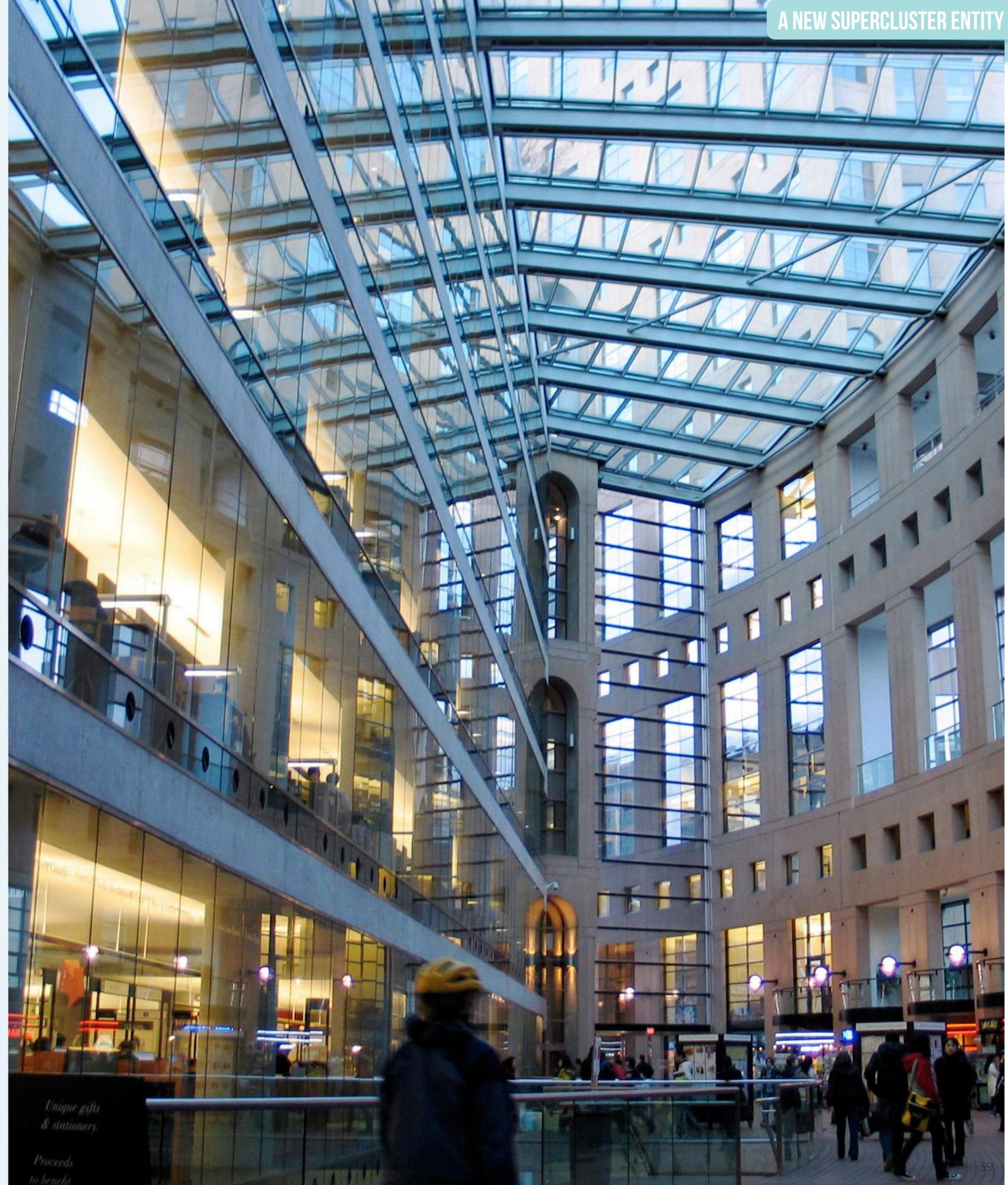
The Lower Mainland has shown that it is capable of generating world-class technology companies. Three of Canada's five "unicorns" (technology startups valued at over \$1 billion) come from Vancouver and the national and international talent the city attracts has shown that it is capable of competing with the world's best. The Strategy presents a chance to help the industry make further inroads into other industries and build on its considerable success to

Given the pace of development in digital technology globally, the importance of further increasing the preeminence the supercluster enjoys cannot be overstated. Moreover, as many of the technologies presented in this proposal represent the type of groundbreaking, fundamental shift that enables a multitude of startups to thrive, the Strategy represents an opportunity to take Canada's innovation to the next level.

²⁵BC Tech Association. TechTalentBC Report. 2016

Bolstering BC's and Canada's Global Reputation for Digital Technology

Just as the glowing reputations of international technology hubs such as Silicon Valley, Seattle, Tokyo and Shanghai help to support their continued attraction of talent and capital, the standing of Vancouver (and the broader Cascadia Innovation Corridor to which it belongs) in the digital technology space is supportive of companies that choose to set up locally. By sustaining its growth and fostering collaboration across industries, the Strategy will further enhance the Lower Mainland's attractiveness as a digital technology investment destination.



Unique gifts
& stationery.

Proceeds
to benefit

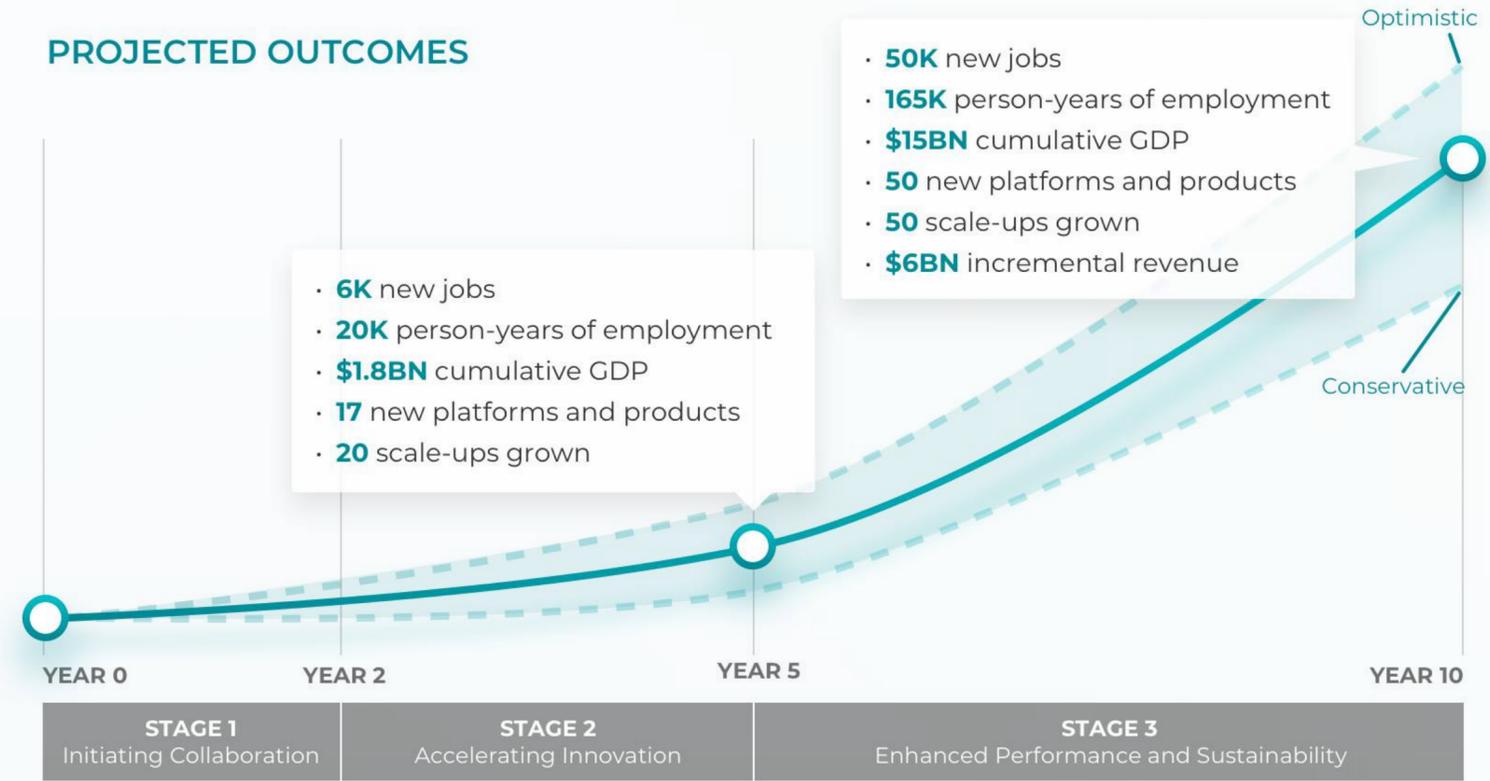
GROWTH OF THE ENTITY

Over the next ten years, participants may invest over \$1.4 billion into collaborative projects, involve more than 1,000 organizations, and fund more than 100 collaborations. This will yield outcomes of nearly \$10 billion in incremental GDP, create 50,000 new jobs, scale up more than 50 firms, and commercial more than 50 products, applications, and platforms.

The projected outcomes are illustrated in the following Supercluster Growth Map. It sets out the anticipated stages of the supercluster and the investment levels anticipated throughout the next decade.

DIGITAL TECHNOLOGY SUPERCLUSTER GROWTH MAP

PROJECTED OUTCOMES

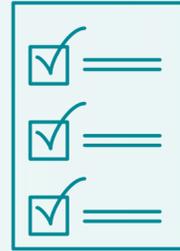


COLLABORATIONS & INVESTMENT



Entity Growth Map

There are three discrete stages to the supercluster collaboration.



STAGE 1: Initiating Supercluster Collaboration (Years 0 – 2)

During the first two years, the Entity's focus will be on fostering a culture of collaboration among startups, SMEs, large technology companies, multinationals, large industry adopters, post-secondary, research institutes, and intermediaries. This is essential in order to emulate the cluster effects observed in ecosystems like Tel Aviv – with its high connectedness and strong partnerships – and ultimately set the stage for further collaborations that will extend over the next decade.

The participants will pursue incremental commercialization projects that align with their near-term priorities, expanding the participation to a broader set of collaborators, and supporting faster adoption in the health, natural resources, and industrial sectors.

STAGE 2: Accelerating Innovation (Years 3-5)

Emboldened by the culture of collaboration that is established through Stage 1, the participants will begin to engage in more ambitious projects, leveraging collective resources and world-class university research capabilities to create interconnected datasets, technology products, and platforms that will position Canadian companies at the forefront of digital technology. These projects will link customer adoption right from the start, boosting industry competitiveness and productivity across an expanding range of sectors. Canada will begin to attract a greater proportion of world-class talent and researchers as a result of the success of the supercluster.

STAGE 3: Enhanced Performance & Sustainability (Years 6-10)

During the latter stage of the decade, the product, platform, and technology outcomes of the supercluster collaborations will begin to extend to the full supply chain of large corporates and multinationals. This will fortify the creation of more startups and fuel the growth of SMEs that provide solutions into these supply chains. Larger technology companies will benefit from globally leading platforms that can further reinforce Canada's leadership position on the world stage. This increased performance will build Vancouver's global reputation and attract top researchers, founders, investors, and senior talent - yielding a virtuous cycle that fuels the growth of more companies.

SUPERCLUSTER PROJECTS

Project Themes

We have led a series of collaboration workshops and calls for ideas from the broader community that have resulted in over fifty project opportunities for the supercluster. This has been refined into a list of initial

phase one projects that our Entity will support in our strategy's first stage, including several truly ambitious technology leadership projects.

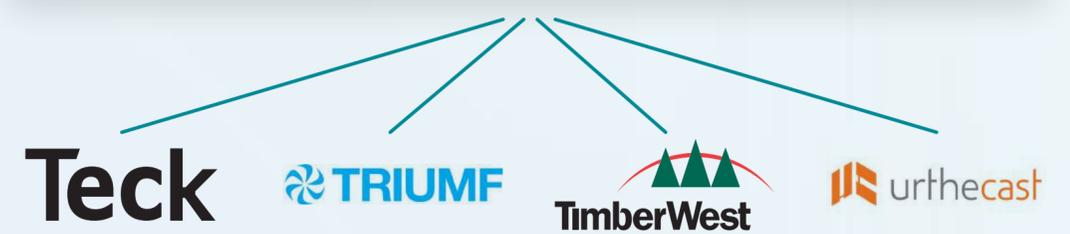
Secure Health and Genomics Platform

This project builds the core infrastructure for a secure health and genomic platform that enables advanced cancer treatments through personalized onco-genomics. The over 25 partners in this project – including UBC, the Terry Fox Research Institute, GenXys, TELUS, and Shoppers Drug Mart – will collaborate on research that will ultimately lead to an estimated \$950 million in GDP impacts.



Earth Data Store

This project creates a digital twin of 85% of the world's land on a daily basis, providing a single source of geographic data for the resource sector along with the opportunity to mine an enormous amount of Earth data on a daily basis using various data analytics and visualization platforms. Bringing together 17 partners including Teck Resources, TimberWest, the First Nations Technology Council, TRIUMF Innovates, Urthecast, and D-Wave, this project will result in an estimated \$330 million in GDP impacts.

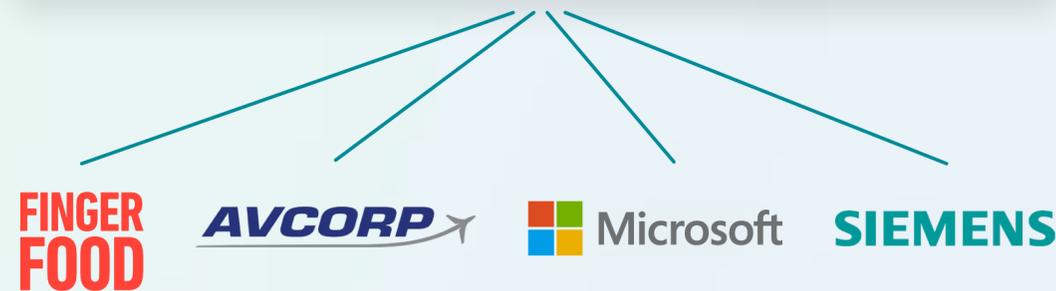


Project Themes Continued

Our ambitions also apply to projects focusing on talent development.

Digital Learning Factory

This project creates a ‘teaching hospital for advanced manufacturing’ where industry, innovators, and researchers will work together with a data advantage to take on the significant challenges in manufacturing. Partners – including Avcorp, Siemens, Microsoft, and Finger Food Studios – will collaborate to develop virtual environments that enable design, rapid experimentation, and testing of cost-saving approaches at full operational scale without incurring full operational expenses. This project is estimated to result in \$220 million in GDP impacts.



Indigenous Talent Development

This project creates a training platform for Indigenous talent development and enterprise. It will simultaneously build the jobs of the future, while preserving the cultural traditions of First Nations. It will offer entry level certification, advanced training, and work experience in six in-demand technology fields, providing in-community guidance and supporting the growth of First Nations enterprise. This project is estimated to result in \$30 million in GDP impacts, along with 1,000 work-integrated learning opportunities and 1,000 graduates from Indigenous communities.



Project Themes Continued

As our supercluster scales in terms of projects and collaborations, we anticipate that unmet demand for talent will be one of the biggest constraints. From digitally-trained workers in the natural resources industry to digital health experts that can deliver remote patient-centric care, the demand for more trained workers will be essential to our success.

The Entity will undertake talent initiatives that include increasing experiential learning opportunities in digital technology, providing flexibility in training to support those transitioning from traditional industry sectors, and supporting collaborative programs that focus on digital skills. We have partnered with all twenty-five of BC's post-secondary institutions, and have a collaborative partnership with six universities including UBC, SFU, BCIT, UVic, Emily Carr, and UNBC.

Blended into our talent agenda is our strong commitment to diversity. As we develop the region's talent pool, we want there to be pathways for members of underrepresented groups to enter the in-demand jobs of the future.

We will also invest in mentorship programs to build STEM interest, particularly among young girls, and to ensure that initiatives exist to improve the attraction of women into digital technology programs. Underrepresented groups represent an opportunity to broaden the talent pool. We will commit to expanding the diversity of the workforce. We will also encourage participants in the supercluster to adopt similar principles in promoting diversity by instituting programs that manage unconscious bias, build inclusive environments, and report promotion, retention, and diversity statistics.

The Entity will also work with Indigenous partners to devise development pathways that will be relevant and successful, develop criteria for participating companies around pathways for Indigenous students, and support Indigenous skills development like the First Nations Technology Council-led Bridging to Technology program.²⁶

We have partnered with all twenty-five of BC's post-secondary institutions, and have a collaborative partnership with six universities including UBC, SFU, BCIT, UVic, Emily Carr, and UNBC.



²⁶ This is in line with the B.C. Government's commitment to implement the UN Declaration on the Rights of Indigenous Peoples and the Truth and Reconciliation Commission of Canada's Calls to Action which includes the commitment of the BC post-secondary system to increasing access and success for indigenous learners.

Project Themes Continued

Our approach to collaboration has some inherent benefits for ensuring diversity and balance in participation. In combining the health sector - which is overwhelmingly represented by women - and the digital technology sector - in which men significantly outnumber women - we benefit from a balance of collaboration that will lead to a greater diversity in ideas. It also provides the opportunity for cross-over training, creating opportunities for women in health technology and leadership.²⁷

All of this will occur in the context of the most exciting and ambitious digital technology projects occurring in Canada, as our Entity works toward its objectives of increasing the diversity of our region's talent pool, building powerful partnerships, scaling up small enterprises, and developing globally-competitive companies.

