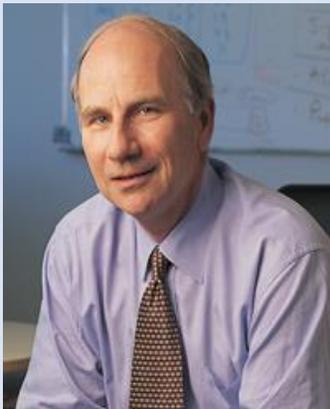


Putting Innovation to Work for British Columbia: Growing B.C. Companies

A Report to the Minister of Jobs, Economic Development and
Competitiveness

January 2020



Dr. Alan Winter was appointed as British Columbia Innovation Commissioner on February 5, 2018, and serves on the board of Innovate BC and as a member of the Emerging Economy Task Force.

He has a breadth of experience at senior levels in the technology sector and in government, including most recently as president and CEO of Genome B.C., from 2001 to 2016.

Prior to this, he was the founding president and CEO of the New Media Innovation Centre in Vancouver, the president of the ComDev Space Group in Ontario and the president and CEO of MPR Teltech Ltd. in Vancouver. During his tenure as CEO, six companies were spun out of MPR, including PMC-Sierra and Sierra Wireless.

Earlier, Winter worked for Telesat Canada and the federal Communications Research Centre in Ottawa, where he was responsible for the satellite-aided search and rescue project (Sarsat).

Over his career, he has served on the boards of more than 30 organizations and has been recognized with Lifetime Achievement awards from both LifeSciences BC and the BC Tech Association.

Winter is a fellow of the Canadian Academy of Engineering; the American Association for the Advancement of Science; and the Canadian Astronautics and Space Institute. He received his PhD from Queen's University, where he received the Queen's alumni Legacy of Achievement.

Letter from B.C.'s Innovation Commissioner

Dear Minister Mungall:

This report culminates my two years as B.C.'s Innovation Commissioner, building on my *Observations on Innovation in British Columbia* report delivered in October 2018.

My earlier report outlined in detail why a focus on innovation, specifically research and development (R&D), is important for economic growth. That document also serves as a snapshot of the investments being made on the provincial, national and international stage, both from the private and public sector. I also shared a series of observations from my early days in this role, underlining a need to build on the advantages that have fueled our province's economic growth and success for most of our history.

British Columbia has long enjoyed the benefits of circumstance – abundant natural resources, an attractive geographic setting and favourable access to international markets. But these advantages have sometimes led to competitive complacency, leaving us behind in innovation, productivity, product development and business investment in R&D.

Twenty-four months into my appointment, this report offers a series of short-term recommendations, grounded in examples from research, personal experience and observations, on how the provincial government specifically can encourage innovative practices to help grow companies in BC and, in doing so, initiate a focus on innovation to retain the ideas, businesses and people that will be key to our success in the knowledge-based economy of the future. I wish to thank all those with whom I met during my term, representing nearly 450 organizations; it is my hope this report captures the essence of our conversations.

I recognize many others from industry and academia have offered recommendations before this report, and to its credit, government and industry have taken some steps. The recommendations set forth in this report are relatively affordable, actionable in the short-range and address commentary I have heard repeatedly in my role.

Through collective action, and a proactive provincial government acting as a true partner with the federal government, municipalities, indigenous groups, industry and academia, I firmly believe we can evolve our traditional sectors into higher-value products, grow new sectors, unleash the ideas and potential of our people, and raise the quality of life for everyone who is proud to call B.C. home. I encourage the Province to do all it can to set us up for continued success and make innovation work for British Columbia.

I have appreciated the opportunity to serve as B.C.'s first Innovation Commissioner and, in particular, Minister Ralston's personal support during these past two years.

Sincerely,



Alan E. Winter
B.C.'s Innovation Commissioner

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Executive Summary

While our traditional sectors, like forestry, mining and energy, have propelled British Columbia's development, we now find ourselves at a unique time in history, where the emerging, or innovation, economy presents us with new opportunities.

In these changing times, British Columbia cannot continue to lean on sectors reliant on tangible assets for prosperity and at the same time support the quality of life we've become known for. We must recognize that the world is being transformed by intangible assets, such as data, software, intellectual property (IP) and product development all leading to increased competitive edge for those jurisdictions that invest. By building on our strengths, and investing in ideas and people, we can manoeuvre through current economic headwinds and ride global trends to a resilient, sustainable and prosperous future.

B.C., like the rest of Canada, has seen many years of steady employment and economic growth. As a result, we've not had the incentive to innovate to the extent we could, or truly should. Instead of developing technologies in B.C. to solve our problems, we've purchased solutions off-shore. These help us to adapt, but they don't help us to get ahead.

The economy of the future will be information-based. With intangibles growing in importance, B.C. needs to put a greater emphasis on how we will prepare and compete, as discussed in the Innovation Commissioner's interim report, *Observations on Innovation in British Columbia*.

This report does not intend to replicate the suggestions of many groups, from business to academia, who have previously offered their advice on growing an innovative economy. Instead, these five, short-to-medium term recommendations are based on the observations and feedback gathered by B.C.'s Innovation Commissioner over the past two years. **They are intended to offer the provincial government a relatively affordable and immediately actionable way forward to retaining the ideas, people and businesses that can grow significant BC companies and propel our economy in the decades ahead.**

In a knowledge-based economy, it will be increasingly important for ideas to flourish. To help, the Province should support an enhanced network of *regional innovation precincts*, as places where people can connect with like-minded innovators to explore ideas and make them come to life.

Experience has shown that when clusters of people and business -- in a specific field -- come together, they can help solve problems and fuel economic growth in a community. As such, the Province needs to *support development of tech clusters* in British Columbia's regions, based around local, sector strengths.

B.C. has become known as a climate action leader and through its new CleanBC plan opportunities exist to use this strategy, alongside our clean, green reputation, to support local innovative businesses and ultimately drive our economy. This report recommends *capitalizing on the strength of CleanBC* to develop products and services which focus on sustainable resource management and higher value opportunities.

Recognizing IP is increasingly central to growing BC companies, government should also *help entrepreneurs protect their IP* and offer incentives to commercialize good ideas in B.C.

This province has a highly skilled workforce and existing efforts are matching skills with demand, maximizing workforce participation, and re-skilling and promote lifelong learning. But gaps need to be addressed in Talent retention strategies key to keeping B.C. businesses here, such as training entrepreneurs on how to scale-up companies and *building the leadership skills* necessary to manage rapidly growing companies as they expand nationally and internationally.

By focusing government's attention today on the economy of the future and *encouraging the provincial government to be a leader in this effort*, we can ensure that innovation is working for British Columbia.

Our Transforming Economy

British Columbia's history has been driven by natural resources. Forestry, mining, energy and agriculture have propelled our economy for over a century. Our tourism sector is hinged on our super, natural setting. Our geography makes us an ideal hub for transportation and trade.

Despite the diversity and strength of B.C.'s communities, as a small, open economy we have remained reliant on international trade and investment to maintain our standard of living. While this makes us vulnerable, it also offers a good base to expand new products into new territory.

For example, the 1980s saw the growth of B.C.'s creative and technology sector. However, forty years on, our larger companies are still heavily weighted toward retail, finance, construction and natural resources. But the emergence of new technologies developed, or adopted through imports to B.C., is shifting how traditional sectors do business.

Forest companies now, more than ever, employ cutting edge technology in their sawmills and new lumber products are being developed for mass-timber construction. Mining companies are using software and visualization tools to help them in the extraction process. Virtual reality is making job sites safer by allowing companies to train people on equipment before sending them into the field. However, the **scale** of natural resource higher-value products and services in B.C. is, however, still very small in comparison to the scale of extractive natural resources sectors.

The technology that is enabling our natural resource sectors is also helping to enable significant parts of the B.C. economy.

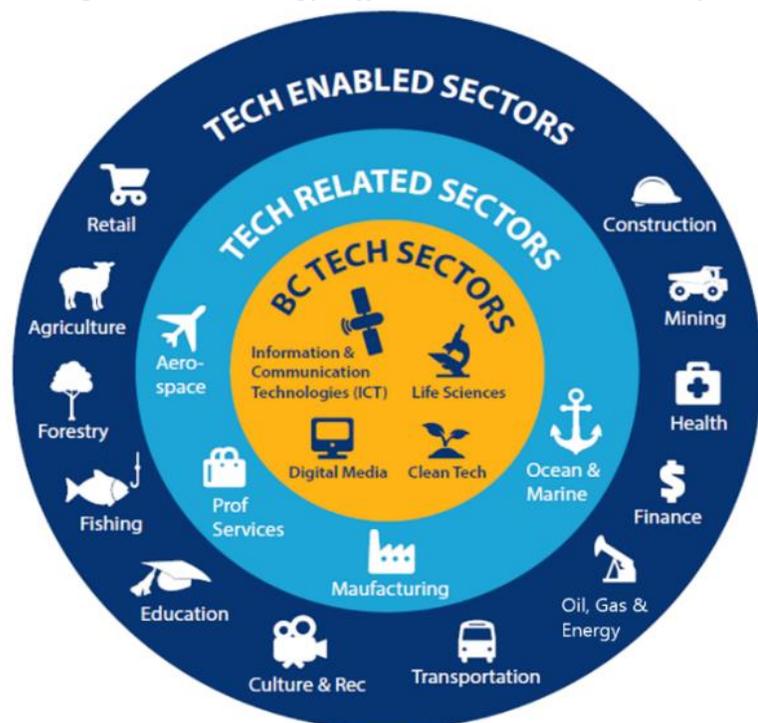
Therefore, our ability to draw a circle around what we would conventionally refer to as the technology sector has morphed in recent years. That's because we are surrounded by technology products and solutions. Technology is literally diffusing across B.C.'s economy, as shown in figure 1.

While clean tech, life sciences, digital media and ICT (information and communication technologies) are B.C.'s four primary tech sectors, accounting for about seven per cent of our provincial GDP, there are numerous sectors which are now very much reliant on their technology.

Figure 2 shows the percentage of GDP for the various sectors in the B.C. economy.

Professional services, manufacturing, aerospace and ocean and marine industries are what can now be referred to as

Figure 1: Technology Diffuses Across BC's Economy



tech-related, because their products, businesses, and ultimate success, is driven by applications of technology.

Most other sectors of B.C.'s economy, from retail, construction, to finance are increasingly being enabled by tech.

Technology is also positioning B.C. to play a leading role in addressing some of the world's most pressing issues. British Columbia-based clean-tech firms, for example, are developing tools to capture carbon and treat drinking and wastewater, in doing so improving the natural environment and quality of life here and, through potential export opportunities, across the globe.