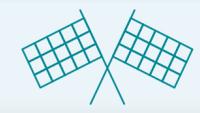
Our focus on these objectives and the collaboration framework between industry adopters and the innovation ecosystem is woven throughout the strategy, and is that which leads to the compounding economic benefits we project as our supercluster's innovation accelerates, increased diversity contributes to performance, advantages achieved in our industries of strength grow, and Vancouver's reputation as the top global digital technology innovation hub emerges.

²⁷ Statistics Canada. Table: Employment by industry and sex (number in thousands). 2016. www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/labor10a-eng.htm



Phase One Projects

Earth Data Store



Outcomes & Benefits

Earth Data Store creates a single source of geographic data for the resource sector. It combines existing data sources including topography, climate, permits, and drilling results with a groundbreaking earth digital twin that will image 85% of the world's land every day to within half a metre of precision. Natural resource companies, government agencies, and community stakeholders will leverage the store to expedite and enhance resource development projects.

This bold new model will integrate data analytics and visualization platforms, facilitating the development of new digital tools - including augmented reality - to enhance public understanding of projects.

It will overcome challenges associated with secure and rapid capture, processing, aggregation and correlation of data from multiple sources, many of which are privately owned and stored within disparate cloud environments. It will leverage Canada's leadership in earth observation, data handling and analytics to create a centralized entity with sovereignty and privacy protections.

- 3,200 person-years of employment in Canada over 10 years
- \$330 million cumulative GDP in Canada over 10 years
- Canadian companies growing revenue and market share through commercialization of IP and innovations in earth observation, data processing and handling, quantum computing, industrial IOT and software engineering
- Scaling of 5 enterprises from small to medium-sized, and 2 enterprises from medium to large-sized
- Public-private platform that supports public understanding of resource and infrastructure projects, operations of private enterprises, and advancement of scientific inquiry
- Lowering project costs and timelines while becoming transparent and building trust with impacted communities
- Enabling Canada's future data scientists with a world-class data store
- Enabling Indigenous peoples to contribute to data collection and lead where possible
- Development and commercialization of digital tools that deliver insights from geospatial data
- Work-integrated learning opportunities to develop highly skilled digital Canadian workforce

Possible Collaborators:



Phase One Projects Continued



Digital Learning Factory

The Digital Learning Factory is a ‘teaching hospital for advanced manufacturing’. It will be a place where industry, innovators and researchers work together with a data advantage to take on the significant challenges in manufacturing (such as high costs and problematic waste ratios) while incubating new ideas for commercialization and providing unique training and work-integrated learning opportunities.

The project will create digital twins, digital mimics of factory’s processes. These low-cost, virtual environments enable design, rapid experimentation and testing of cost-saving approaches at full operational scale, without incurring full operational expenses. It allows manufacturers and their suppliers to undertake collaborative R&D without slowing production. This means manufacturers will not have to choose to undertake R&D or production; they can do both, and reap the benefits of both. This will allow manufacturers, large and small, to learn at scale, cheaper and faster, improving productivity and competitiveness of manufacturing in Canada.



Outcomes & Benefits

- 1,800 person-years of employment in Canada over 10 years
- \$220 million direct and indirect cumulative GDP in Canada over 10 years
- Canadian companies growing revenue and market share through commercialization of IP and innovation, in the domains of simulation & modeling, industrial IOT, blockchain, augmented and mixed reality, visual analytics, and machine learning
- Scaling of 6 enterprises from small to medium-sized, and 2 enterprises from medium to large-sized
- A Virtual Technology Application Centre: a research, technology and training platform to drive low-cost innovation access and skills development across Canada
- Enabling Canada’s future engineers, technicians and operators to have “first” access to next generation digital manufacturing technologies
- Enabling Canada's innovators to test solutions with key channel partners
- Development of new and cutting-edge approaches for optimizing manufacturing processes and improving manufacturing productivity
- Achieving 50% gender-parity within 1,000 work-integrated learning opportunities that develop a highly skilled digital manufacturing workforce in Canada

Possible Collaborators:



Phase One Projects Continued



Virtual Resource Management

Resource companies worldwide need operational efficiencies to drive down costs of production. Unlocking productivity gains through digital innovation is a necessity. This project creates a virtual copy of any forest or mine, or potentially any natural resource. It will be updated in near real time as operations are underway, and connected to assets, operators and historical information on the state of, and change to, the land base. This enables efficient and sustainable resource management through precise, data-driven decision-making.

The project creates an open platform where companies, their subcontractors, and partners, can add their operating data to site designs, and earth observation to produce a live and interactive digital twin of operations. The project will visualize operations using mixed reality, making data-driven changes to the plan for the day, week and month with little lead-time, and supporting research collaboration and community consultation.



Outcomes & Benefits

- 800 person-years of employment in Canada over 10 years
- \$120 million direct and indirect cumulative GDP in Canada over 10 years
- Canadian companies growing revenue and market share through commercialization of IP and digital innovations in: Industrial IOT, mixed reality, data analytics and earth observation
- Scaling of 5 enterprises from small to medium-sized, and 2 enterprises from medium to large-sized
- A virtual environment for collaborative R&D that can drive quickly to a full business case. This takes the risk out of scaling innovations, particularly from SMEs and academic collaborators
- Up-skilling and work-integrated learning opportunities in Canada's resource industries, emphasizing underrepresented groups where possible
- Improved ecological approaches to natural resource development, allowing companies to meet any objectives as required by industry and government in the pursuit of environmentally sustainable practices
- Health and safety improvements to operations as plans, assets and operators can be monitored in one system

Possible Collaborators:



Phase One Projects Continued

Secure Health and Genomic Platform



Outcomes & Benefits

To build a secure health and genomic data platform from 150,000 volunteer Canadians, reflecting ethnic and gender diversity, including strong representation of Indigenous peoples. The project will:

- Build a powerful, secure core infrastructure for health and genomic data
- Connect existing genomic Centers of Excellence (CoEs) and scale the platform for advanced analytics on large populations, initially for approximately 15,000 Canadians
- Focus initially on global leadership in cancer therapeutics through Personalized Onco-Genomics
- Enable Canada's Indigenous peoples to have "First" access to next-generation treatments

Innovators will collaborate with Canada's genomic research COEs to:

- Conduct groundbreaking research on massively-scaled, Canadian-sovereign genomic datasets
- Translate research into innovative new IP
- Build upon BC's global CoE and foundational R&D of Michael Smith, BC's Nobel Laureate

The project will combine globally leading, Canadian-sovereign-and-resident, secure technologies and Canada's research excellence to enable Canada to be a global leader in genomic health innovation.

Possible Collaborators:



To position Canada's innovators at the forefront of the global \$8.7 trillion precision health marketplace. Estimated benefits:

- 10,600 person-years of employment in Canada over 10 years
- \$950 million cumulative GDP in Canada over 10 years
- Catapult Canada's genomic research excellence
- Create magnet to retain Canada's and attract global top talent
- Platform and national ecosystem will generate and retain research-driven IP and scale Canada's SMEs
- Develop new cutting-edge approaches for optimizing human health and combatting life-threatening diseases through personalized health therapies
- Canada's innovators will leverage the advanced capabilities in cognitive analytics, visualizations, cloud computing and the decreasing costs of genomic sequencing, to develop intellectual property and scale the commercialized solutions globally
- Attract, grow and retain global top-talent to drive innovation across Canada with an initial focus on improving cancer outcomes, a disease that impacts 4 in 10 Canadians
- Work with First Nations Health Authority to create the global-first Indigenous genomic dataset

Phase One Projects Continued

Tailored Health Therapies

The project will use Canadian-resident-secure-and-sovereign platforms, cognitive analytics and machine learning technologies to create personalized treatments and therapies for patients, using unique biomarkers.

The project will bring together globally innovative technologies, Canada's small/medium enterprises (SMEs) and Canada's research excellence in pharmacogenomics and reducing adverse drug reactions (ADRs) to create the tailored health pathways. The project will build upon and scale the secure and ethical approaches currently in use in Canada.

This platform enables Canada's SMEs to develop innovative, tailored solutions to some of the most pressing health concerns including the high incident rate of ADRs. It provides a platform for safe development of future personalized medicine approaches using inclusive data reflecting Canada's genetic diversity.

BC will be positioned as a true global leader in pharmacogenomics by capitalizing on one of the largest datasets available in the world, a thriving ecosystem of SMEs, and cutting-edge genomic research led by Canada's universities.

Outcomes & Benefits

Position Canadian innovators at the forefront of the global personalized health marketplace, with estimated benefits:

- 1,000 person-years of employment in Canada over 10 years
- \$100 million cumulative GDP in Canada over 10 years
- Enable Canada's researchers to generate new IP and work with Canada's SMEs to create and scale personalized health therapies
- Integrate patients' genetic profiles into clinical decision making at point-of-care to:
 - Create tailored gender and ethnic-specific therapies
 - Reduce ADRs
 - Improve clinical outcomes
- Enable patients and care-teams to benefit from machine learning, in simple-to-use formats
- Significantly reduce time needed for development and delivery of drugs, and allow for re-purposing of existing drugs/molecules for secondary use
- Reduce ADRs among high-risk patients (over 50% of frail elderly ER visits are due to ADRs) and avoid incurring hundreds of millions of dollars of unnecessary health costs
- Work with the First Nations Health Authority to create Indigenous-specific health therapies

Possible Collaborators:



Phase One Projects Continued

Patient-Centric Digital Care

The project will focus on securely using digital channels to provide Canadians with their health data and insights to assist patients and caregivers in managing health and wellness. Initial use-cases will focus on chronic disease and enabling remote, universal access. The project will:

- Empower patients and put them at the center of care
- Build common services and infrastructure to create a collaborative ecosystem
- Enable analytics capabilities

In Canada, and ultimately globally, the secure, collaborative and scalable platform will:

- Securely store health data from point-of-care clinical systems, including health, pharmacy, laboratory, medical images as well as wearable and implantable device data
- Enable partners and third parties to ethically connect and exchange data
- Provide access for SMEs, and academic researchers to develop cutting-edge solutions and intellectual property
- Enable the creation of digital-care pathways and machine-learning algorithms to provide real-time decision-making insights to patients and care-teams

Outcomes & Benefits

Position Canada's innovators at the forefront of the \$233 billion global Digital Health market. Estimated benefits:

- 6,600 person-years of employment in Canada over 10 years
- \$410 million cumulative GDP in Canada over 10 years
- Secure, digital channels for Canadians to self-manage their care plans, access test results and Canada's health innovations
- Digital ecosystem and national supply chain for Canada's SMEs to access national and global health markets (e.g., access to 25 million Canadians)
- Seamless, real-time insights to patients and care teams to enable patient-specific, cost-effective care pathways, facilitate end-to-end care and reduce wait-times and unnecessary usage (e.g., waiting for medical-imaging analysis)
- Improved health services for vulnerable populations including the elderly and those with chronic and mental health conditions
- Work with First Nations Technology Council and First Nations Health Authority to improve Indigenous people's remote access to digital care and create Indigenous-specific health innovations
- Ecosystem to educate digitally-savvy health providers

Possible Collaborators:



Phase One Projects Continued

Indigenous Talent Development



Outcomes & Benefits

This project creates a training platform for Indigenous talent development and enterprise. It will simultaneously build the jobs of the future, whilst preserving the cultural traditions of Indigenous peoples. As Canada’s original innovators, Indigenous peoples today face two major challenges:

- A skills development gap that contributes to the digital divide faced by many Indigenous peoples
- Limited preservation of traditional knowledge, stories, cultural traditions and skills from elders who impart knowledge and culture through oral communication in highly intimate settings

The project:

- Offers entry level-certification, advanced training and work experience in 6 in-demand technology fields
- Provides in-community guidance, supporting the growth of Indigenous enterprise
- Develops work-integrated learning opportunities in immersive technologies, leveraging virtual reality to document and preserve the oral history and cultural traditions of Indigenous People

The estimated benefits are:

- 300 person-years of employment in Canada over 10 years
- \$30 million direct and indirect cumulative GDP in Canada over 10 years
- 1,000 graduates from Indigenous communities
- 1,000 work-integrated learning opportunities
- Preservation of critical cultural heritage as part of skills development, and public education and awareness
- Indigenous peoples empowered with the necessary skills and certifications to thrive and lead in the digital age
- The supercluster is actively shaped by Indigenous voices, perspectives and world views as it responds purposefully to reconciliation
- Connections between Indigenous communities, leadership, academia, government, and industry, creating optimal conditions for the success of Indigenous participants and entrepreneurs
- Leveraging the fastest growing part of our population, First Nations Youth
- In this age of reconciliation, Indigenous innovators will have full and equitable access to tools and technologies that will strengthen communities, and open the world to Indigenous voices, perspectives and ingenuity

Possible Collaborators:



Phase One Projects Continued

Scaling Innovation Ecosystems

Outcomes & Benefits

As innovation ecosystems scale, they incur discrete growing pains. These problems may appear as by-products of success, but left unaddressed, lead to systemic inefficiencies that work against the region, ultimately inhibiting it from step-changes in competitiveness. Specifically, these problems include:

- Focusing upon company creation and failing to accelerate company growth
- A fundamental disconnect between technology development and its local and regional adoption, leading to both unmet customer needs and inaccessible local markets
- An abundance of world-class research, most of which is not commercialized

Scaling Innovation Ecosystems unites multiple parties in the innovation ecosystem, to ensure the supercluster region scales effectively, each bringing their unique strengths. It brings industry (and/or government) being disrupted by digital technology together with innovators, researchers and SMEs providing digital solutions, as well as experienced Executives-in-Residence who have scaled and grown businesses, to develop and deliver market-driven innovation that is achievable, scalable and has global market impact.

Estimated benefits:

- 2,000 new connections made annually, increasing connectivity between problem solving start-ups and SMEs with strategic partners throughout the supercluster region, leading to an increase in local (high paying) jobs, revenue and investment
- 100 new signed project deals for executing innovation made annually
- 50 additional commercialization of research projects
- SME revenue and headcount growth directly attributable to adoption in the supercluster region
- Increased number of medium sized technology firms in the supercluster region by doubling the size of companies worked with over a three-year period
- Transformation of traditional industries, the resource sector and government through adoption of digital solutions, leading increased competitiveness on the global market
- Strengthened links between academia, First Nations and industry leading to solutions that meet market demands and a skilled workforce that is entrepreneurial and addresses customer needs
- Recognition that innovation can be a means of reconciliation with First Nations

Possible Collaborators:



Phase One Projects Continued



Global Market Entry

The small size of the Canada's population and global competitive pressures means that Canada's companies must look abroad to drive the scale they need for long-term success, however only 11.8% of SMEs are involved in export activities. The implementation of international growth strategies requires continuous access to international know-how and experience that few companies have on their own. In response, the Global Market Entry project will connect the supercluster community with the knowledge, partners and customers they need to build truly global companies. This project will provide SMEs with:

- Preparation – through International Market Validation Training
- Engagement – through targeted market connection trips ocused on B2B meetings and by bringing MNEs to Canada for matchmaking
- Expansion – through the identification of global channel partners

These activities will be combined with the expansive network of industry contacts and access to global value chains that the MNE's in the supercluster community provide.



Outcomes & Benefits

Estimated benefits:

- SME revenue growth directly attributable to exports
- Increased percentage of SMEs exporting, particularly those in marginalized communities
- Accelerated entrance of SMEs into global supply chains
- Faster export sales cycle for new products
- Easier access to growth capital for SMEs – focusing on attracting growth funds from Cascadia Innovation Corridor
- Cluster promotion - the supercluster will exhibit and speak at targeted global conferences to promote the supercluster's capabilities and showcase its companies. Partnering with similar organizations like the UK Catapults or Hong Kong Science Park will further enhance the supercluster's reputation
- Attraction of Foreign Direct Investment – the supercluster will hold 1-on-1 meetings for the purpose of attracting foreign direct investment

Possible Collaborators:

SMEs

MNEs

wavefront™

LEVERAGING OUR ASSETS

Over the past few years, we have seen examples of collaborations among startups, large technology companies, research institutes, and industry customers within our ecosystem. These organic collaborations have provided examples of what we could accelerate with our supercluster strategy.

In the natural resources sector, Teck Resources and LlamaZOO came together to create MineLife VR, a virtual reality program with which users can navigate a three-dimensional visualization of a mine's entire lifecycle. Fifty years' worth of complex geospatial and mine planning data is synthesized in one immersive and interactive visualization. For Teck, complexity is reduced, and communication, design, and planning iteration sped up. For LlamaZOO, the partnership resulted in a giant industry customer that showcased the VR technology at one of the largest geographic information system (GIS) conferences, which led to an invitation to join a leading GIS supplier's partner network.

In the healthcare sector, quantum computing leader D-Wave is working with the Vancouver Prostate Centre to apply its powerful quantum computing technology to drug discovery efforts to make material improvements in patient treatment.

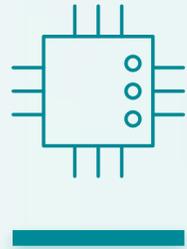
These collaborations provide a glimpse of our opportunity if we convene partnerships to tackle larger-scale challenges. By enabling collaboration among a broader base of participants, we can capitalize on the assets and capabilities of technology leaders across the Data Stack.



MineLife VR, developed by LlamaZoo

Data Collection Supercluster Platforms: IoT | Connectivity | Data Repositories

Figure 8: Data Collection Supercluster Platforms



Data Collection Assets

At the data collection level, Vancouver boasts an impressive list of companies that have developed industrial IoT, wireless and broadband solutions that serve global markets and multiple industry sectors. For instance, Sierra Wireless has been the global market leader for wireless embedded modules for five years running, shipping over 130 million devices that make up the infrastructure of the Internet of Things.²⁸ Experts in machine-to-machine communication (M2M), networking solutions, and connectivity, Sierra Wireless has demonstrated technology leadership for years. In 2014, they created the Legato Platform, the first Linux-based embedded platform for M2M. This came right after the prior year's development of the smallest embedded wireless modules for 2G, 3G, and 4G. Their significant R&D investment has led to a portfolio of over 400 patents in wireless technologies, and allows them to remain at the global fore as data collection from IoT devices ramps up.