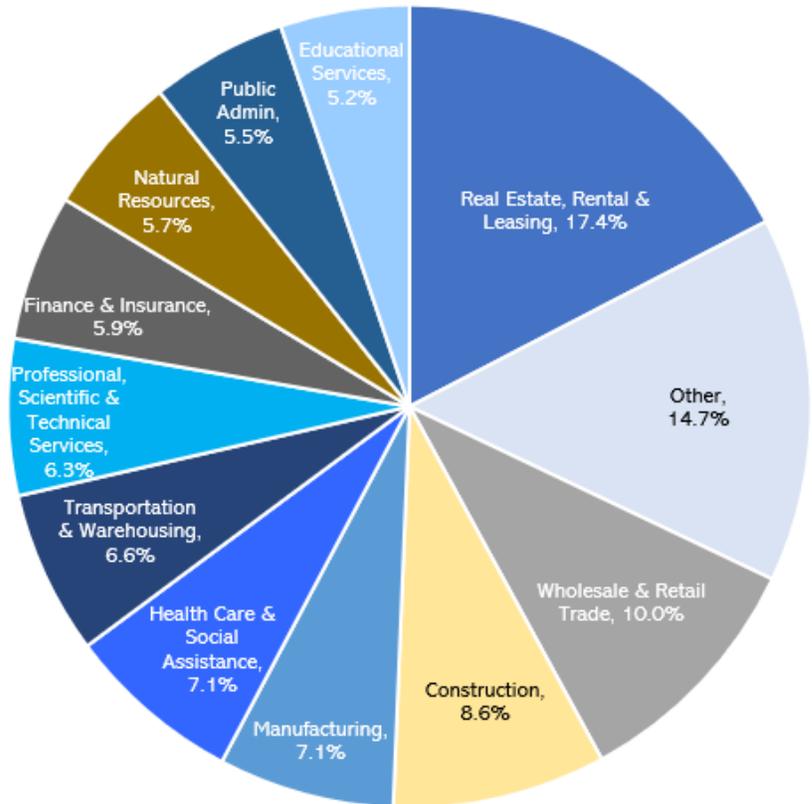
Research being undertaken in labs and on campuses in British Columbia is helping to find cures for diseases impacting the lives of humans, animals, plants and other organisms. B.C. universities alone account for 40 per cent of all research conducted in the province; in turn, the University of BC, Simon Fraser University and the University of Victoria have an estimated economic impact of \$22 billion, of which \$8 billion can be attributed to new knowledge and knowledge transfer.

Research has a practical connection to every single physical thing in our lives – from our cars to our medicines, our phones to our homes, each is based on technology enabled through basic and applied science. This research in turn helps us live longer, healthier lives, with jobs that support families and sustain social programs.

British Columbia is also at the forefront of research into new applications of tech, like artificial intelligence, virtual reality, augmented reality, blockchain, genomics and quantum computing. The latter, for example, has the potential to allow machines to process exponentially more data, promising changes to the way we do everything from banking to physically getting around our communities.

Research in the Province is of top quality, but the value of the research has historically been captured by companies outside B.C. and Canada. B.C. has an entrepreneurial spirit which has, generation after generation, shaped our province. No matter the sector: farming, forestry, or even financial services, one idea, product or innovation can change the way we approach a problem. We now need this entrepreneurial spirit to help capture the value of our excellent research for our provincial economy.

Figure 2: Composition of BC GDP, by industry



Share of BC GDP at basic prices by major industry, 2018
Source: Statistics Canada, table 36-10-0400-01, May 2019 Preliminary Industry Accounts

As a province, we need to encourage these ideas to flourish, we need to give them a powerful platform to get to market and we need to create partnerships with governments, industry and academia so that these businesses grow, and stay, in British Columbia.

As a government, the Province has tools it can use to encourage bright ideas. With some encouragement, partnership on investments, and an overall greater focus on innovation, these ideas can help transform our increasingly tech-enabled economy, grow B.C. companies where the IP and research value are captured in B.C. and Canada, and put us on a path to greater prosperity.

Innovation in British Columbia

Innovation: the creation and adoption of a new idea, process or product that generates sustained social and economic value.

Source: BC Innovation Commissioner/Deloitte

Although the term innovation is synonymous with technology, technology isn't always a necessity for innovation.

Innovation comes in many forms: it can be a new product or it can be an improved service; a new or better way of doing something, a new business model or a means of doing business; it may also be a different marketing process, or change to the way something is designed, packaged, promoted or priced. While some innovations are truly remarkable, many are incremental.

The effect of innovation in economic terms can be difficult to measure; but there are a series of indicators which are commonly used, including numbers of patents filed, labour productivity, investments in knowledge based capital and money spent - or people working - on research and development (R&D). The overall public and private investment in R&D in a jurisdiction is the Gross Expenditures on R&D (GERD)

Based on economic modelling done in the European Union several years ago, a one per cent increase in R&D expenditures as a percentage of GDP (GERD), would cause an increase of real GDP growth rate by 2.2 per cent, all things equal.¹

In other words, there is a straight-line relationship between the GDP per capita in a jurisdiction and the gross investment in R&D in that jurisdiction, assuming no "rent" revenues for the extraction of natural resources.

For B.C. the conclusion is clear. Today B.C.'s GERD is 1.4 per cent in comparison with the current OECD average of 2.4 per cent. In order to maintain or grow our current prosperity as measured by GDP per capita if we had no "rent" revenues from natural resources, B.C. would have to carry out 1% of GDP more R&D in the Province, or approximately \$2.5B per year. This **does not** mean that the provincial

¹ Economic Research-Ekonomska Istrazivanja, 2016

government has to spend an extra \$2.5B per year in R&D, but it **does** mean that the provincial government would have to become an active partner to leverage another \$2.5B in public and private R&D by partnering with the federal government, the private sector and international investors.

The *Observations on Innovation in British Columbia* report authored by B.C.'s Innovation Commissioner in late 2018, offers a deeper look at the links between R&D and GDP growth and details the levels of investment going into innovation activities in B.C. and across the country. In brief, when comparing business expenditures on research and development, commonly referred to as BERD, investments occurring in B.C. over the past twenty years have fallen behind those made in other leading countries.

This can be explained, in part, on the dominance of small businesses in B.C., with 98 per cent of all business employing fewer than fifty employees, and by the types of companies in B.C. who generally invest a low proportion of their revenues in developing higher-value products. Generally, smaller businesses spend less on R&D and training, which has an impact on productivity.

On the plus side, B.C. does have a strong research community and does well in leveraging available federal dollars to carry out this important work. The province also does well in attracting venture capital, although gaps exist in later stage financing, which hinders companies starting-up here to later scale-up.

When executed well, with research and knowledge put into practice, the resulting innovation can foster the adoption of new ideas, new technology development, and transformative business practices that in turn improve productivity and competitiveness.

Importance of Innovating

Innovation is recognized as a key driver of economies, yet, despite the aforementioned lower investment in business expenditures in research and development by B.C. industries over the past decade, the provincial economy has outperformed other provinces.

This relative success has been attributed to high prices for commodities, a strong construction sector, housing and tourism revenues. With employment and economic growth going well, we've not had a worry or nor an incentive to innovate to the extent we could – or should.

However, change may be on the horizon.

Our economic growth is slowing, brought on by headwinds which we must mitigate and adapt to our advantage. Concerns over geopolitics, trade uncertainty, and fluctuations in the value of natural resource commodities, among other factors, are dampening expectations. In the longer term there is a concern that our natural resources become “stranded assets” because other countries have more sustainable, efficient, and higher-value resources which are required for the future circular economy.

At the same time, our opportunity is to ride the wave of global trends which will require us to plan and redesign how we live and work, including technological change, climate change, urbanization and shifting demographics, as seen in figure 3.

Figure 3: Headwinds vs Trends

Economic Headwinds

Mitigate & Adapt



"Tack into the wind"

-  Geopolitics
-  Trade uncertainty
-  Debt leverage & recession concerns
-  Commodity prices
-  Consumer spending
-  Construction & slowing real estate

Global Trends

Plan & Redesign



"Ride the wave"

- Demographics 
- Technological disruption 
- Changing nature of work 
- Urbanization 
- Globalization 
- Climate Change 
- Green Economy 

Source: Innovation Commissioner, adapted from Deloitte, 2019

To remain competitive, and provide a high quality of life for the people who live here, we need to put a greater focus on innovation. Then, we need to do a better job of capturing the value of those innovations by growing B.C. companies, expanding our markets and keeping our talent in B.C.

Investing in Innovation

"In Canada, innovation policy is constrained by industrial structure and by the fact that Canada has been mostly a taker, rather than a maker, of technology."

- Peter Nicholson, Institute for Research on Public Policy
Facing the Facts: Reconsidering Business Innovation Policy in Canada, 2018

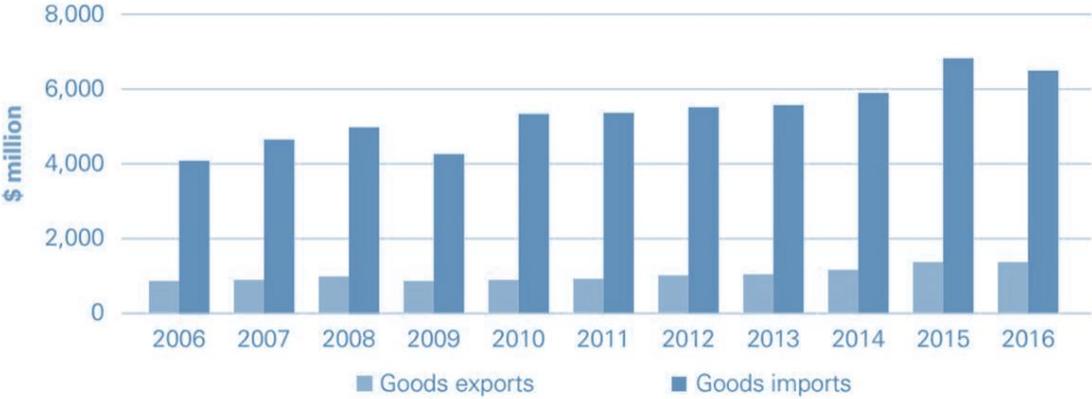
Author Peter Nicholson has opined often about Canada's low-innovation equilibrium, where we effectively trade commodities for technology products. In short, instead of developing solutions in Canada that we need, we just buy them.

For example, notwithstanding the growth of B.C.’s tech sector, its relatively small size has meant that tech-enabled firms looking to buy and adopt the latest advances in technology have had to often look outside B.C. for this technology.

As a result, as figure 4 indicates, B.C. imported almost five times the value of high-tech goods than it exported in 2016. Consequently, the province ran a substantial trade deficit in tech products (exports of tech services were approximately three times the value of exports of tech goods, however, there is no available data on the value of the import of tech services.)

It is important to highlight that of the over 10,000 tech companies in B.C., nearly 90 per cent have fewer than 20 employees. In addition to this limiting the ability to develop the technologies that B.C.-based tech-enabled firms may be looking for, it is also likely limiting their capacity to expand into global markets.

Figure 4: B.C. Technology Goods Exports and Imports



Source: Profile of the British Columbia High Technology Sector, BC Stats, 2017 Edition

Nicholson has pointed out that university research, which has long been Canada’s favoured way of innovating – generating ideas, or so-called “supply-side” strategies -- won’t be enough going forward.

A focus on strategies instead that generate “demand” for those innovative ideas, like policies on intellectual property (IP), procurement, smarter regulations and exports, will accelerate growth.

The Impact Centre at the University of Toronto, recently flagged the importance of international marketing and sales as another key factor in Canada’s innovation performance, noting it is poorly tracked and is under-represented in program offerings, despite its importance to growing firms and the adoption of products.

Envisioning B.C.’s Future

Investments in innovation, from both public and private sectors, can generally have positive effects on productivity, employment and wages, investment and exports.

If we truly envision B.C. as a *resilient, sustainable, prosperous* economy in a society which has *opportunities for everyone*, then we must prepare ourselves accordingly for the economy of the future.

Resilient includes the ability to ride out swings in commodity cycles, *sustainable* includes getting the best value for resources, and *prosperous* includes a Canadian currency that is strong relative to others.

At the time of this paper, the Emerging Economy Task Force, appointed by the Minister of Jobs, Economic Development and Competitiveness, is preparing a final report for government articulating a vision for the province and recommendations to support success for everyone.

While the task force will report in due course, it is fair to say B.C.'s economy forty years from now will look very different than it does today; just as it did forty years ago, when the technology and creative sectors were in their infancy in this province.

Over the past four decades, B.C. employment growth has been overwhelmingly concentrated in services-producing industries. Out of 1.4 million jobs created since 1976, 1.2 million were in the services sector, compared to just 168,000 in the goods sector. In the most recent decade, the services sector played an even larger role, contributing 250,000 new jobs, or 96% of all new jobs, compared to 11,000 new jobs in goods industries. In other words, over 2007-2017, there were about 22 new jobs in the services sector for every new job created in the goods sector.