TELUS also leads the way in digital connectivity and network security. Its IoT line of business provides fleet managers with data insights that enable them to streamline their operations. TELUS has also put

Canada at the top of wireless innovation by creating a 5G 'Living Lab' in Vancouver, supporting the city's goal of becoming the world's smartest and greenest city. The project nailed its goals, achieving the wireless speeds necessary to accommodate the deluge of data anticipated to come from the smart cities and connected devices of the near-future.

Urthecast is the leader in high definition video imaging from space. In addition to the two cameras they operate on the International Space Station, Urthecast has been contracted to develop a synthetic aperture radar satellite based on its OptiSAR IP.²⁹ OptiSAR will provide developers, researchers, and analysts with unprecedented access to Earth data through a combination of high resolution radar data and very high resolution optical imagery.

Complementing the data collection capabilities of companies is Wavefront, Canada's national centre of IoT excellence, with its mandate to support the commercialization and adoption of wireless innovation.

²⁸ABI Research. New Market Dynamic Brewing as Sierra Wireless Leads M2M Module Revenues but SIMCom Wireless Leads in Shipments. 2016.

²⁹News Release. UrtheCast Reports Second Quarter 2017 Financial Results. Aug 2017.

Data Analysis Supercluster Platforms:

Cloud | Supercomputing | Quantum Computing | Machine Learning

Figure 9: Data Analysis Supercluster Platforms



Data Analysis Assets

At the data analysis level, Vancouver draws from cloud computing expertise in the Cascadia Innovation Corridor, and has seen the growth of many companies in machine learning and business intelligence. Vancouver is also home to leading quantum computing companies and a growing ecosystem of software companies that leverage this new computing capability.

1QBit and D-Wave Systems are the commercial leaders in quantum computing, developing solutions to take on the world's most demanding computational challenges. In recognition of its innovation ability, 1QBit was included in the 2015 World Economic Forum Technology Pioneers program as it is considered 'poised to have a significant impact on business and society'.

D-Wave Systems, for its part, has a history of exceptional research and commercialization, with over 90 peer-reviewed papers in leading scientific journals and a head-turning list of clients that include NASA, Google, Los Alamos National Laboratory, BMW, and Volkswagen, all of which came knocking after

D-Wave introduced the world's first commercial quantum computer in 2010. D-Wave also owns over 200 worldwide patents related to quantum computing, including those for its quantum processor and for systems and methods for quantum processing of data (USPTO #9779360 and #9727824).

There is considerable breadth of capability among small and medium-sized enterprises in our consortium. LoginRadius, for instance, developed a customer identity and data management platform that it sells to over 3,000 customers worldwide, including Conde Nast, Viacom, and CBC. Safe Software automates workflows across enterprises, connecting data from hundreds of separate systems. Among the clients they serve are Geoscience Australia, the University of Oxford, and the Iowa Department of Transportation. The startup PHEMI securely collects and integrates clinical, lifestyle, and genomic data. Its products, such as the PHEMI Central Big Data Warehouse, were developed to unlock data silos within the enterprise, opening all data to analytic and operational applications.

Data Analysis Assets Continued

Microsoft has established a Centre of Excellence in Vancouver, and brings deep expertise in data science and cloud analytics. Microsoft's Azure cloud computing service provides data warehousing that exceeds one terabyte and enables users to run analytics on multiple streams of data from multiple sources, all in real time. Microsoft is also a prime example of the leverage opportunity that exists within the Cascadia Innovation Corridor, allowing companies to draw from Microsoft's capabilities south of the border to accelerate their own innovation.

Our data analytics capabilities are underpinned by strong academic programs offered in data science and data analytics. SFU is a data analysis powerhouse in the research and academic world. The university hosts one of Compute Canada's four national advanced research computing facilities, leads Compute Canada's data centre consolidation project, and applies Big Data research across more than a dozen of its major academic disciplines.





UVIC



Data Analysis Assets Continued

We also have many world leading facilities to support data analytics research including:

- SFU's Big Data Hub, which connects campus community and external partners to Big Data;
- SFU's CEDAR supercomputer, which provides users with the most powerful supercomputer in Canada;
- SFU's Pacific Blue Cross Health Informatics Lab which uses Big Data to improve health delivery and decision-making;
- UVic's Pacific Institute for Climate Solutions, a collaboration of four BC universities to study climate data and inform corrective action;
- UVic's Genome BC Proteomics Centre, which develops novel analytical capabilities related to life sciences;
- TRIUMF, Canada's premier physics lab, which manages data from facilities like the Large Hadron Collider, Hubble Space Telescope, and Canadian Astronomy Data Centre; and
- ARBUTUS advanced research computing system at University of Victoria (UVic), which hosts virtual machines provides incredible computing power.

Additionally, we have world-renowned researchers in data analytics, many of whom are Canada Research Chairs:

- UBC's Professor Alan Mackworth, Tier 1 Canada Research Chair in Artificial Intelligence;
- UBC's Professor Raymond Ng, Tier 1 Canada Research Chair in Data Science and Analytics and Scientific Director of UBC's Data Science Institute, with over 180 peer-reviewed publications;
- UBC Assistant Professor Mark Schmidt, Canada Research Chair in Large-Scale Machine Learning;
- UBC Assistant Professor Sara Mostafavi, Canada Research Chair in Computational Biology, a field in which she applies machine learning to the study of genomics;
- SFU Professor Jinguo Cao, Canada Research Chair in Data Science;
- UBC Professor of Electrical and Computer Engineering Tor Aamodt, whose areas of research include computer architecture and deep neural networks, and who won a 2016 Google Faculty Research Award;
- SFU's Professor of Computing Science Greg Mori, who conducts research in computer vision and machine learning and was invited as a Visiting Scientist at Google in 2014-15

Data Visualization Supercluster Platforms: AR-MR-VR | Mapping | Simulation and Modelling

Figure 10: Data Visualization Supercluster Platforms



Data Visualization Assets

In the top layer of the Data Stack, visualization represents the greatest opportunity for our supercluster. Spawned from the rise of Hollywood North and one of the largest video game hubs in the world, we have built an enviable talent pool of 3D artists, animators, developers, and user experience designers. This reputation has catapulted Vancouver to a reputation as the leading jurisdiction for 3D artistry, 3D special effects, and 3D games.

Figure 10: Data Visualization Supercluster Platforms
Microsoft's world-class patented mixed reality capabilities led to the development of the Mixed Reality Viewer app, which enables users to interact with digital visualizations overlaid upon actual environments. The OneNote cloud app is another product that highlights both Microsoft's data display proficiency and our region's talent. The technology that allows the app to organize free-form information like scribbles, photos, and drawings into easily interpreted content was developed by a team in Vancouver. This November, Microsoft strengthened its commitment to Vancouver, announcing a partnership with BCIT to create a new mixed reality curriculum along with 50 new jobs.

Vancouver is an emerging leader in new startups focused on virtual, mixed, and augmented reality (VR/MR/AR) capabilities. The BC Tech Association launched The Cube, Canada's first hub created exclusively for VR/MR/AR companies. The Cube is focused on accelerating the growth of new startups and replicating the success of companies like Finger Food Studios and Conquer Mobile.



PACCAR AR, developed by Finger Food Studios

Data Visualization Assets Continued

Finger Food Studios designs, develops, and implements mixed reality solutions into industrial workflows, creating integrated holographic solutions for Industry 4.0. In an industry first, Finger Foods integrated holographic technology into a workflow for PACCAR, one of largest truck manufacturers in world.

Conquer Mobile researched, developed, and commercialized PeriopSim, a virtual reality clinical training and simulation technology for nurses, doctors, and other care practitioners that has been selected for several landmark academic research studies to measure the effectiveness of simulation in education.

Our leadership in visualization technologies is amplified by the research of our post-secondary institutions. UBC is the work place of researchers that aspire to make those digital and virtual environments more realistic. One such researcher is Professor Septimiu Salcudean, a Tier 1 Canada Research Chair in Intelligent Computer Interface Design.

While his work increases the naturalness of immersive virtual surroundings, labs across campus turn analyzed data into comprehensible insight. These labs include:

**The Human Communication
Technologies Lab**

**The Sensory Perception and
Interaction Research Lab**

**The UBC Media and Graphics
Interdisciplinary Centre (MAGIC)**

Taken together, our capabilities and assets at all three layers of the Data Stack have the potential to build the global enterprise platforms of the future.



Technology Pillars – Founding Members

In order to support the digital transformation of traditional industries and the creation of new market opportunities, our members need to have a track record in future-focused innovation and collaboration.

Virtual, mixed, and augmented reality (VR/MR/AR) is one of these transformation engines. With Microsoft we have a lead partner that is actively supporting the emergence of VR/MR/AR leadership in Vancouver. Not only is this being done through work with up and coming SMEs like Finger Food Studios and Archiact in Canada's first VR/MR/AR hub in Vancouver (The Cube) but also with traditional industrial companies like Goldcorp.

Microsoft's HoloLens technology enables users to work with virtual environments in real world production management systems. For example, a mine engineer in Quebec can talk to an engineer in Argentina while looking at the same 3D image of mine designs or slopes to review problems areas and identify productivity improvements for real-time production gains.

While this potential is quite exciting, it is also dependent on networks that can move large volumes of data quickly. Another lead partner, TELUS, is driving hard to making 5G a reality through the 5G Living Lab in Vancouver where next generation technologies are tested. Recent achievements include network speeds of 30Gbps in a controlled environment and the successful completion of a 5G wireless connection using the global 3GPP technology standards platform. These breakthroughs are critical for laying the foundation for 5G networks, which will enable a future with driverless cars, smart cities and new innovations in healthcare.



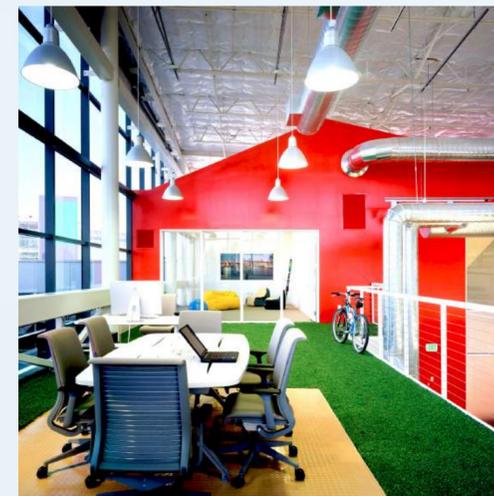
Technology Pillars – Founding Members Continued

Large volume data movement in 5G networks also needs enterprise-scale Big Data solutions. That is the essential challenge when innovative, data-driven solutions move from one case or piece of equipment in a controlled lab or test bed to the demands of a large population or full scale commercial operation. Enter PHEMI, a Vancouver-based Big Data warehouse company that is pioneering approaches to large scale data aggregation while dealing with privacy, security, and governance. They were named a 2017 Gartner Cool Vendor in Healthcare Providers for their advancement in precision medicine and clinical research initiatives.

Finally, managing all the data is important, but only half the equation. The other half is what you do with it. As datasets get larger and machine learning algorithms more complex, the demand for more powerful computing is a key success factor. Fortunately, our supercluster has the world's first quantum computing company and leader in quantum computing systems and software. With a record of attracting engagements with global

technology leaders like Lockheed Martin, NASA, Google, and Volkswagen, D-Wave illustrates how supercluster members can parlay technology leadership into global reach.

Right across the supercluster's core technologies, we have members with a track record of driving forward to create big, bold futures. By harnessing this energy through the formation of powerful partnerships and alliances in the Digital Technology Supercluster, the Entity has the capacity to achieve its goals and objectives.





Innovation Ecosystem Assets

We are considered the number one startup ecosystem in Canada in part because of our strong support network of accelerators, angel investors, and VC funds that fuel early stage growth. We have an accelerator network that operates across the province and interconnects with accelerators across Canada. Many of the graduates of these accelerator programs successfully raise angel and venture capital investment, allowing them to further scale their businesses. These incubators and accelerators include Launch Academy, Wavefront, the BC Acceleration Network, and the BC Tech Association's HyperGrowth program. Specialized accelerators for cleantech (Foresight Cleantech Accelerator), healthtech (Accel-Rx), biotech (CDRD) and agri-food (BC Agri-food Venture Acceleration Program) also support entrepreneurs with subsector-specific expertise, providing valuable mentorship and connections to customers and investors.

In 2016, there was over \$860 million in venture and public capital raised by BC companies and an additional \$100 million raised in angel investment capital. With the launch of the new BC Tech Fund, we have seen an increasing number of venture funds in our region as well as a growing number of US and foreign venture capital firms that have made investments in BC.

The Consortium Asset

We have grown to over 200 participants in our supercluster, with companies and organizations at every level of the Data Stack. Our supercluster also includes more than a dozen large corporate adopters including LifeLabs, Providence Healthcare, Shoppers Drug Mart, Teck Resources, Canfor, Avcorp, and TimberWest - significant brands that can lead the adoption and success of new products and technologies.

While startups and large enterprise have the technology know-how, it is these corporate adopters, willing to collaborate and adopt innovation, that will lift the entire ecosystem. The small-scale collaborations are a preview of what can be achieved at scale with our supercluster.

In connecting the needs of customers with our capabilities at every level of the Data Stack and the research capabilities of our post-secondary institutions, we can accelerate the development of new products, platforms, and technologies that will transform the enterprise and position us as leaders in the digital technology market.

IMPLEMENTATION

Supercluster Development Periods

The development of the supercluster will progress through three different time periods associated with the evolution and development of the Entity. The Entity will move through a two-year initiation, a three-year acceleration, and five years of enhanced performance and sustainability. The intention is to build on the cohesive partnerships developed through the LOI/RFP stage, and to scale to eventually become a national resource that is inclusive and impactful.

In this period, the priority is to set-up and scale the Entity. This includes getting initial supercluster programs and projects launched. Specific milestones during this period include:

- Establish Canada's Digital Technology Supercluster in BC as a new entity in the global innovation system and the go to place for data-driven innovation in Canada;

- Have MoUs or other agreements outlining partnership arrangements with the other successful superclusters across Canada;
- Secure at least 200 registered members;
- Have a portfolio of at least \$150 million in approved collaborative development projects in progress and/or completed; and
- Establish a leadership development service focused on providing innovation leaders with management skills in collaborative process, product, and technology development.

STAGE 1
Initiating Collaboration

STAGE 2
Accelerating Innovation

STAGE 3
Enhanced Performance and Sustainability

Initiating Collaboration (0 to 2 years)

Supercluster Development Periods Continued

The first period lays the foundation for the supercluster’s project portfolio. In this second period, the aim is to use the commercialization pipeline and regular new process, product, and technology platform launches to drive the growth and scale of the organization.

Specific milestones in this period include:

- Secure over 500+ members with a balanced mix of global technology leaders, high growth Canadian enterprises, and SMEs;
- Develop a commercialization pipeline of new Entity-supported platforms aimed at generating \$1 billion to \$4 billion in new sales for Canadian enterprises;
- Aboriginal enterprises connected with at least four First Nations communities are active in the commercialization pipeline;
- The Entity has a recognized, well-defined measurement index for measuring leadership and participation of women in technology;
- At least four global technology MNEs will have shifted the nexus of a strategic business unit/global development centre into Vancouver; and
- The Entity has launched its Strategic Foresight and Intelligence services.



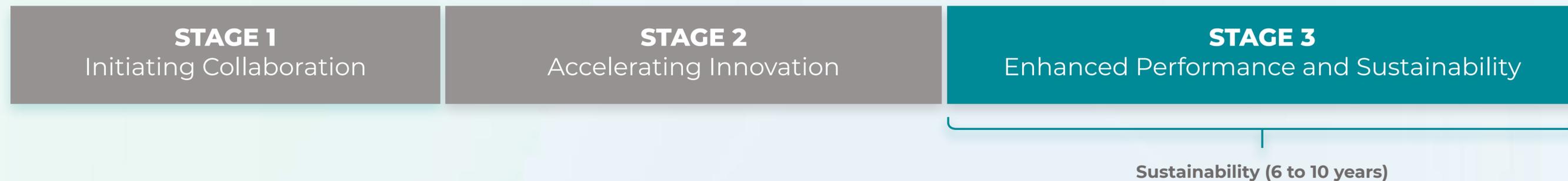
Supercluster Development Periods Continued

After the acceleration period, the key is to sustain the momentum created through the initial two periods through continued stewardship of the commercialization portfolio and continued delivery of program management and related services.

- The Entity has a membership base of at least 750 members;
- Total value of collaborative R&D investment in the Digital Technology Supercluster exceeds \$1.4 billion;

- The commercialization pipeline of new Entity-supported platforms is aimed at generating \$4 billion to \$8 billion in new sales for Canadian enterprises;
- The supercluster initiative has led to the creation of up to 40,000 new digital technology jobs; and,
- Vancouver becomes one of the Top 10 technology hubs in the world (from its current ranking of #15).

At this point, the Entity offers ongoing program management, leadership development, and strategic foresight & intelligence services.