The top industry contributors to B.C. employment growth were health care and social assistance, wholesale and retail trade, professional, scientific and technical services, and accommodation and food services. The only goods-producing sector that recorded a major employment gain was construction. Other than in the construction sector, goods-producing industries have seen net employment losses over the past decade.

Overall, long-term trends in B.C. employment growth by industry and by occupation appear consistent with the predicted effects of automation and skill- and routine-biased technological change. There have been negligible employment gains in goods-producing industries, other than construction. Most new jobs are in services-producing industries and occupations.

A recent ranking by commercial real estate firm CBRE put Vancouver as the top market in North America for high-tech growth over the past two years, ahead of 29 other cities, adding over 13,000 jobs in 2017 and 2018.

B.C.'s tech sector generated over \$31.3 billion in sales in 2017. Modelling by Statistics Canada shows the direct, indirect and induced economic impact from these sales are estimated to be \$30 billion in GDP and \$18 billion in labour income in B.C. Overall, the sector is estimated to support 250,000 jobs (or 188,000 full time equivalents) in the province.

As the Innovation Commissioner's 2018 *Observations* report noted, B.C.'s tech sector – representing 7 per cent of GDP – has significant room to grow relative to other jurisdictions. If the B.C. sector were to double revenue, bringing it inline with the percentage of GDP generated by tech in leading states like Oregon, Washington, California or Massachusetts, the modelling suggests the potential for another 114,000 FTEs working in tech and 73,000 more FTEs in supplying industries and the induced effect of labour income.

Economics Professor and Author Enrico Moretti, in examining the U.S. knowledge-based economy, estimates that for every new tech job in a metropolitan area, five additional local jobs are created outside of tech in the long run.

The multiplier effect is higher, Moretti says, because tech workers have better wages and more disposable income, tech companies need more companion services than traditional industries, and tech firms attract other tech firms. At the same time, many industries such as manufacturing import material, add value and then export, resulting in the full value of the exports not circulating in the economy.

Innovation Economy

"Early in the twenty-first century, a quiet revolution occurred. For the first time, the major developed economies began to invest more in intangible assets, like design, branding, R&D, and software, than in tangible assets, like machinery, buildings, and computers. For all sorts of businesses, from tech firms and pharma companies to coffee shops and gyms, the ability to deploy assets that one can neither see nor touch is increasingly the main source of long-term success."

- Jonathan Haskel and Stian Westlake
Capitalism without Capital, Princeton University Press, 2018

By most accounts, the economy of the future will be increasingly information based and digital. But, in many respects the economy of the future is already here.

The intangible economy goes by many names: data-driven, innovation, knowledge, emerging economy, all capturing essential parts of the concept. This term seeks to define the important shift in what is of economic value in the 21st

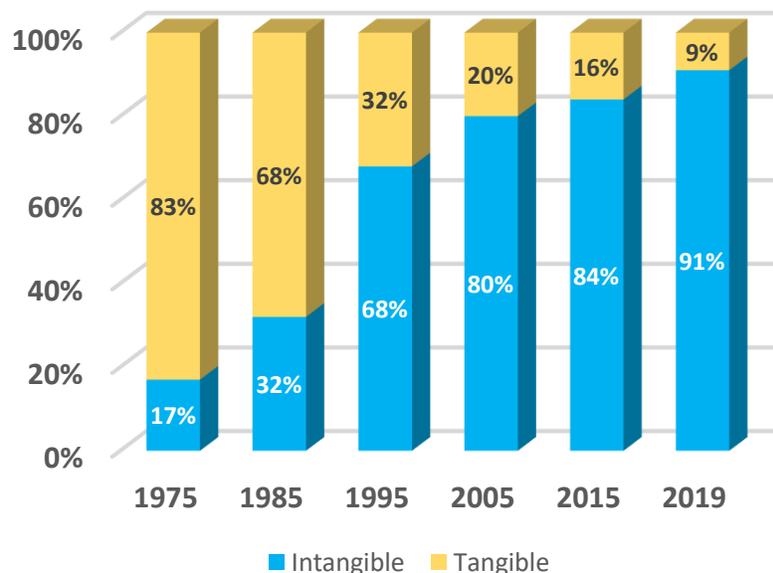
century; basically, the "economy will no longer be mainly fueled by capital assets such as equipment, machinery and physical plants and instead will be increasingly driven by intangible assets such as domain names, service contracts, computer software, data and patented technologies."².

To illustrate this shift, the Public Policy Forum published a graph demonstrating the percentage of tangible versus intangible assets that make up the S&P 500, as seen in figure 5.

As intangible assets continue to make up the

Figure 5: The Growth of the Intangibles

Intangible assets, as a proportion of the S&P 500 market value



Source: A New North Star: Canadian Competitiveness in an Intangibles Economy, April 2019

² <https://ppforum.ca/wp-content/uploads/2019/04/PPF-NewNorthStar-EN4.pdf> p.16

bulk of wealth, they will “increasingly become the primary source of economic competitiveness and a major creator of economic wealth”³. Thus, the growth of the province’s intangible economy is linked directly to its competitiveness and long-term prosperity in a global market that is increasingly valuing intangible assets over tangible ones.

The intangible economy is driven primarily by investment flows and capital pools rather than being driven primarily by goods exports and imports.

This is not to say that tangible assets have no value – in British Columbia, tangible assets such as construction, retail goods, manufactured goods and products from mining, forestry and retail are still important in the economy and are strengths the province can build on. The suggestion is that supporting intangible assets, such as IP generation, talent, and AI development, digital twinning, means the province can also realize greater value by building on its traditional sectors to ensure they remain globally competitive.

Tangibility from the intangible:

B.C. firms see growth in value, based on research

Saanich-based Aurinia Pharmaceuticals’ valuation gained nearly one-billion dollars in December after it announced positive clinical trial results on an experimental drug aimed at helping people suffering from a form of lupus. It had a \$2.12B market capitalization as of January 14, 2020.

While pre-revenue biotech companies with soaring market capitalization are not unusual, it is an example of the power of research and how intangible assets can generate wealth for an economy.

Vancouver-based Zymeworks is another example, becoming one of the country’s faster growing biotech companies (\$1.84B market cap at January 14, 2020) through development of their own promising cancer drugs and through licensing of their own technology, used by other large pharma companies. (bdc)

³ <https://ppforum.ca/wp-content/uploads/2019/04/PPF-NewNorthStar-EN4.pdf> p.41

Building on B.C.'s Achievements

As the world moves further into an innovation economy, B.C. is in a fortunate position.

Our geographic position on Canada's west coast puts us close to Asian markets, and the Cascadia technology hubs of Washington, Oregon and California. At the same time, our connections to European markets remain strong.

But, as a small economy, the need to continue promoting ourselves, our businesses and our advantages to external markets, is one of the key reasons the Province established a framework for innovation (B.C.'s Innovation Commissioner; Innovate BC; and the Emerging Economy Task Force) in 2018.

Promoting our advantages

Over past two years, B.C.'s Innovation Commissioner, supported by the provincial government's International Trade Division, has led several innovation missions to the United States, Europe (Ireland, UK, Germany, the Netherlands, Belgium, Estonia, Finland), Asia (Japan, South Korea and Singapore) and Israel.

These missions advanced trade with, and investment into, B.C. through engagements with existing clients, and connecting with new leads. During each mission, the profile of B.C. was raised as an innovative and attractive trade and investment location, highlighting through meetings and public engagements, our Cascadia linkages, proximity to the Asia-Pacific region, our Clean BC plan, our Digital Supercluster, and the benefits of being signatories to key international trade agreements (such as the Comprehensive Economic and Trade Agreement, CETA, with the European Union and the eleven country Comprehensive and Progressive Agreement for Trans-Pacific Partnership, CPTPP).

Multi-National Corporations (MNCs) realize that their investment in B.C. will be enhanced if it is seen as a win-win for both the company and the province's ecosystem. In other words, the MNCs need to think beyond just "talent or salary arbitrage," to assess what key functions for their business which are "sticky" and will remain in B.C. in spite of the ups and downs of trade - such as corporate functions like R&D groups and business units.

Depending on the audience, specific areas of strength were highlighted, for example: AR/VR; B.C. businesses applying AI; structured software, clean technology and B.C.'s strength in genomics.

A key part of these missions, as well as meeting with B.C. businesses and Multi-National Corporations, was ensuring that businesses who had already invested in B.C. received "aftercare" from government and were supported for long-term success.

This aftercare role is essential as it encourages further investment into B.C. and can result in aligned investment objectives with the province (for example, Microsoft HoloLens R&D in B.C. and product sales contributing talent development in AR/VR/MR in Vancouver).

In addition, many technology staff will work for an MNC in B.C. for five-to-ten years and then look for a smaller company in which to have impact, or they may pursue starting their own companies. We need to make sure such employees are encouraged to stay in B.C. because they generally have excellent training and many will have international R&D and marketing experience, so needed in the B.C. ecosystem.

Taking cues from innovation leaders

Aside from acting as an ambassador for B.C. and its companies abroad, another function of the international missions was to understand how other nations prioritize innovation. On the missions, the B.C. Innovation Commissioner and delegates met with leaders and policy makers in Europe, Asia, the U.S. and Israel to learn how their policies have been successful in advancing economic development and positioning these countries for participation in the emerging economy.

The missions demonstrated that countries that successfully execute on their commitment for innovation invest in research and development (R&D) at or above the OECD average level of 2.4% of GDP to drive their increasing GDP per capita.

For many countries, investment in innovation has become as important as investment in social programs as they believe that a strong economy is essential to the long-term delivery of quality social programs.

Countries such as Singapore, Estonia, and Israel, in which natural resources are not a primary contributor to GDP, are more likely to have invested heavily in the tech and innovation sector.

For countries more similar to B.C., such as Finland, Sweden and Australia, the focus on innovation investment has had to increase through time as the need to transform traditional sectors into the digital, or intangible, economy has become increasingly important to remain globally competitive.

It was also observed that countries that invest heavily in innovation today, have generally experienced an economic crisis in the past, where all political parties became convinced that transformation of existing industry into the emerging economy was required to maintain prosperity.

In cases where innovation investment has been seen by all parties as a priority and as a stable long-term commitment, investors and businesses have had the confidence to establish companies with a long-term vision and have themselves invest heavily into R&D.

Of the countries that had a focus on tech and innovation, their public sector generally has programs to capture their own IP, support their own industries and meet their own needs, although these programs were generally delivered through a third-party entity. Supports were given through R&D funding, capital infrastructure, pilot plants, scale-up through capital and mentoring, and export support.

Relationship building

Over the course of the B.C. Innovation Commissioner's term, he has made building relationships with key, senior federal government and agency officials a high priority.

As was described extensively in the Innovation Commissioner's 2018 *Observations* report, the federal government invests significantly in B.C., through direct funding programs and via science-based research centres. This province does well in leveraging federal research funds, but room remains for the Province to partner with the federal government in innovation investments and in more clearly articulating our priorities.

As was highlighted previously, many senior federal officials are unaware of B.C.'s innovation priorities and strengths due to a variety of reasons, including geographic distance, the relative lack of contact with senior officials from the B.C. government, and the fact that few senior federal officials have B.C. roots.

Notwithstanding costs and time commitments to having senior B.C. staff travel, there is much to be gained from having a more significant British Columbia presence in Ottawa.

Investing in People and Communities

British Columbia has taken notable steps forward in preparing the province's people and infrastructure for the knowledge-based economy.

In recent years, government has prioritized updates to the K-12 curriculum and increased learning opportunities in science, technology, engineering, art and design, and mathematics (STEAM); added more tech-related spaces at post-secondary institutions; and continues to support programs that retrain workers and helps people with barriers to find meaningful employment.