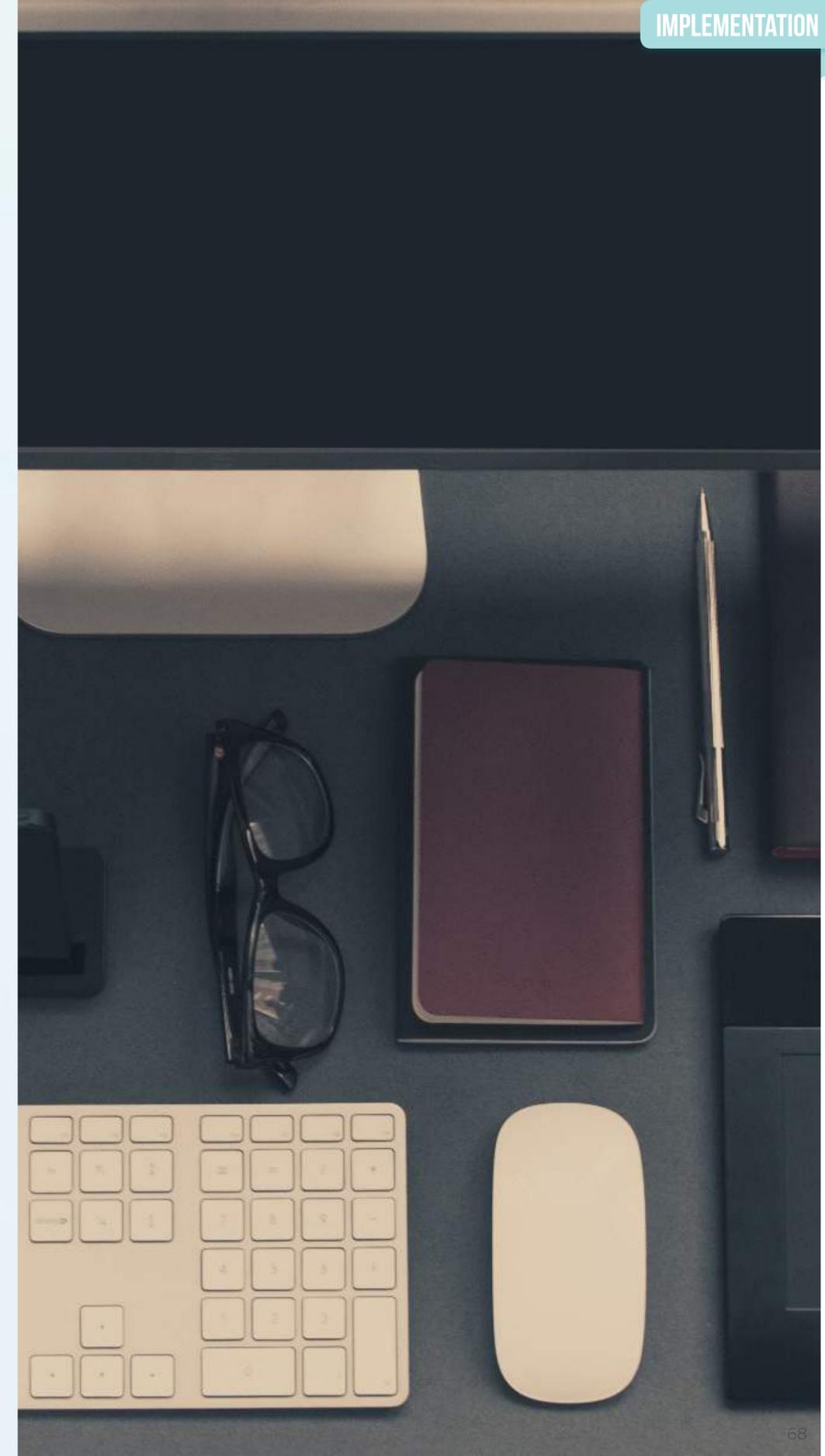




A Sustainable Organization

After five years, the Entity is expected to continue to attract members and yield ongoing projects averaging at least \$135 million per year in project funding over the Years 6 to 10, leading to \$1.4 billion in cumulative project investments after ten years. It will also see the Entity develop much needed expertise in collaborative technology development. This expertise will be leveraged into a suite of new and sustained innovation services for the supercluster.

With an eye to future sustainability, the new non-profit is being designed as a professional service organization modelled after contract-based research-technology organizations (RTOs). Revenues to support the Entity are based on service agreements with appropriate scope definitions, funding arrangement, and reporting requirements.



For example, as a specialist in collaborative technology development, the Entity can develop and offer services in categories such as:

01

Program Management

Countries around the world use non-profit RTOs as a place for industry, government, and academia to develop technology together in areas of shared strategic interest. Whether it is the UK Catapult program, the Fraunhofer Institute in Germany, or SRI International in the US, these organizations are key contributors to sustained technology leadership in their jurisdictions. The Entity will leverage the program and project management expertise developed in the supercluster program into other relevant, collaborative technology development programs.

02

Leadership Development

A critical success factor is a line of sight to commercial opportunities that generate revenue. After all, without new revenue generation, the resources to support member ROI, economic development goals, and innovation capacity building do not exist. Therefore, the Entity will develop deep expertise in process, product, and technology development methodologies. This expertise will not only be used to drive the performance of the Entity, it will also form the basis of a specialized leadership development program for innovation leaders.

03

Strategic Foresight & Intelligence

These services explore long-term social and technological trends that could spark new product lines and create brand new industries. It uses the strength of the supercluster community and a growing global network of innovation leaders to anticipate future opportunities and align resources to lead market development instead of following it. Example of service projects include technology forecasts in data-driven innovation, the development of technology and commercialization roadmaps, and special reports on key intelligence topics (KITs).

By choosing a service-based business model for the not-for-profit and establishing the capacity for business development and strategic engagements, the Entity is likely to continue operations and maintain the momentum in the project portfolio well past the expiration of the five-year contribution agreement for the ISI program.

ORGANIZATIONAL MODEL AND CAPACITY

Governance Model

We will set up a not-for-profit entity to coordinate industry-led, large-scale collaborative technology development in data-driven innovation. (organizational charts for the Board and Entity management are in the Appendices)

As a membership-based organization, members elect the Board of Directors as per the voting and appointment rights associated with each level of membership (details available in Section 2.6 - Membership Model). This leads to a large, inclusive Board with 34 members representing SMEs, industry leaders, post-secondary, and government. This also provides the organization with the capacity to staff board committees with a variety of personnel, so that a wider range of perspectives gets included in the development and monitoring of the Entity's operations.

The Board of Directors is responsible for direction, strategy, and governing policies that ensure the organization delivers on its mandate for members, the Innovation Superclusters Initiative and other stakeholders in the innovation ecosystem. These policies are developed and monitored through board committees staffed with members of the Board and external advisors. Each committee will operate according to a Board-approved terms of reference that outlines the mandate, operating guidelines, and membership of the committee.

The Board of Directors has the authority to modify the committee structure it uses to develop governing policies, and to monitor how they are implemented in operations.

Leadership Team

The Board will recruit a CEO who is responsible for hiring the executive team and leading the organization. In addition to the CEO, there will be four executive positions; a VP Technology, a VP Growth, a VP Finance & Corporate Services, and a VP Business Development along with one Director of Strategic Foresight & Planning. The organization will operate through an approved budget that is part of an annual business planning process.

01

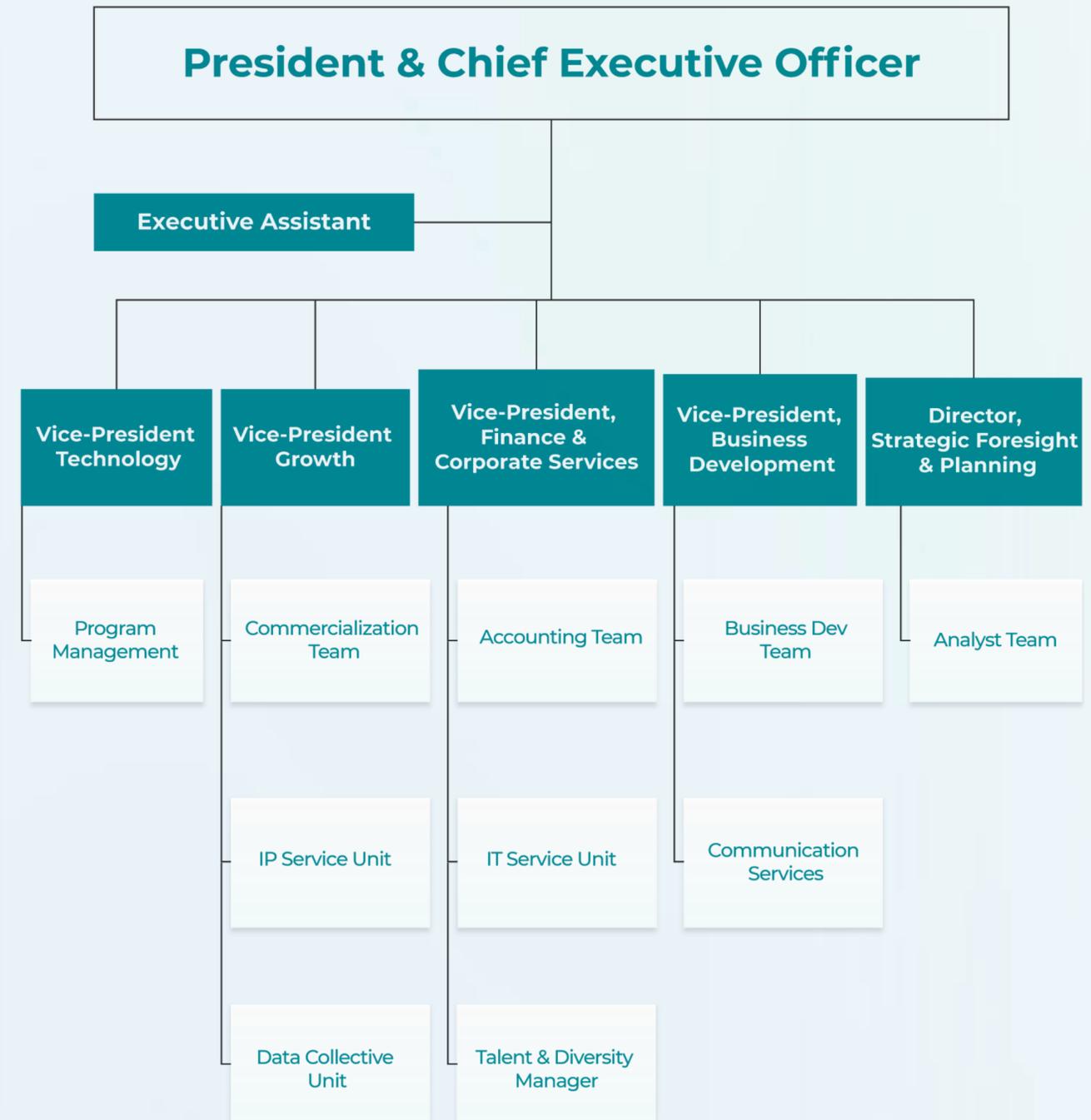
Chief Executive Officer (CEO)

The CEO is responsible for the performance of the organization. They set a strategy and direction to fulfill the mandate of the organization from members, the Innovation Superclusters Initiative, and other stakeholders. They build and lead the executive leadership team and, through their leadership, model the culture and behaviour expected of others throughout the organization. The ideal candidate has a track record of building collaborative, creative cultures.

02

Vice-President, Technology (our CTO position)

The VP Technology is responsible for the program portfolio and pre-market projects. They leverage the membership to build collaborative development projects aligned with program-based goals and objectives through a staff of program directors and business analysts. Their key goal is to ensure that new process, product, and technology platforms move through the development pipeline to launch. The ideal candidate has a track record in full stack development and Big Data analytics.



03

Vice-President, Growth

The VP Growth is responsible for helping capture value from new process, product, and technology commercialization. A staff of commercialization managers and the IP service unit work together to support efforts to capture value through sales growth, job creation, and capital projects.

They also manage a data collective on behalf of supercluster members that will create pools of data in support of open innovation. The ideal candidate has a track record of driving revenues from new, high- technology products.

04

Vice-President, Finance & Corporate Services (our CFO position)

The VP Finance & Corporate Services is responsible for overseeing all financial-related matters, including financial planning, budgeting, and cash flow management. This includes accounting operations and financial reporting. Diversity & Talent Development and IT specialists are also part of their team. Their key goal is to ensure the Entity has the resources it needs to support its programs. The ideal candidate has a track record of financial management for national, membership-based organizations.

05

Vice-President, Business Development

The VP Business Development is responsible for building the membership base and creating ecosystem partnerships that connect the Entity to local, national, and international partners. This work is supported by business development representatives, customer service staff, and a communications team. Their key goal is to secure new members, attract investment, and secure new R&D service contracts that lead to sustained revenue generation for the Entity. The ideal candidate has a track record of building strategic partnerships and alliances.

06

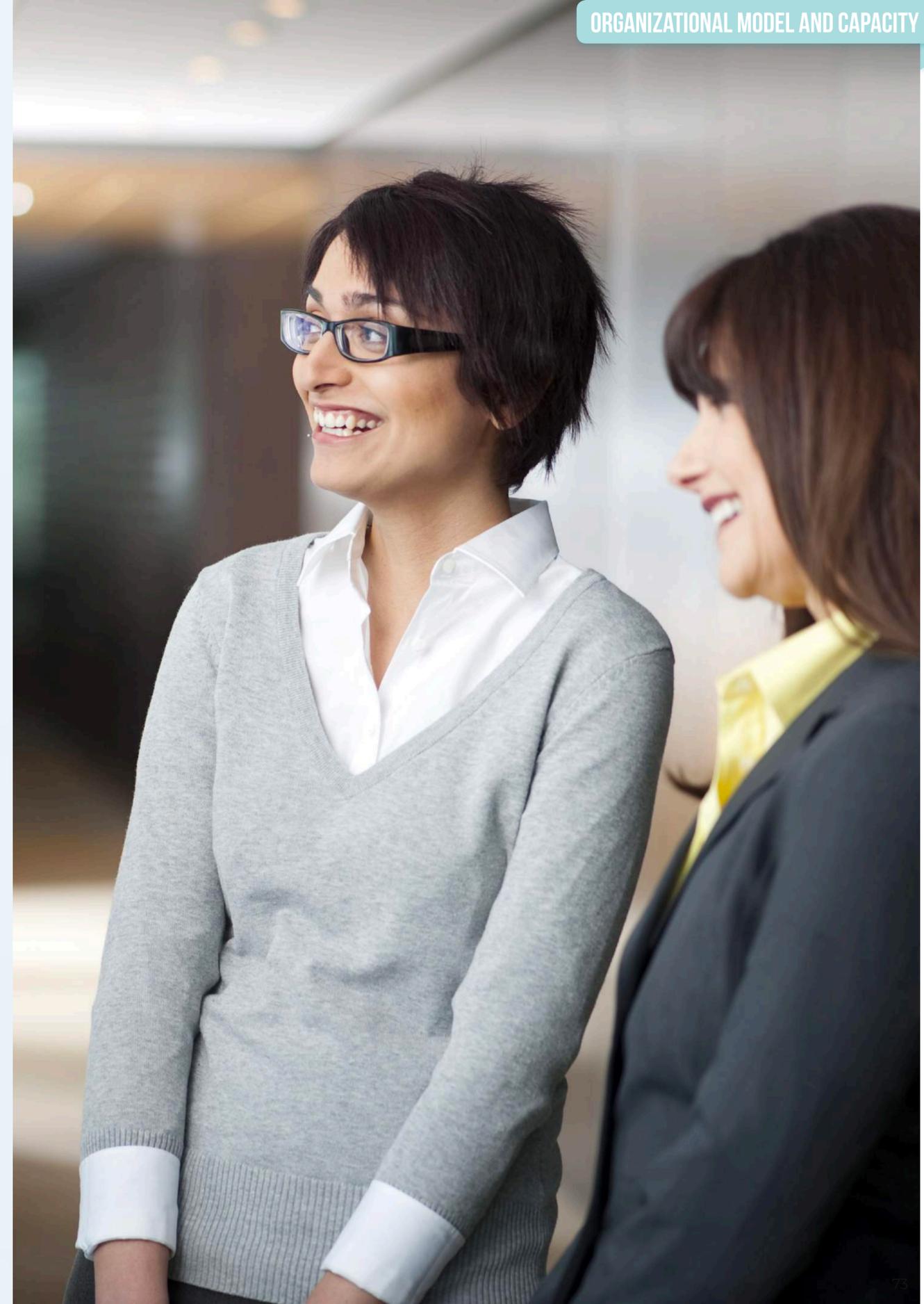
Director, Strategic Foresight & Planning

The Director of Strategic Foresight & Planning provides support to program development, business planning, and market intelligence. This ensures that the Entity has good quality intelligence to inform its program development and support effective strategic planning on behalf of the Entity and its members. The ideal candidate has a track record of technology roadmapping and assessment.

07

Advisory Committees

The CEO and executive team will use advisory committees to support specific initiatives and operations. For example, at some point the VP Growth might establish an international marketing committee to provide advice on how to promote the supercluster and related platforms in markets around the world.





Diversity

One of the pillars of the Entity's HR strategy is a focus on an inclusive, diverse talent base. This starts right at recruitment with the implementation of the Entity's diversity principles.

Diversity principles will apply at all operating levels, including the Board of Directors, the board committees, and advisory committees, and will be encouraged among those participating in projects. Principles guiding candidate selection for the Board requires there to be representation balances from traditional industry & the high technology sector and urban & rural communities, the inclusion of at least one Indigenous leader, and a maintenance of gender parity at all times. For project teams, the Entity will be developing a performance index that weighs a variety of factors that support both the participation and leadership of women in technology.

To help the Entity operate as an independent and neutral organization that reflects the diversity of its membership, a number of structures are in place. First, as a not-for-profit entity, the organization is not dominated by just one or two controlling owners. It represents the needs of its community, defined by a membership that now exceeds 200 organizations.

Second, the needs of the large membership base are reflected through the use of a relatively large Board of Directors (34 members). While helpful in providing membership for board committees, it also ensures that the organization is unlikely to become dependent on a relatively small circle of organizations or leaders.



Diversity Continued

Third, program management and project selection are membership-driven activities enabled through the support of Entity staff. For example, in the area of Precision Health, discussions around projects extend well beyond the Board. They include a broad cross section of stakeholders that include government ministries, academic research networks, SMEs with innovative new products and large MNEs with expertise in large scale technology development and deployment.

This program management model also enables the organization to respond to emerging opportunities. When a new challenge or opportunity presents itself, the Board Program Investment Committee can approve a research study for a potential new program. These studies are led by the Director of Strategic Foresight & Planning who will conduct global market and technical competitive intelligence activities to define and evaluate potential opportunities for the supercluster. This evaluation forms the basis for a new program plan which can then be reviewed and, if appropriate, approved for funding.

These structures create a model for good governance through the managed delegation of authority from the membership, through to the Board of Directors, the executive team, and Entity staff. This is supported by a conflict of interest policy that ensures that potential conflicts are identified at both the individual and organization level, and managed appropriately. Within the organization, a binding mechanism for dispute resolution between members involved in Entity-supported activities will be developed as part of the membership agreement.

In the end, the governance model for the new Entity provides the right mix of balance, direction, and flexibility to support the transformation of Vancouver's Digital Technology Supercluster into a national digital technology supercluster.

For project teams, the Entity will be developing a performance index that weighs a variety of factors that support both the participation and leadership of women in technology.

Board of Directors

The Board of Directors will be composed of board members appointed by members of the non-profit Entity. Board Members will elect people from the Board to the positions of Chair, Vice-Chair and Secretary/Treasurer. Committee Chairs are appointed by the Chair of the Board in consultation with other Board members. All positions have term limits.

01

Board Member

Board members are expected to attend all regular meetings and be active participants on board committees. They are expected to facilitate collaboration across organizations by helping connect people in their organization with potential program and project partners in other organizations. They are also expected to take an active role in the Entity's strategic planning and performance management reviews.

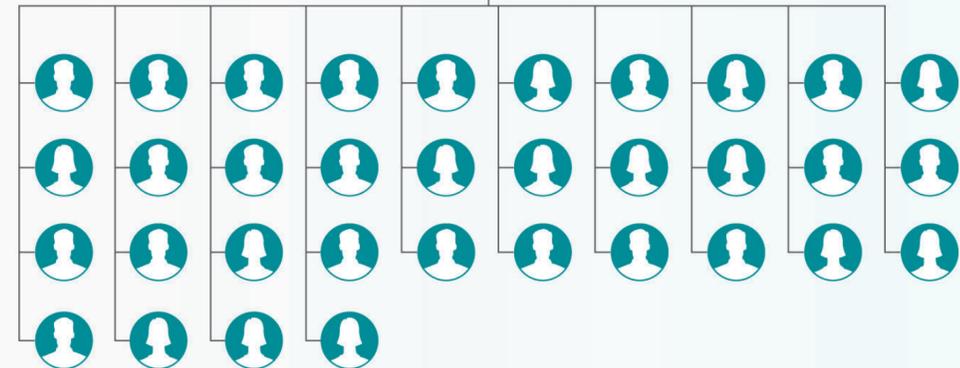
02

Board Co-Chairs

The Board Co-Chairs are elected by the members of the Board. The Co-Chairs provide leadership to the Board, chair all Board meetings, appoint committee chairs in consultation with other Board members, and work closely with the CEO on key issues and opportunities. One of the Co-Chairs will chair the Board Executive Committee. The other Co-Chair will chair the Governance Committee.

BOARD AND COMMITTEE STRUCTURE

Board of Directors



Executive Committee



Governance Committee



Finance Committee



First Nations Advisory Committee



IP and Data Management Committee



Program Investment Committee



Membership & Ecosystem Outreach Committee



Diversity, Culture & Talent Development Committee



03

Board Secretary/Treasurer

The Board Secretary/Treasurer is responsible for maintaining the records of the Board, including agenda, meeting minutes, and related materials. They are familiar with the legal foundation documents that guide the operation of the Board and Entity, and act as the Chair of the Finance Committee.

04

Board Committee Chair

A Board Committee Chair is responsible for running one of the board committees listed in section D2.1. The Committee Chair will have a Board-approved terms of reference which detail the Committee's mandate, operating guidelines, and membership. The Chair will be responsible for calling committee meetings, ensuring there is an agenda with proper materials prepared, and ensuring, through the business of the committee, that appropriate policies, oversight, and admin are completed.

05

Ex-Officio Observer

Consistent with the contribution agreement, an observer position on the Board will be established for the ISI program to monitor the progress of the Entity. This position may also attend board committee meetings when topics of interest arise.





Board Committee



Mandate Notes

Executive	<ul style="list-style-type: none"> • A subset of the full Board of Directors empowered to make decisions on behalf of the full Board within approved guidelines.
Governance	<ul style="list-style-type: none"> • Executive search and recruitment policies including the hiring process for the CEO. • Establish decision making authority, conflict of interest, and dispute resolution policies.
Finance	<ul style="list-style-type: none"> • Set financial management policies and procedures including the annual audit.
IP and Data Management	<ul style="list-style-type: none"> • Develop and monitor both the IP Strategy and Management policy and Data Governance policy.
Program Investment Committee	<ul style="list-style-type: none"> • Approve program management and project selection policy. • Review commercialization outcomes and performance of the project portfolio. • Approve new programs and appoint the Chairs of program review committees.
Membership and Ecosystem Outreach	<ul style="list-style-type: none"> • Approve membership related policies and ecosystem outreach governing partnerships & alliances in the region, across the country and around the world.
First Nations Advisory	<ul style="list-style-type: none"> • Identify project opportunities for Indigenous communities. • Advise on First Nations issues in the supercluster.
Diversity, Culture & Talent Development	<ul style="list-style-type: none"> • Responsible for ensuring the Entity creates an inclusive, respectful environment that supports the supercluster as a safe, creative space for innovation.

MEASURING AND REPORTING PERFORMANCE

Performance Measurement

Setting up a proper performance measurement and communication system goes a long way to building confidence with stakeholders.

Our approach is to establish a set of categories aligned with ISI program objectives and economic impact measures. This alignment creates an important feedback loop, so we can learn what works, and make modifications to our program strategies and project portfolio.

A. Partnerships & alliances (membership, collaboration, and outreach metrics)

B. Globally competitive platforms (investment, development, and commercialization metrics)

C. World-class talent (development, diversity, and recognition metrics)

D. Economic impact (third party methodology aligned with ISED)

One of the challenges when choosing a set of performance metrics is ensuring that related drill-down analytics can be completed. For example, we may establish an indicator for women in technology. However, follow-up interest in youth engagement may lead to a desire to segment that result through a new “young women in technology” indicator. That may be followed by interest in understanding the participation of young women who are aboriginal, leading to a “young aboriginal women in technology” indicator.

Our response to this challenge is to build a library of KPIs that allows us to build focused performance scorecards. Instead of having one set of Entity-level KPIs listing only one or two diversity metrics, the Entity can actually build a diversity scorecard and dive deeper into the data. The KPI library is a dynamic tool for a structured approach to performance management. The initial list of indicators is available in the table that follows:



PERFORMANCE METRICS

A | PARTNERSHIP & ALLIANCES

Membership Base

- # of registered members
- # new members joining in the fiscal year
- # of members active in at least one project during the life of the Supercluster
- # of members active in at least one project during the year
- # of member departures during the year

Collaborative Projects

- # of collaborative projects
- # of collaborative projects involving SMEs
- # of collaborative projects involving a post-secondary or research institution
- # of collaborative projects involving a First Nations enterprise
- Average # of participants per collaborative development project

C | WORLD-CLASS TALENT

Talent Development

- \$ allocated to digital technology scholarships
- # of interns participating in collaborative development projects
- # of connections with world-class research chairs and institutes
- Number of professional, science and technology-related jobs in the cluster

Diversity Initiatives

- # of projects with one or more work packages led by women
- # of projects with one or more work packages including First Nations members

Excellence and Recognition

- # of awards sponsored by the Supercluster
- # of citations collected recognizing excellence in entity supported projects

B | GLOBALLY COMPETITIVE PLATFORMS

Investment Attraction

- \$ value of investment committed by private sector organizations
- leverage > # of private sector dollars invested for every dollar of Supercluster funding
- leverage > total dollars invested for every dollar of Supercluster funding

Development Pipeline

- # of process, product and technology platforms in development
- # IP created in entity supported projects (patents, trademarks, design regs etc.)
- # of active demonstration projects
- # of demonstration projects completed

New Platform Sales (VP Growth)

- # of new process, product and technology platforms launched
- # of greenfield and expansion projects funded in the Supercluster
- \$ value of capital investment projects related to commercialization projects
- \$ value of sales from new process, product and technology platforms
- # of countries where a new platform sale has been made (commercial terms)

D | ECONOMIC IMPACT

Investment Attraction

- # new jobs created
- # new jobs created in SMEs
- # new jobs created in new ventures (started in the last 3 years)
- # new jobs created in scaling ventures (firms with \$1M to \$10M in revenues / yr)

GDP

- Aspirational goal to move tech sector from 7% of GDP to 12% of GDP

BERD (Business Expenditures on R&D)

- Aspiration goal to move BC's BERD from 0.70 to 1.00



Data Collection and Reporting

The Entity's measurement and reporting system will be integrated into the Entity's project management procedures with specific obligations outlined in the Master Project Agreement. This will be supported by a central registry system that structures performance data collection in a way to efficiently build performance scorecards and reports.

The Entity will produce formal semi-annual reports and use a monthly reporting cycle in Entity management and operations. To help make this more efficient and responsive, the Entity will explore automating this through an online registration, tracking, and reporting system.



PROGRAM AND PROJECT MANAGEMENT

Strategic Program Strategy

The Entity operates through collaborative development projects that support the goals and objectives of strategic programs. These programs enable the Entity to articulate clear strategic goals and align the resources of members around common program objectives. By creating program level guidance for project investments, the net result is a mix of complementary projects and partnerships that deliver productivity improvements and grasp global market opportunities.

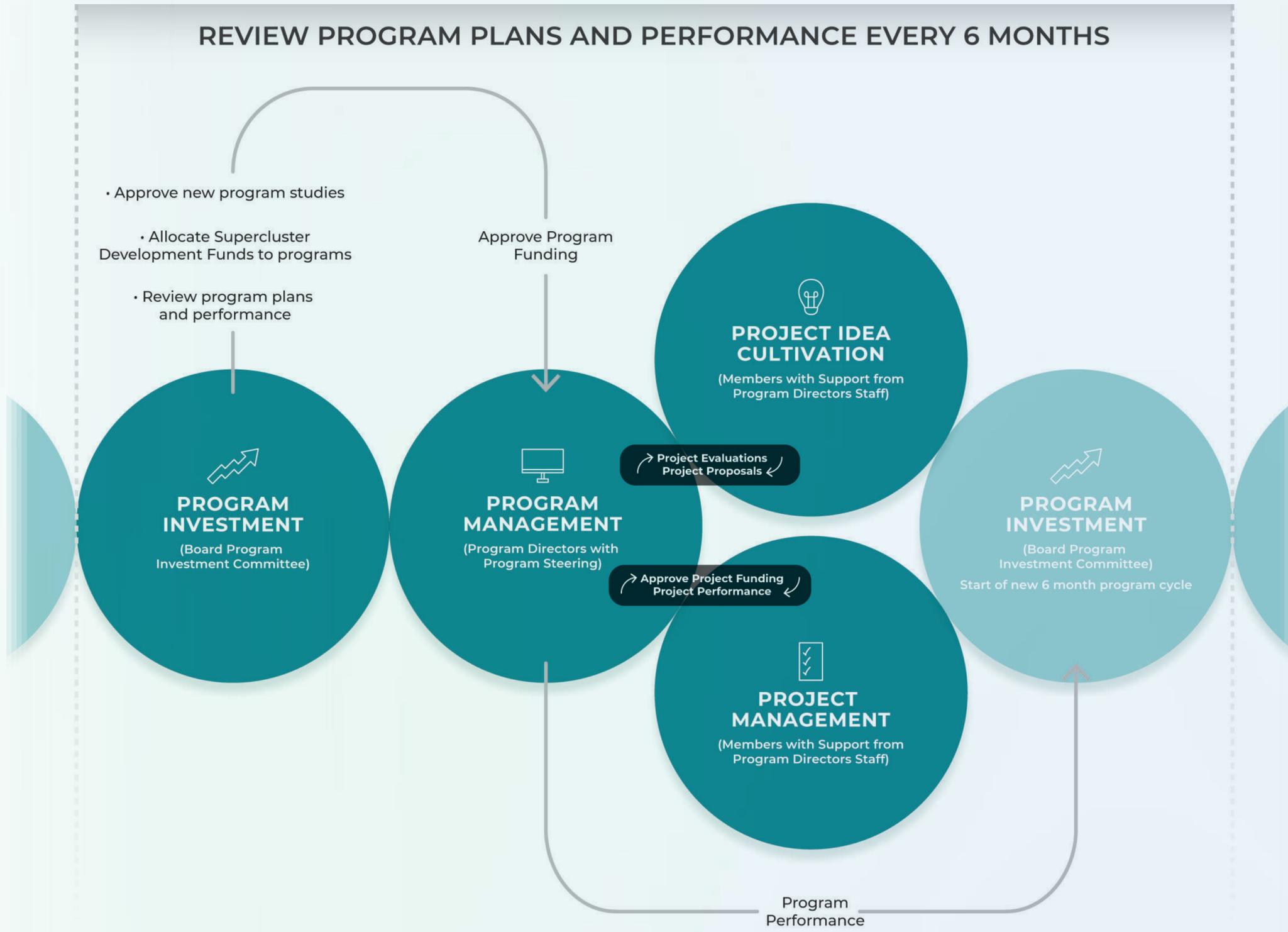
The VP Technology leads the development and management of the Entity program portfolio. New programs undergo a strategic foresight and intelligence exercise to ensure programs are capable of delivering a meaningful impact in a strategic area of interest. The Board Program Investment Committee reviews the resulting program plans and

approves an allocation of the annual Supercluster Fund based on program management policies and membership level rights.

Each program is led by a full-time Program Director who works with a program steering committee, consisting of representatives from participating members, up to the limits established by their membership level. Every six months there will be a project development cycle that creates a mix of potential projects, evaluates these potential projects, and awards investment to a rank-ordered list of successful projects.

Once awarded, projects are funded through stages and appropriate milestone reviews as per a Master Project Agreement signed between the Entity and all project participants.

REVIEW PROGRAM PLANS AND PERFORMANCE EVERY 6 MONTHS



Project Design Cycle

PROGRAM INVESTMENT

- Review program plans and performance
- Allocate supercluster development funds to programs
- Approve new program studies.

PROGRAM MANAGEMENT

- Collect projects
- Evaluate projects (individual reviews based on Established criteria)
- Rank and approve projects (group review and discussion)
- Submit program performance

PROJECT IDEA CULTIVATION

- Issue call for proposals
- Explore project ideas
- Build collaborative project teams
- Create project plans and submit proposals

PROJECT MANAGEMENT

- Negotiate and sign Master Project Agreement
- Kick-off and execute project as per the plan
- Submit project performance reports into program management

Semi-Annual Program and Project Design Cycle

Project Types

The Entity funds Technology Leadership and Ecosystem Development Projects that align with the themes of eligible activities. Technology leadership projects enhance the productivity and competitiveness of member firms, and are divided into different types of projects as follows:

TECHNOLOGY LEADERSHIP PROJECTS

Pre-Market Project Types

Project Type	Description
Technology Assessment	Explore the potential impact of emerging technologies and provide recommendations on development options.
Co-Development	Develop digital process, product, and technology platforms to achieve a targeted performance advance and competitive advantage.
Demonstration & Testing	Characterize, measure, and evaluate platform performance in late-stage prototype tests or field trials for qualification and certification.

In-Market Project Types

Project Type	Description
Market Adoption	Support the adoption and use of technology during the acquisition of the first commercial clients for the platform.
Global Scale	Support the acquisition of commercial clients outside Canada and the United States.

Project Types Continued

Ecosystem development projects focus on ensuring that opportunities are distributed to a broad cross-section of individuals and organizations across the ecosystem. Project types include:

ECOSYSTEM DEVELOPMENT PROJECTS

Project Type (ISI Theme)

Description

SME Scale-Up
(Partnerships for Scale)

Co-development project opportunities for SMEs to become partners in globally competitive platforms that accelerate their growth.

Digital Internship
(Diverse and Skilled
Talent Pools)

Help to people entering the field of digital technology to get pay and relevant work experience, with 50% of positions for women.

Strategic Engagement
(Global Advantage)

Targeted outreach to global Chief Technology Officers along with marketing and promotion activities that position the supercluster in the global innovation system.



Member Input into Project Ideas

There are two occasions where members can bring forward project ideas. The first is in program discussions. These discussions revolve around shared areas of strategic interest such as the Phase 1 programs of precision health, the development and use of virtual production environments (digital twins), and the development of new products and services through leveraging aggregated datasets (data commons). Project ideas help frame the program opportunity.

The second is at the start of program project development cycles. This cycle combines periodic open forums to reach into the community, a call for proposals, and active project development. Program directors connect potential partners around collaborative development opportunities and encourage existing project proponents to expand their partnerships, such as complementary SMEs and connections to research institutions.

1st Level Project Evaluation

The Board Program Investment Committee sets the evaluation criteria to be used in evaluating projects.

The first level of evaluation includes three qualifying criteria that all projects need to meet in order to move to the next stage of review.