The establishment of the U.N. Declaration on the Rights of Indigenous Peoples into law, and related reconciliation investments, aim to support indigenous people in accessing education and increase connectivity for rural and remote communities.

The Connected Coast project, for example, is bringing much needed high-speed internet and cell-phone service to a range of smaller communities, not only making learning and e-commerce easier, but opening up new opportunities for economic diversification.

In visits in many parts of B.C., the Innovation Commissioner heard consistently that community leaders are passionate about ways to diversify their economies such that their young people are able to stay in the communities and their jobs are not subject to the same cycles as commodities.

In summary, there are steps government has already taken to help prepare B.C.'s economy for the future, from infrastructure, talent development and developing a competitive business climate. Formation of the Emerging Economy Task Force, and its impending report will help guide government going forward.

But there are steps the Province can take now, specifically to help grow B.C. companies, to set us on the path for success.

Recommendations

"The growing trend towards intangible assets, such as data, brands and IP, requires that policy-makers re-evaluate, refine and improve our basic assumptions about economic competitiveness and the best mix of public policies to support it."

- Public Policy Forum
A New North Star, 2019

Over the past two years, through conversations with tech and innovation leaders sharing a spectrum of perspectives from business, government and academia, domestically and internationally, it is clear that British Columbia has much to offer the world.

We have, through our modern history, carved a reputation for ourselves: entrepreneurial, conducive to business, and open to opportunity. We have a wealth of talent, and a quality of life, that makes us an envy of the world. In these changing times, with economic headwinds and global trends at work, we must shift our approach to remain competitive and to maintain our attractiveness.

As stated in the interim 2018 *Observations on Innovation in British Columbia* report to the Minister, and available publicly online, the best route to sustaining prosperity is through development of a highly innovative economy.

This means addressing the need for:

- ▶ *access to talent;*
- ▶ *access to technology and IP to enable growth of B.C. companies;*
- ▶ *access to capital;*
- ▶ *and access to markets.*

Addressing these needs requires partnerships by the province with the federal government, municipalities, indigenous governments and groups, industry and academia, collectively investing in research and development, to OECD levels at a minimum, thereby helping to maintain and increase our prosperity in a competitive world.

However, in the absence of an economic crisis in B.C. which could catalyse such investments in our economy, the following recommendations are offered as short-to-medium term affordable opportunities focused on the growth of B.C. companies that the government of British Columbia, specifically, can initially champion to help make innovation work for British Columbia.

Enacting these recommendations will prepare us for the future and help retain ideas, people and business in British Columbia that we need for a more innovative future.

Innovation Precincts

Proximity to others within an ecosystem is a contributing factor, among many, in fostering company growth and innovation.

Often, people and businesses come together to increase “idea collision opportunities” by way of innovation precincts. Precincts are physical places, predominantly centrally located within a community, that help foster cross-sectoral innovation and organically grow talent and commercial development.

Through research and site visits, it has become clear that establishing and supporting innovation precincts leads to more innovation, diversification and opportunities for young people.

Precincts come in all shapes and sizes: the MaRS Discovery District in Toronto is an example of a globally recognized hub, occupying 1.5 million square feet in the city centre. Bayview Yards in Ottawa is a smaller scale Canadian precinct that is also making a significant impact in their tech community and on the regional economy.

In B.C., we have had more limited experience, and therefore success, in bringing together innovators into a precinct setting.

While there is currently no precinct on the scale of MaRS here – there could be. Potential exists, with focus, to develop a major, globally-recognized health R&D flagship precinct, as part of the development of the new St. Paul’s hospital and health campus being planned for Vancouver’s False Creek area.

Two other types of precincts do exist in this province: similar to Ottawa’s Bayview Yards, Kelowna’s Innovation Centre and likewise Victoria’s Fort Tectoria and in the future the Fraser Valley, represent regional precincts with growing presence; while Trail’s Metal Tech Alley, for example, represents a smaller scale community precinct.

That said, in many regions of the province, it is existing incubators and accelerators that typically fill the need for a precinct, although to varying degrees and with very limited support. In most cases, these are not precincts in the truest sense, as they typically lack the scale, purpose and networking space to bring together all of the elements, including for example venture capitalists and post-secondary representation, needed for a precinct to work to its fullest potential.

Kelowna’s Innovation Centre is an example of a hub serving the Okanagan that is successfully, and physically, bringing together regional entrepreneurs, innovators and other resources.

MaRS Discovery District

Founded in 2000 by 14 civic leaders, who rallied support from government, corporations and the University of Toronto, MaRS has grown to 1.5 million square feet of fully occupied space in downtown Toronto. Today it is occupied by more than 120 tenants working in four main sectors: health, cleantech, fintech and enterprise.

MaRS has programs and services tailored to firms from start-up, to scale-up, to high growth, offering advisory support and access to talent, investors, and 200-plus corporate, government, community, and academic partners. For example, in partnership with University of Toronto it offers a certificate in entrepreneurship.

MaRS has been successful in helping ventures raise capital, important for growing and scaling companies, with \$4.83 billion raised from 2008-2017. Since 2008, \$11.67 billion has been contributed to Canadian GDP from MaRS ventures, leading to more than \$3.21 billion in tax contributions. In 2017 alone, more the 12,800 jobs were created by MaRS supported ventures.

Source: KPMG, MaRS

The Centre started informally with a series of vacant spaces within an old telecom building. A culture of innovation was built as the entrepreneurial community gathered in a central location. Today, in a newly developed space, a series of local business and agencies are co-located in the space: Accelerate Okanagan is on-site providing mentorship and support through their various programs; as Okanagan College and UBCO both have a presence along with the Business Development Bank of Canada, several credit unions and law firm.

This existence of multi-disciplinary expertise and capabilities forming a “hub identity” in a shared space is one of three noted attributes among innovation centres.

In addition to offering a collaborative place for facilitating dialogue, successful precincts also often provide access to physical infrastructure, like science labs, certified test sites and equipment.