- **The project is aligned with the strategic direction of the program.**
- **The project team is a strong, collaborative partnership combining the strengths of at least three different organizations representing at least two membership classes.**
- **The project is organized around a process, product, or technology platform with a line of sight to a defined market and sales opportunity.**

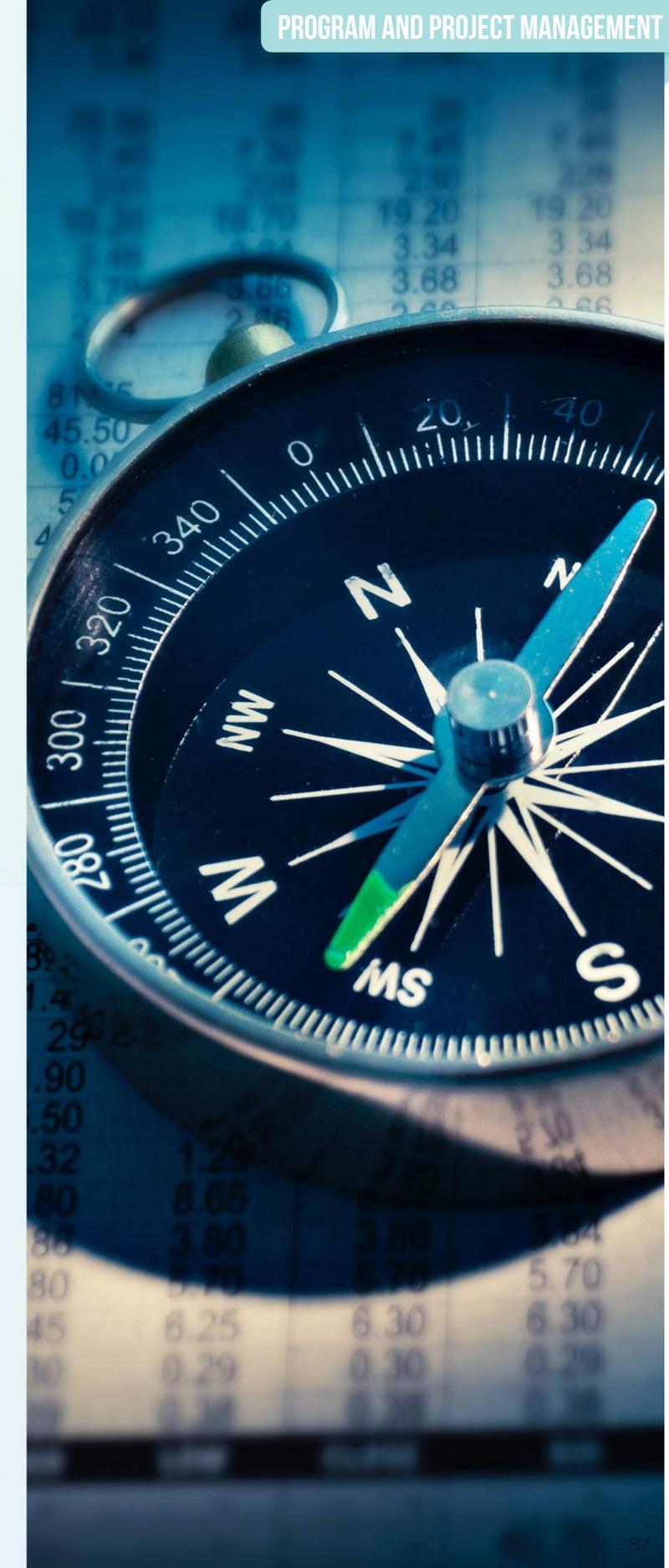
2nd Level Project Evaluation

From there, the program steering committee, with the support of the Program Director, reviews and ranks projects so that investment funds flow to the very best projects. Here are the main criteria for evaluating potential projects:

- **Opportunity.** The project is aimed at an opportunity with a clearly defined target customer based on a significant competitive advantage.
- **Commercialization potential.** The opportunity is aimed at an attractive, growing market with a clear path to sales.
- **Time to market.** Projects aim to launch a new process, product, or technology platform in 1 to 7 years with an overall portfolio goal of completing platform launches every year.
- **Collaboration.** Larger project partnerships are encouraged to create alliances that can compete against the very best from around the world.
- **Diversity & talent development.** Leadership opportunities for under-represented groups and outreach to regional partners outside the main urban centres are encouraged.

- **Return on investment.** The opportunity has the potential to capture the market share required to deliver sales, job growth and economic impact for the scale of investment.
- **Global branding.** The opportunity enhances the global reputation of the Digital Technology Supercluster, leading to additional investments in the ecosystem.

These criteria provide clear guidance on what the Entity looks for in collaborative development projects. In addition, the use of strategic programs ensures funding is directed towards opportunities that are market-based and bigger than any one individual company. Finally, our use of Master Project Agreements creates the flexibility for project partnerships to respond to opportunities with broader alliances. The result is a balanced project portfolio, featuring a broad collection of members, that supports the goals and objectives of the Digital Technology Supercluster.





Management of Program Funds

The Entity has three main elements that govern its approach to ensuring the sound management of program funds and participant contributions:

- Financial management policy framework
- Financial management and accounting system
- Master project agreements

The financial management policy framework covers the policies and procedures governing the Entity's financial management system. These policies are reviewed and approved by the Board Finance Committee. These policies ensure that governance and oversight activities (including external audit controls) are effective, internal controls are properly established, financial information supports decision making and accountability, and standardized, efficient financial management practices are in place.

The financial management and accounting system is how the Entity executes the expectations outlined in financial policies. This includes appropriate delegations of authority for contract and expenditure approval, reserves policy, conflicts of interest, and segregation of duties to help prevent fraud and error.

As well, the Entity operates through an approved annual plan and budget with regular reporting and monitoring of income and expenditures.

The Master Project Agreement (MPA) is the central form of contract documentation for managing collaborative development projects. The agreement establishes the purpose of the project agreement, the roles and responsibilities of all parties involved, and clarifications around key terms and conditions like intellectual property.

In the MPA, project activities are defined in one or more statements of work with each statement of work outlining a set of deliverables. This is also where incremental and eligible activities are defined so that industry matching eligibility is defined before the project begins. As a signatory to all MPAs, the Entity is able to confirm which activities will be eligible and, where necessary, make adjustments to workplans and expectations.

Industry funds can flow directly through the Entity or directly to a project recipient. In either case, the funding agreement ensures that proof of invoice and collection are obtained so that the execution of the funding contribution can be confirmed. By ensuring that there is a clear verification standard, members have the flexibility to invest and capitalize funds in ways that are most appropriate for their R&D investments, while the Entity still captures and tracks the contribution.

Together, the establishment of a sound financial management policy framework, approved by the Board Finance Committee and executed through a properly organized financial management and accounting system using the structure of Master Project Agreements, ensures that the Entity is able to be a good steward of all contributed resources.



INTELLECTUAL PROPERTY

IP Strategy

Collaborative development projects that receive funding from the Innovation Superclusters Initiative will create new, Entity-supported IP. The Entity's goal is for members to leverage this IP to build the competitive strength of collaborative partnerships and alliances, enabling members to generate new process, product, and technology sales or drive significant productivity improvements in their enterprises. The IP strategy consists of the following elements:

01

Role of the Entity

Position the Entity to encourage, facilitate, and promote well-balanced, world-class collaborative partnerships and alliances.

02

Master Project Agreements

Use a standard master agreement to define roles, responsibilities, and terms and conditions for collaborative project work, including completed IP agreements.

03

The Entity's IP Registry

Use an internal, Entity-managed IP registry to track and monitor the ownership, licensing and commercialization outcomes associated with Entity-supported IP.



Role of the Entity

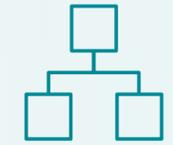
As a facilitator of collaboration, the Entity will not seek to hold and profit from holding IP assets. The Entity will focus on providing members with access to independent expertise and mentorship to help use Entity-supported IP to strengthen the competitiveness of new process, product and technology platforms.

For example, a commercialization manager under the VP Growth, may help match members, help members with a research and commercialization strategy, mentor members, analyze aggregate data on commercialization outcomes, and suggest improvements to the innovation and IP strategy.

To support this role, the Entity will have a dedicated service unit using Entity staff and external contractors

to facilitate the management of IP and provide advisory support for the development and use of IP in projects. This includes the acquisition or licensing of external IP, if required, to support a specific program or collaborative development project. The unit will operate under a Board-approved policy called IP Strategy and Management. A board committee (IP Strategy and Management Committee) will be responsible for the development and monitoring of the policy.

The Entity will also provide training & development services in a wide variety of IP management topics, with a particular emphasis on helping SMEs develop appropriate IP-enabled technology development strategies.



Master Project Agreements

The diversity of the membership base across multiple sectors requires the Entity to accommodate some flexibility in approaches around the management of IP. Thus, the Entity manages approved collaborative development projects through Master Project Agreements (MPA) that outline the roles, responsibilities, and obligations of each member in a binding agreement. This includes completed negotiations around the details of IP management.

The policy framework establishes standards that ensure all members of a project will have appropriate rights to newly-generated intellectual property.

Details include licensing of IP, protection of background IP, and ownership and usage rights associated with new IP. These details are guided by policies and procedures outlined in

the Entity's IP Strategy and Management Policy, with a method of binding arbitration specified for dispute resolution.

In an MPA, members retain ownership of background IP. To safeguard this, every MPA protects this background IP and confidential information using a standard NDA along with a set of permissions or restrictions associated with specific forms of background IP. It is the responsibility of the owner of the background IP to define these permissions and restrictions.

Ownership and usage rights associated with potential new IP are agreed upon in writing and executed by all participants in the project before the project is initiated. In addition, all individuals working on projects will have signed an IP license or assignment agreement with one of the Entities involved in the project. The policy framework establishes standards that ensure all members of a project will have appropriate rights to newly-generated intellectual property. This approach is particularly helpful for SMEs that may not have the legal resources or experience of larger project partners.

As a signatory to all Master Project Agreements, the Entity is able to facilitate discussions and approvals to help ensure that final terms and conditions are indeed fair and reasonable.

As part of the resources for building Master Project Agreements, an IP management standards library will be developed through a combination of best practices and project experience. Much like programmers use a central software library with standard code for repeated processes, the Entity will use central standards for repeated project use cases. These standards will set baseline expectations and lead to a variety of practical approaches to the challenge of creating "frictionless" IP.



Commercialization and the IP Registry

It is important for the Entity to follow up and ensure IP is maximized for the benefit of members and the ecosystem. The Entity's IP registry is an internal record system that supports the monitoring and management of Entity-supported IP. These records confirm ownership, licensees, associated rights, and commercialization outcomes.

As an extension of the registry, a set of procedures cover the management of IP through the lifecycle of a project. As part of project initiation, the Entity facilitates the completion of an IP review in which it will record and protect existing (background) IP relevant to the project scope, and ensure that all written approvals to use background IP and licensing terms for newly developed IP are documented. In cases where there is significant patent activity, a freedom to operate opinion will be secured.

During the project, newly-developed IP will be declared through a centralized record-of-invention process connected to the Entity's IP registry. This process will ensure all new IP is properly assigned and managed. Ownership of newly-generated IP will

follow the agreed-upon provisions that were approved in the Master Project Agreement. As well, project materials (documents, reports, lab notes or equivalent, recordings) are considered part of the project IP and will be retained in compliance with a set of project record management standards.

At the end of the project, a closing IP review will verify newly-created IP disposition along with ownership and licensee rights. Also, monitoring of commercialization outcomes extends beyond the life of the collaborative development project to ensure IP is being maximized for the benefit of members, including SMEs and the broader innovation ecosystem.



IP Strategy Benefits

Alignment to Program Objectives and Benefits to Canada

The first benefit is the creation of new collaborative partnerships organized around world-class platforms aimed at attractive, global markets or productivity improvements. By integrating Entity-supported IP into the platform strategy of new process, product, and technology opportunities, the Entity ensures that all assets required to capture market share are present, including but not limited to sales, marketing, production, and talent. It is the ability to create the right total team that yields a shared competitive advantage, not just the IP.

By framing IP in the context of a commercialization opportunity, it also makes it easier to attract investments in leadership, talent, and capital that are looking for world-class innovative business opportunities. Thus, a second benefit of our IP strategy is the creation of these investable opportunities.

With additional investment, collaborative partners then create the capacity to acquire new sales revenues and the associated profit growth that is

the essential business driver for capital investment, new hiring, and business expansion. This expansion is the source of the ROI for members and the range of economic impact multipliers, starting with job creation. In short, new product sales are the key to new job creation. Thus, the third benefit of our IP strategy is that it facilitates the business expansion that drives job creation and economic impact.

Finally, world-class digital process, product, and technology platforms operate as hubs for a collection of companies with complementary strengths and contributions. As these platforms gain traction in global markets, they create revenue opportunities for partner companies, which increase demand for technical collaboration. With the Entity's Master Project Agreement model, it is much easier to onboard new partners and accelerate momentum in the growth of a digital ecosystem. Thus, the Entity's IP strategy actually leads to follow-up phases of increased engagement and collaboration.

IP Management and Royalty Frameworks

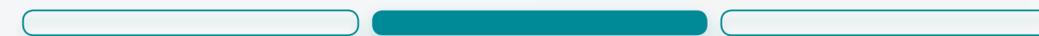
Within the IP management system are a range of assets (patents, industrial design, trademarks, copyright) and know how (trade secrets, project records, data) that contribute to the competitiveness of a company in one or more process, product, and technology platforms. These assets are not licensed individually, but in agreements that assign one or more of these assets to a platform opportunity, according to the terms in a Master Project Agreement.

The IP registry is the process the Entity uses to track and monitor the IP elements of these agreements as well as follow the commercialization outcomes associated with sales growth and productivity improvements. This linkage creates the essential feedback loop to confirm what benefits are being created from Entity-supported IP, and allows the Entity to make adjustments to its IP Strategy and Management Policy.

These IP agreements nested in Master Project Agreements are designed so enterprises can secure ownership of newly-generated IP related to their

background IP and strategic positions while offering reasonable and non-discriminatory licensing of appropriate rights to development partners. This provides an opportunity to support royalty-free arrangements for all members in a collaborative project. Exceptions would include projects with a significant difference in investment levels or significant maintenance costs associated with a type of newly-generated IP.

Any royalties of IP generated through funded projects are distributed as per the defined terms and conditions of each project's Master Project Agreement. Consistent with its role and as a signatory to the Master Project Agreement, the Entity would ensure that any royalty arrangements were based on a fair, reasonable, and non-discriminatory set of terms and conditions.



Benefits to Members

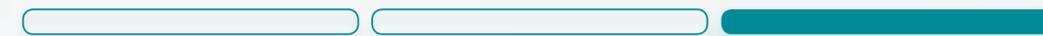
By embedding participating SMEs into world-class collaborative partnerships, SMEs gain a position in a globally competitive digital process, product, or technology platform. It automatically elevates the underlying quality of their product and technology portfolio. In addition, the SMEs gain access to global markets far quicker and more efficiently than if they were to attempt these efforts on their own.

For large firms, who generally work with other large firms, introducing SMEs into their collaborative partnerships often results in new ideas outside the conventional thinking of their traditional vertical relationships. It allows the large firms to explore riskier ideas than they might otherwise include in their internal project mix.

Finally, the critical contribution of an IP strategy is not just what it adds to collaborative development projects, but also what it takes away. If IP is difficult to license, IP rights are put at risk, or rights associated

with new IP are undefined, the transaction costs associated with collaboration are too high. Many companies will often opt-out of the opportunity to play it safe.

Our IP strategy is designed to mitigate risk, take away uncertainties, and reduce the transaction costs associated with participating in collaborative development projects. As members become comfortable in their working relationships, platforms capture market share, and new product revenues drive increased collaboration, we create strong alliances of Canadian companies that achieve repeated successes in the global innovation system. This is what happens when we use Entity-supported IP to build the competitive strength of collaborative partnerships and alliances in the ecosystem.



MEMBERSHIP MODEL

The Entity uses an open membership model that enables any organization to join as an associate member. This removes any barrier preventing SMEs from joining and encourages the rapid scale up of a community of interest around data-driven innovation.

Membership provides organizations and their staffs with the opportunity to explore and participate in collaborative development opportunities in a safe, inspiring place of innovation.

New members have many routes to membership, including direct contact with Entity business development staff, registration through the website (prototype already successfully deployed as part of the Phase II application process), and key account engagements aimed at attracting significant global enterprises to supercluster projects. Early efforts show this approach working very well as the supercluster has grown from about 60 to over 240 members between the LOI and Phase II application.

Beyond creating a broad membership base, the Entity also needs to attract significant levels of R&D Investment. Thus, the membership structure is designed to incentivize organizations to make and meet annual commitments to collaborative R&D for the year, with increasing benefits associated with larger commitments. In addition, being new, the Entity requires significant support from larger leadership companies and thus, a founding membership category has been created.



Membership Categories

Membership Categories	Levels
Associate Members	<ul style="list-style-type: none"> • No minimum. Contribution by project. • Any organization can join as an associate.
Regular Members	<ul style="list-style-type: none"> • Regular Level > \$200K per year commitment • Gold Level > \$400K+ per year commitment
Founding Members	<ul style="list-style-type: none"> • Founder Level > \$2M per year commitment for 5 yrs. • Platinum Level > \$5M per year project commitment for 5 yrs.

Membership Classes

Membership classes are:

- SMEs, Canada's MNEs, International MNEs, Investment Funds & Foundations, Post-Secondary Institutions, Research Institutes, Government Ministries & Agencies, Non-Profit Organizations

Regular members are bound by a one-year annual term, and can renew each year. Founding members start with a five-year initial term, and can renew annually thereafter.

To supplement this basic membership grid, a set of membership classes is also applied to organizations to facilitate collaboration through different combinations of members.



Membership Benefits

Different membership levels have different benefits as an incentive to make commitments to increasing levels of collaborative R&D. These benefits are not designed to be exclusionary. It is important to recognize that:

- Any member can join a program partnership or alliance.
- Any member can leverage supercluster funds.
- Any member can participate in project proposals and delivery.

Membership benefits are associated with Board and Committee membership, strategic programs, and specific program and project benefits. Board and Committee membership simply recognizes that larger funders are taking larger risks and thus need to have a larger voice in the operation of the organization.

In strategic programs, it is important for members contributing large dollars to be confident that the Entity will allocate funds to their strategic priorities. Thus, members have rights to ensure funds are allocated to programs of their choice. The Entity also

increased the incentive for early commitments at the LOI stage. Programs are not projects. There is still a competitive process for project development and selection. These benefits are about ensuring that there is a strategic alignment between Entity investments and its members.

Finally, in program and project management benefits, benefits focus on program steering committee membership, participation, and greenlighting. Greenlighting is an option that helps members reduce one of the risks of membership. While most members are expected to be able to develop projects that are approved for investment, there are occasions when a member may have a qualifying project that they know is important, but for any number of reasons, is unable to fund. Greenlighting enables them to move approval forward on that project, subject to a limit on the value of the Entity investment.

Membership Benefits Table

Membership Benefits	Founding Memberships		Regular Memberships		Associates
Item	Platinum	Founder	Gold	Regular	Project
Qualification	Limit of 4	Limit of 16	Open	Open	Open
Annual Membership	\$5M (5-year commitment)	\$2M (5-year commitment)	(\$400K min)	\$200K	Contribution by project
..... Board & Committee Membership					
Board membership: # of seats	Yes (2)	Yes	1 per 10 members (max 4)	1 per 20 members (max 4)	N/A
IP and Data Management Committee: # of seats	Yes (2)	Yes (1)	Observer	N/A	N/A
..... Strategic Program Sponsorship and Fund Allocation					

Membership Benefits	Founding Memberships		Regular Memberships		Associates
Item	Platinum	Founder	Gold	Regular	Project
Join Program Partnerships & Alliances	Yes	Yes	Yes	Yes	Yes
New Program Sponsorship	Yes Priority 1	Yes Priority 2	Yes Priority 3	Yes Priority 4	N/A
LOI Stage Commitment	175%	150%	125%	125%	N/A
Proposal Stage Commitment	150%	125%	100%	100%	N/A
..... Program & Project Management Benefits					
Program Steering Committee Membership	Yes (No limits to # of programs)	Yes (No limits to # of programs)	Yes (1 program per \$200K of investment)	Yes (1 program limit)	N/A
Leverage Entity Funds	Yes	Yes	Yes	Yes	Yes
Project Proposal and Delivery	Yes	Yes	Yes	Yes	Yes
Greenlighting a Project	3 projects / year to a max of \$750K / year	2 projects / year to a max of \$300K / year	1 project / year to a max of \$60K / year	1 project / year to a max of \$30K / year	No
Access to Program Summaries, Project Reports and Results	All	All	Program specific limits plus direct projects	1 program plus direct projects	Project Only

Membership Benefits Continued

Ultimately, the membership model is designed to find a balance between providing access for interested participants and incentivizing commitments to collaborative R&D funding. It is important to note that members cannot get funded by themselves. It is only by working together with other members that they can secure funding.

The combination of the Entity's strategic programs, master project agreements, and project selection system outlined in section D2.4, along with the Entity's membership model, create an organization with structures, systems, and processes that operate together to build a collaborative environment.



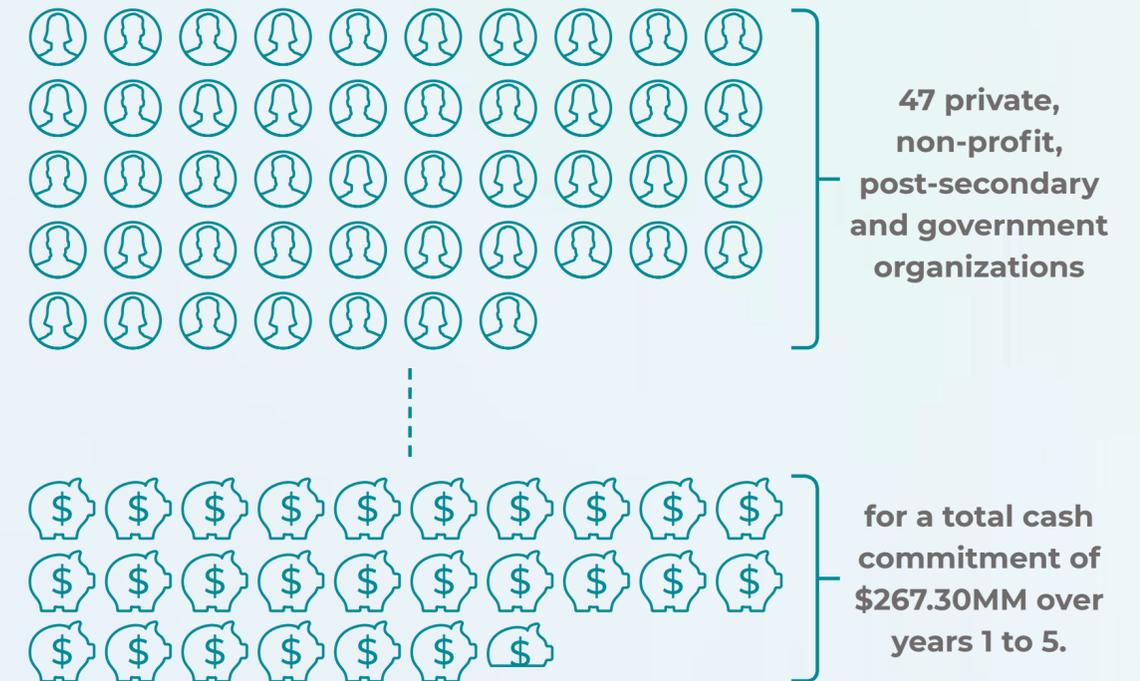
THE FINANCIAL MODEL

Funding Profile

Funding for project costs as well as the administration and operation by the Entity is provided through the cash and in-kind contributions from industry, post-secondary, and not-for-profit organizations leveraging funding from the federal Innovation Supercluster Initiative. Cash funding for projects and the Entity are committed annually at the start of each fiscal year. A portion of the cash is provided up front to fund the administration and operating of the entity. The rest of the committed cash is released to the Entity or directly to the projects once they are approved. For modeling, cash is shown as available and reserved for projects and the Entity at the beginning of each year.

The financial model only includes contributions from participants providing and letter of commitment or support with a specific value. In total 47 private, non-profit, post-secondary and government organizations are included for a total cash commitment of \$267.30MM over years 1 to 5. Cash commitments ranged from \$20K to \$6.24M annually by individual organization.

In-kind contributions are measured at fair market value at the time they are provided and are modeled on a straight-line basis over the initial 1 to 5 years of supercluster activity. Thirty-five organizations committed to a total of \$246.88MM of in-kind contributions over 5 years. In-kind commitments from qualified industry matching organizations was 18% (\$55.78MM) of their total commitment.



(Thousands)	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Total	%
..... Cash							
ISI	\$12,500	\$62,500	\$62,500	\$62,500	\$50,000	\$250,000	33%
Non-profits	\$120	\$120	\$120	\$120	\$120	\$600	0%
Post-secondary	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000	1%
Private Sector	\$51,340	\$51,340	\$51,340	\$51,340	\$51,340	\$256,700	34%
Cash Total	\$65,960	\$115,960	\$115,960	\$115,960	\$103,460	\$517,300	68%
..... In-Kind							
Government	\$147	\$588	\$588	\$588	\$589	\$2,500	0%
Non-profits	\$9,612	\$38,447	\$38,447	\$38,447	\$38,448	\$163,400	21%
Post-secondary	\$1,471	\$5,882	\$5,882	\$5,882	\$5,882	\$25,000	3%
Private Sector	\$3,280	\$13,121	\$13,121	\$13,121	\$13,132	\$55,775	7%
In-Kind Total	\$14,510	\$58,038	\$58,038	\$58,038	\$58,052	\$246,675	32%
Grand Total	\$80,470	\$173,998	\$173,998	\$173,998	\$161,512	\$763,975	100%



Cost Profile

Total expenditures are tied to total funding and over years 1 to 5 amount to \$763.98M with 89% (\$680.88MM) for project costs and 11% (\$89.10MM) for the administration and operating cost of the Entity.

The financial model includes the initial phase 1 platform and application projects that have been identified as well as future phase 2 through 10 opportunities. Projects are associated with themes:

Technology Leadership

Partnerships for Scale

Diverse and Skilled Talent Pools

Global Advantage

Estimates for project expenditures were created from the individual draft budgets for each of the phase 1 projects starting in year 2 and continuing through year 7. Cost estimates for potential phase 2 through 10 projects were then added to the phase 1 expenditures

to show steady growth in project costs through year 4. Future phase 2 to 10 projects were distributed by project theme and sub-theme with 70% in Technology Leadership and 10% each in Partnerships for Scale, Diverse and Skilled Talent Pools and Global Advantage. Funding for each project theme was then broken down further by individual sub-themes such as Collaborative R&D Projects and Linking Start-ups with Strategic Partners.

Project Budgeting

Project budgets were allocated by cost type and then were further described by major category.

Cost Type	Major Category	
Direct Labour Subcontractors and Consultants	<ul style="list-style-type: none"> • Project Manager • Engineer • Interface Designer 	<ul style="list-style-type: none"> • Statistician/Scientist • Domain Expert • Admin
Equipment	<ul style="list-style-type: none"> • Specialist/technical • Diagnostic/lab • Computer 	<ul style="list-style-type: none"> • Appliances/devices • General/office
Capital Assets	<ul style="list-style-type: none"> • Data platform • Communications platform • Test/lab environment 	
Materials	<ul style="list-style-type: none"> • Diagnostic/lab supplies • General/office supplies • Lab/office facilities 	<ul style="list-style-type: none"> • Computer supplies • Research/industry data
Travel	<ul style="list-style-type: none"> • Events • Trade • Research 	
Other Direct	<ul style="list-style-type: none"> • Networking/communications • Advanced/AI/ML applications 	<ul style="list-style-type: none"> • Computing resources • Data Warehousing

Project Budgeting Continued

Phase 1 projects ranged from 1 to 5 years long, totaled \$288M and cost from \$1M to \$106M each with an average expenditure of \$28.80M. Sample projects in Phase 1 include: Earth Data Store, Secure Health and Genomic Platform, Patient-Centric Digital Care, City Scale Projects, Crowd Sourced Data Management, Digital Learning Factory, Virtual Resource Management, Virtual Inspection and Maintenance; Indigenous Talent Development, and Tailored Health Therapies.

Estimates for costs by type and major category for phase 2 to 10 future projects were added to the phase 1 project budgets to create the total project expenditures by cost type. Direct labour accounted for 51% of project costs with an average fully loaded cost per FTE of \$90K per year. Other direct costs or computing resources, data warehousing, networking, communications, advanced applications and AI are 24% of project costs due to the focus on digital platform and application development.

Project Expenditures (thousands)	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Total	%
Direct Labour	\$0	\$42,771	\$96,212	\$115,773	\$94,879	\$349,636	51%
Equipment	\$0	\$5,894	\$15,598	\$19,540	\$24,061	\$65,093	10%
Capital Expenditures	\$0	\$291	\$458	\$558	\$678	\$1,984	0%
Materials	\$0	\$6,352	\$15,750	\$20,855	\$24,317	\$67,272	10%
Travel	\$0	\$951	\$2,982	\$3,796	\$4,517	\$12,246	2%
Other Direct	\$0	\$13,892	\$35,527	\$53,607	\$58,304	\$161,330	24%
Subcontracts and Consultants	\$0	\$2,045	\$5,948	\$7,281	\$8,045	\$23,318	3%
Total	\$0	\$72,195	\$172,475	\$221,409	\$214,799	\$680,879	100%



Administration and Operating

Entity costs of \$83.10M include Salaries, Operating, Marketing, Travel and Other which are further itemized by major category.

Salaries are fully loaded costs for the 40 full-time equivalent staff of the Entity as described in the management organization chart and average \$90K per FTE and are expected to grow at 2% per year. They total \$15.25M or 18% of the Entity's costs over years 1 to 5.

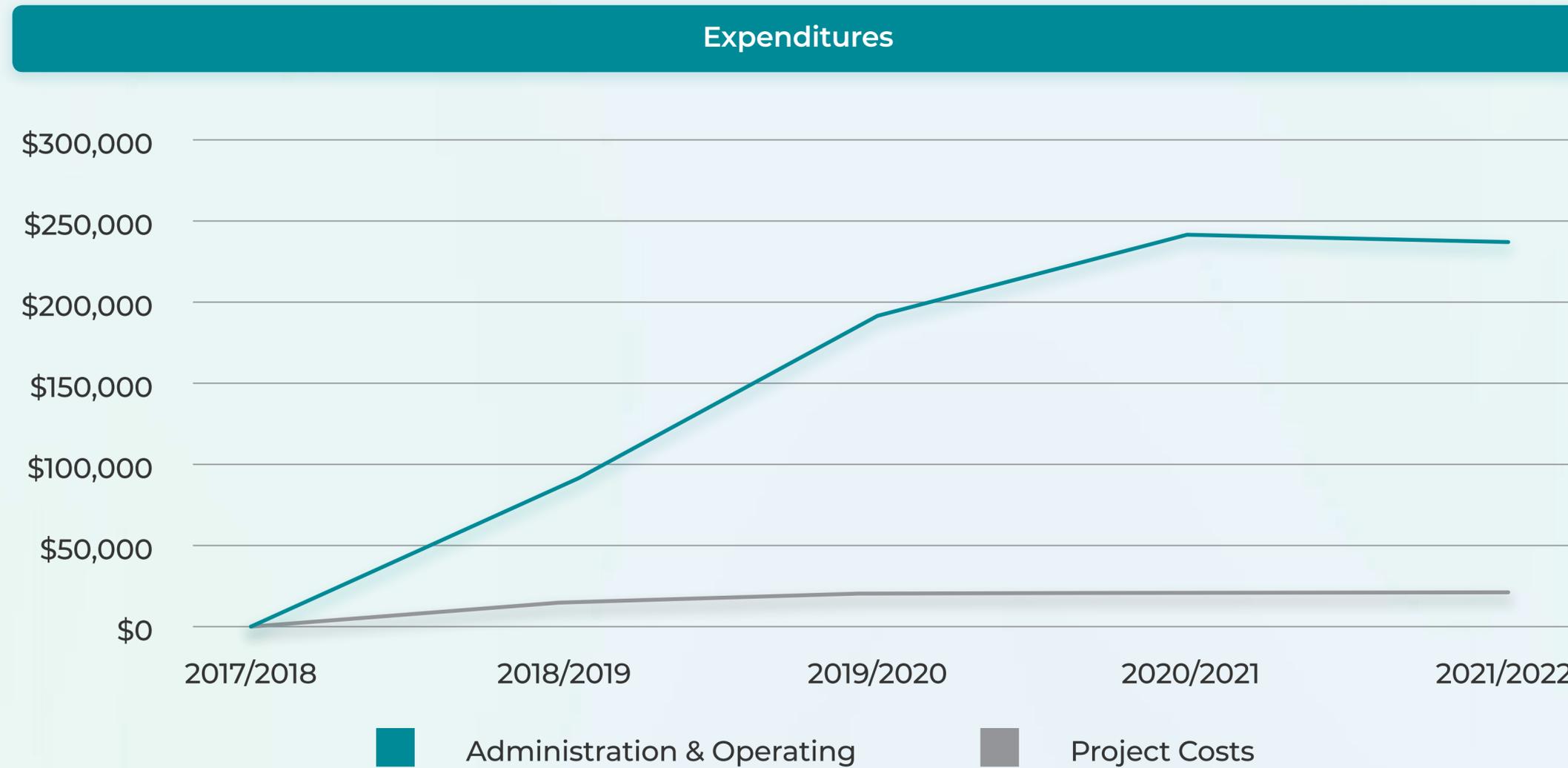
Operating costs include facilities, supplies, phone and internet, equipment and maintenance, licenses, and professional fees and account for \$9.72M or 12% of Entity costs. Marketing includes advertising and promotion, communications, collateral & branding, events totaling \$2.57M or 3% for years 1 to 5. Travel costs are \$2.00M or 2% over 5 years for hotel, airfare, transportation and per-diems of Entity staff.

Other Direct costs of \$53.55M or 65% of the Entity expenditures are programs undertaken by the Entity in support of the supercluster outcomes and are expected to be primarily partner and contractor costs. Costs are allocated for the Technology Assessment,

SME Scale-up, Digital Internship and Strategic Engagement programs and include programs such as the \$4 million annual investment to enhance the pipeline through the attraction and retention of underrepresented groups and the development of international trade through Federal and Provincial trade ministries to drive exports.

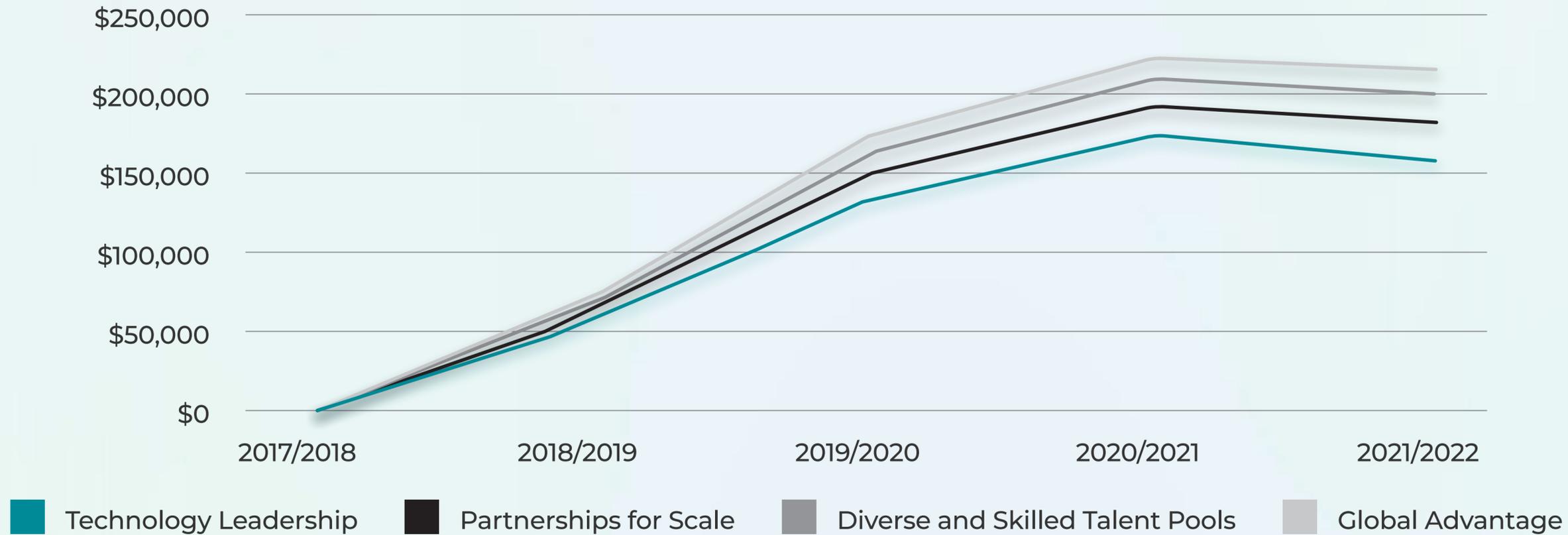
Phase 1 projects ranged from 1 to 5 years long, totaled \$288M and cost from \$1M to \$106M each with an average expenditure of \$28.80M.

Numbers at a Glance

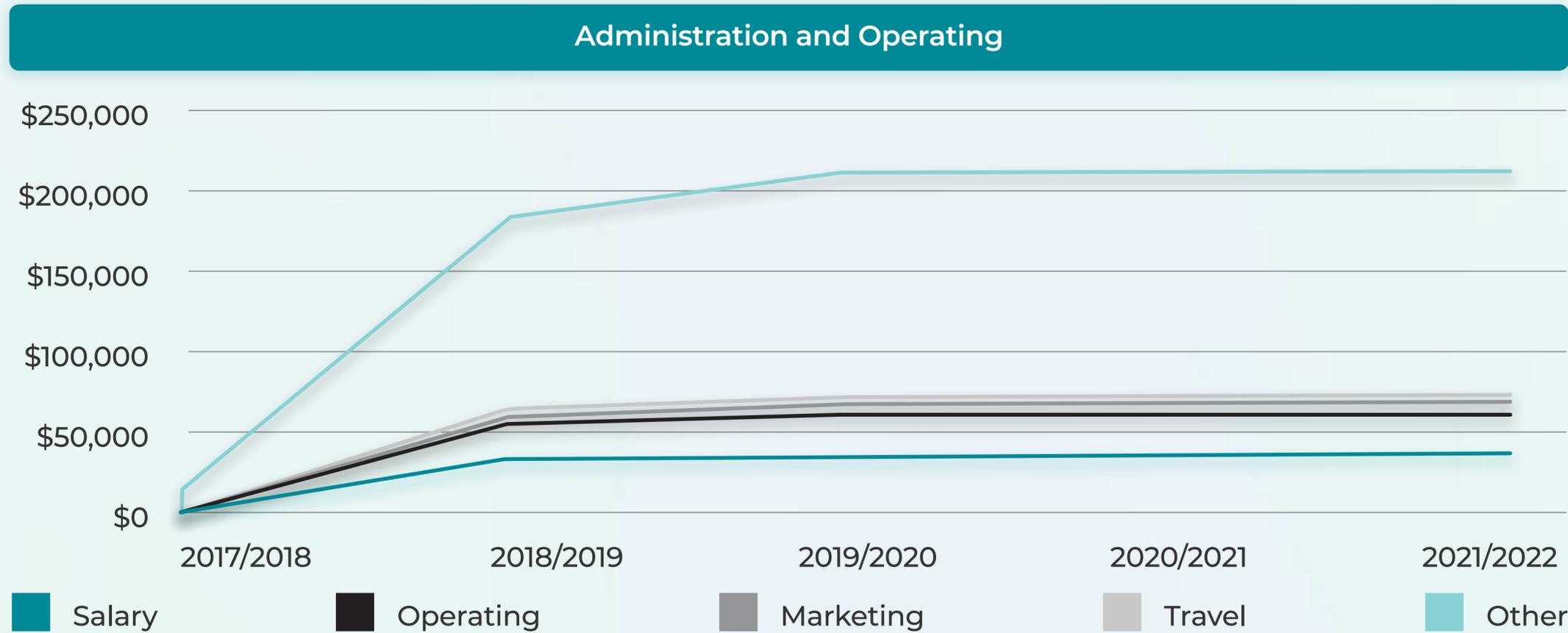


Expenditures	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Total
Administration & Operating	\$1,549,150	\$18,299,125	\$21,015,000	\$21,081,825	\$21,151,200	\$83,096,300
Project Costs	\$0	\$72,194,400	\$172,474,800	\$221,409,600	\$214,799,900	\$680,878,700
Total	\$1,549,150	\$90,493,525	\$193,489,800	\$242,491,425	\$235,951,100	\$763,975,000

Project Expenditures by Theme



Expenditures by Theme	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Total	%
Technology Leadership	\$0	\$59,416,725	\$134,935,400	\$172,397,475	\$159,226,500	\$525,976,100	77%
Partnerships for Scales	\$0	\$4,648,600	\$15,495,600	\$20,111,600	\$22,055,600	\$62,311,400	9%
Diverse and Skilled Talent Pools	\$0	\$4,845,200	\$12,437,950	\$15,975,100	\$16,851,450	\$50,109,700	7%
Global Advantage	\$0	\$3,284,675	\$9,606,250	\$12,924,925	\$16,665,650	\$42,481,500	6%
Total	\$0	\$72,195,200	\$172,475,200	\$221,409,100	\$214,799,200	\$680,878,700	100%



Note: Other is defined as ecosystem development, diversity programming, regional programming, partnerships, Canada-wide engagement, global engagement, etc

Administration & Operating	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Total
Salary	\$351,750	\$3,467,225	\$3,742,200	\$3,809,025	\$3,881,925	\$15,252,125
Operating	\$171,700	\$2,126,200	\$2,475,600	\$2,475,600	\$2,475,600	\$9,724,700
Marketing	\$45,400	\$562,000	\$655,200	\$655,200	\$655,200	\$2,573,000
Travel	\$35,300	\$436,000	\$508,800	\$508,800	\$508,800	\$1,997,700
Other	\$945,000	\$11,707,700	\$13,633,200	\$13,633,200	\$13,629,675	\$53,548,775
Total	\$1,549,150	\$18,299,125	\$21,015,000	\$21,081,825	\$21,151,200	\$83,096,300



Sustainability

For years 6 to 10, after the initial ISI contributions end, the supercluster and Entity will continue to execute on the collaborative innovation projects. Projects are expected to span multiple years and continue after the initial ISI contribution period in years 1 to 5. A key goal of the Entity is to win new members, attract investment, and secure new R&D service contracts that lead to sustained revenue generation. It is designed to operate as a professional services organization modelled after contracts based research and technology organizations. The Entity will have established capacity for business development and developed expertise in collaborative technology development including program management, development and commercialization methodologies, IP management, technology trends, and talent development that will be valuable to supercluster participants. New funding for ongoing administration and operations as well as projects is expected to come from continued support of existing members and growth in new participants. Funding for projects is expected to be \$136M annually and \$17M annually for the Entity in years 6 through 10.





Financial Risks & Mitigation Strategies

Supercluster funding comes from multiple public and private sources and different industries reducing economic risk and dependency on any one funder. Funding growth comes from ongoing business development targeting increased membership participation. Development of robust project and commercialization services brings in new members. ISI program funding has been committed for 5 years and the Entity will seek support from provincial and municipal governments.

To ensure funds are available when required, a portion of founder and regular membership fees up front annually in support of the Entity. The amount and timing of cash and fair market value in-kind funding for projects is committed in advance when projects are formed and approved, prior to their start. Oversight from the Finance Committee, a financial management and accounting system including, annual business planning, ongoing cash flow management, and reporting serve to reduce financial risks.

The risk of system or security intrusions or failures, litigation from business and technical advisory services and management of operations is mitigated through the regular review and testing of network and physical security and maintenance of industry standard insurance. Business risk to changing conditions which may impact funding, administration and project execution is mitigated by working with experts that form The Entity's Board, management and the superclusters' extensive network of advisors who can monitor and adjust activities in response.

GENDER BALANCE AND DIVERSITY PLAN

Central to the Entity’s Diversity and Inclusion Strategy is the development and maintenance of a gender-balanced and diverse network. Throughout all stages of planning, strategy, and project development, the Entity will treat diversity and inclusiveness as a priority by pursuing the following initiatives:

- Enshrining diversity principles in the Entity;
- Establishing two board committees to lead diversity efforts;
- Generating a diversity scorecard to measure outcomes; and
- Investing \$4 million per year in attraction and retention of underrepresented groups

Enshrining Diversity Principles in the Entity

The Board of Directors, board committees, advisory committees, and Entity staff will maintain gender parity at all times, retaining at least two Indigenous leaders, and having representation from traditional and high technology industries, as well as from urban

and rural communities. Diversity criteria will influence the development and selection of projects, and the Entity will track the number of women in leadership roles on project teams.

Establishing two Board Committees to Lead

The Entity’s Diversity, Culture, and Talent Development Board Committee and Indigenous Board Committee will work to ensure underrepresented groups are positioned to meaningfully benefit from supercluster activity. To ensure success, the committees will study and employ best practices and key material used throughout the world, including the HR Tech Group’s comprehensive environmental scan outlining promising techniques for cultivating a fully diverse and inclusive ecosystem.





Generating a Diversity Scorecard to Measure Outcomes

Diverse teams perform higher, innovate faster, attract a wider pool of quality candidates, and are more likely to foster inclusive environments. The Entity will work to improve the ways women and Indigenous peoples are included, treated, valued, developed, and funded across the full innovation lifecycle, setting them up to succeed in the broader workforce. The Entity will generate a diversity scorecard to encourage participating companies to adhere to criteria set around gender parity, retention, and promotion statistics, as well as communicate expectations, measure results, and report progress toward our collective goals.

Investing \$4 Million per Year in Attraction and Retention of Underrepresented Groups

To enhance the talent pipeline, we will invest \$4 million per year in the best strategies designed to attract greater numbers of girls and Indigenous youth to STEM. We will support activities that engage these groups, strengthen networks of female and Indigenous role models, and skills development programs such as Ladies/Girls/Kids Learning Code workshops and UVic's Aboriginal STEM.

The Entity will encourage companies to prioritize cultivating inclusive environments. The Entity will support the best existing approaches to address pay equity and new financing models to provide more female entrepreneurs with access to capital, and to encourage more women to invest in early stage and private companies. Finally, as under-representation is more pronounced in higher levels, the Entity will encourage advancement of underrepresented individuals into roles for which they are qualified, particularly at board and management levels.³⁰

³⁰Startup and scaling companies in BDC's portfolio - on average only 13% of CEO roles, 15.8% of C-suite positions, and 14.3% of founders or co-founders are women.

RISKS

Overview

The core deliverable for the Entity is the launch of new digital process, product, and technology platforms. These platforms create the revenue streams that in turn create the business expansion that drives capital investment and job creation. Thus, the question of risk revolves around factors that could inhibit the Entity's ability to support the launch of new platforms.

The three main risks are:

- Inability to create sustained, collaborative relationships
- Insufficient commercial potential in the project portfolio
- Failure to succeed globally

Reinforcing the Collaborative Environment

The first risk is the inability to create sustained, collaborative relationships. Collaborative relationships lead to collaborative development projects. If the quality of collaboration is too low, the Entity will not be able to generate a sufficient volume of high quality project opportunities.

To mitigate this risk, the Entity uses a number of organizational structures to make it easy to collaborate. First, any organization interested in

data-driven innovation can join at no cost. This makes it easy for organizations to explore the organization, and meet other members without worrying about potential encumbrances or costs.

Second, the Entity uses a program model to bring members together around shared strategic interests. Given that program discussions occur before projects are developed, this provides members with opportunities to explore partnerships and participate in shaping collaborative development projects before actual commitments need to be made.

Third, the Entity's use of Master Project Agreements provides members with a flexible approach to defining relationships. An arrangement between natural resource companies, Microsoft, and an SME software company might need to be structured very differently than one between agricultural companies, TELUS, an agricultural input supplier, and a college. Rather than treating the consortium as a single entity with one set of collaboration techniques, our model treats the consortium as a tapestry of partnerships, enabling a diversity of development approaches to flourish with the ecosystem.



Building a Market-Oriented Project Portfolio

The second risk is insufficient commercial potential in the project portfolio. This risk focuses on the scenario in which a great number of collaborative development projects emerge, are too early stage, are aimed at technical advances without clear line of sight to real market potential and a path to sales, or have commercial potential that is limited to the needs of immediate project participants.

To mitigate this risk, the project evaluation criteria emphasize a number of elements designed to ensure projects are aimed at real market opportunities. There is the need for a clearly-defined target customer versus a generic market category. There is also the need to have a clear path to sales identified versus only an aggregated market potential. Finally, projects must provide an estimated time-to-market so that a launch pipeline can be established with platform launch goals for each year.

Second, the organization has established a position, VP of Commercialization, that is responsible for capturing value from the portfolio. Their success is dependent not only on getting new platforms to launch, but on those platforms generating momentum in global markets. They are responsible for supporting in-market projects and IP services. With the IP service unit, part of their role is to ensure that IP is integrated into platforms to improve their competitive advantage and that the project partnerships have the total team strength to achieve market success.

Third, the Entity will work with governments and large organizations around innovation procurement standards and initiatives that encourage large Canada's organizations to be first adopters of promising new digital process, product, and technology platforms.



Growing our Global Success

The third risk is failure to succeed globally. The Canadian market is usually too small to support global scale operations, so companies need to become export savvy. Exporting to the US is a good first step, but not enough companies to become real global leaders. The cultural similarities with the US can leave Canadian companies operating with a mindset not so different from a domestic supplier. The result is a sales effort that stalls, and an enterprise unfamiliar with selling into Asian, European, African, and South American markets.

To mitigate this risk, the Entity will establish strategic alliances with other research-technology organizations in North America, Asia, Europe, Africa and South America. These alliances will act as ecosystem bridges that facilitate relationship building between members of the ecosystem and members of global innovation hubs around the world.

Second, the Entity will allocate funds to a special project type for in-market platforms called Global Scale that supports the development of customers outside Canada and the US. This will be developed in partnership with Federal and Provincial trade ministries, and will leverage Canada's trade relationships to drive export sales.

Third, the Entity will use its global expertise in data-driven innovation to attract at least four global technology MNEs to shift or establish the nexus of a strategic business unit/global development centre to Vancouver. By bringing organizations with established global networks into the local ecosystem, it will be easier to provide SMEs with opportunities to explore global markets. At this point, many of the collaborative structures put in place come into play.

SUMMARY

Canada is poised to lead the world in collaborations that will make the digital future a competitive advantage for Canadian industries.

Canada's Digital Technology Supercluster is different from other supercluster models that espouse a traditional industry-specific vertical focus. Instead, our supercluster will foster collaboration between industry adopters (across multiple verticals) and the digital technology ecosystem leading to compounding economic benefits for Canada.

With over 200 private sector participants, 25 of BC's post-secondary institutions, leading universities and research institutes, and funding commitments exceeding \$500 million, we have the momentum necessary to build a world-class supercluster. Our supercluster includes over a dozen large corporate adopters including LifeLabs, Providence Healthcare, Shoppers Drug Mart, Teck Resources, Canfor, Avcorp, TimberWest, Microsoft, Urthecast and TELUS - significant brands that can lead the adoption and success of new products and technologies.

Galvanized by the federal Innovation Superclusters Initiative, aligned behind a global vision, and inspired by an ambitious strategy, we have targeted leading companies in the health, natural resources, and industrial sectors to support their

digital transformations. We have engaged digital technology companies from across the spectrum of startups, small and medium enterprises (SMEs), large companies, multinationals (MNEs), large industry adopters, post-secondary institutions, and research institutions to address digital challenges by collaborating to create products and platforms that can lead the world.

Our supercluster includes over a dozen large corporate adopters including LifeLabs, Providence Healthcare, Shoppers Drug Mart, Teck Resources, Canfor, Avcorp, TimberWest, Microsoft, and TELUS



The Digital Technology Supercluster will connect a range of digital technology market participants, from startups and innovative SMEs to postsecondary institutions to large multinational corporations. In short, it will play a vital link between technology developers and adopters in the BC, Canada and global economy and:

Promote the accelerated growth of the Digital Technology Sector by supporting ambitious projects that create the potential for knowledge spillovers and spinoffs

Facilitate risk sharing on ambitious projects by developing collaborations with a consortium of businesses and organizations to share in expertise, investment and risk;

Increase access to innovation, research and technology by fostering partnerships between Canada's postsecondary research institutions and the private sector to expedite the commercialization of innovative projects and enhance the availability of a skilled, job-ready workforce; and

Develop links with large multinational corporations to improve global value chain integration opportunities for Canada's digital technology firms.



CANADA'S DIGITAL TECHNOLOGY **SUPERCLUSTER**

The result will be new economy jobs, new products and platforms that position our companies to scale, and a growing number of startups and scale-ups that will attract talent and investment from around the world.

Private-Sector Enterprises



Post-Secondary Institutions, Public-Sector and Not-for-Profit Organizations





CANADA'S DIGITAL TECHNOLOGY
SUPERCLUSTER

Canada-wide, Global Impact

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