Diversified funding is another attribute key to precincts’ success, where the vast majority of innovation precincts leverage public funding alongside private sector financing.

Kelowna’s facility is largely privately funded but did receive funding from the federal government for an incubation space and other tenant improvements, provincial funding for space, and is on city-owned land under a long term lease. The Kelowna Innovation Centre’s success is anecdotally attributed to government funding and support as a key catalyst; but the community was equally key in driving the precinct’s development.

Tech in the Okanagan

Kelowna has seen impressive growth in the technology arena in recent years, with average tech revenues in the region increasing by 112 per cent between 2013 and 2017, and 70 per cent between 2015 and 2017.

In line with revenue growth, the number of people working in technology within the Okanagan has increased by 90 per cent between 2013 and 2017, with total people employed within technology as of 2017 greater than 12,000. It is estimated the local tech community has contributed \$1.67B in economic impact within the local Okanagan tech community.

Source: KPMG

Bayview Yards helps launch ideas, new collaborations

Bayview Yards was established through \$38 million in investments from the federal government, province and City of Ottawa, which donated real estate. It is anchored by Invest Ottawa and its economic development programs. Bayview offers resources and capabilities, such as market information, investment programs and tools and technologies for entrepreneurs at the centre, which would often be inaccessible and over-priced for start-ups.

Invest Ottawa is able to leverage the space to close sales or raise revenue, leading to its success. Their presence helps to provide advisory services to other tenants in the building, offering an arena for fostering expansion and “ideating”.

In June 2019, Invest Ottawa, Bayview Yards, and Ottawa Hospital announced the creation of a new “Smart Health Sandbox”. This arena is intended to help catalyze the commercialization and adoption of new life science innovations. It’s an example of how a common area for knowledge sharing can lead to collaboration.

Source: KPMG

Introduction of private funds can instill a sense of trust and build excitement. When members of the community are involved and have tangible input into the development and evolution of the precinct, a precinct tends to grow more organically (versus through sustained investment injections) alongside a local community.

As well, it's notable that many such precincts establish purpose through a particular focus on specific industries that have a relevant and local tie-in to their communities. By establishing a brand or identity, precincts can better communicate a defined purpose and mission to attract and build a greater network of like-minded organizations and, frankly, to interested funders.

Downtown Toronto's MaRS innovation campus, for example, brands itself as the world's largest urban incubator, with a focus on health, cleantech, fintech and enterprise; while Bayview Yards, located just outside of downtown Ottawa and a short commute from the Kanata tech community, is branded more as a generalist, 'one-stop' business accelerator.

In B.C., federal funding has not been leveraged in a significant way, with the Province making limited investments to-date in innovation precincts. Federal funding offered for technology access centres established by colleges, for example, like those already supported at Camosun College and Okanagan College, can act as a key component of future precincts.

To encourage innovation, we need to encourage the collaboration of innovators. We, collectively, need to assist in creating the space and ensure it has the ability to operate properly.

Recommendation 1:

Fund the establishment and operation of Innovation Precincts across B.C.

Issue: Innovation Precincts, or physical places for collaboration and idea testing, are few and far between in British Columbia. With a few exceptions, where they do exist, they lack the scale, expertise and space for success. The Province has made limited investments in such spaces to date; other entities are filling a need, but not necessarily maximizing the potential.

Recommendation: Establish a *major innovation precinct* around the new St. Paul's hospital campus, which could be focused on health R&D, would be globally-recognized and enable investment and growth of B.C. companies in health, life science, and supporting areas including IT, AR/VR, medical devices and digital health.

Additionally, the Province should support development of *regional innovation precincts* such as Victoria, Kelowna, Kamloops, Surrey/Fraser Valley, which can focus on cluster development for their regions and provide diversification for employment outside metro Vancouver. Recognizing each region is unique in its progress toward precinct-like entities to date, a plan, and any funding, to support development of innovation precincts will need to be tailored to the individual community and existing assets and resources.

Government should also co-fund smaller *community innovation precincts* in response to communities' desire to participate in the emerging economy, initially supporting innovation precincts around the regional colleges co-funded by Technology Access Centre grants.

Emerging Technology Clusters

“Canada can do a lot to increase its own trend economic growth rate even if other countries engage in a trade war. This includes promoting basic research and the commercialization of innovation. Research and development (R&D) enjoys economies of scale—more technological progress is made by pooling innovations, a characteristic that efforts like organizing and backing sectoral clusters are intended to achieve.”

- Stephen S. Poloz
Governor, Bank of Canada
Staff Discussion Paper, December 2019

Emerging technology clusters are industry clusters with a focus on specific technologies, which are visible in the community; attract world-class talent; are connected closely to universities and colleges; attract investment for research and companies in their ecosystem, and allow applications to diffuse through the B.C. economy, including such sectors as finance; construction; retail; and natural resources.

This fall saw the provincial government announcement of a new innovation corridor for the Fraser Valley, with a second downtown in Surrey built around the establishment of a Quantum Algorithms Institute at SFU’s Surrey campus.

B.C. is a front-runner in Quantum computing and government should be given credit for helping to support this rapidly developing technology to ensure we remain a leading jurisdiction, where a cluster of quantum companies can flourish.

With connections between academia and industry, and several world-leading quantum firms established in B.C., alongside a strong and growing talent-pool fed by the research universities and the institute, B.C. has the opportunity to develop a future cluster around quantum computing.

Unlike a “precinct”, where like-minded people get together in a specific space, a “cluster” is typically concentrated in one field but spread over a city or broad community.

As economic theorist Michael Porter has argued in defining his industry cluster concept, regions improve their prosperity by leveraging their existing strengths, and connecting business (and industries) that are already leveraging these strengths to improve the sophistication and productivity of the ecosystem.

For example, a traditionally resource-based economy may be ideal for innovation in forestry or energy, but as seen in Australia, many other technologies are required to innovate and develop higher-value products.

Precincts vs. Clusters

Innovation Precincts are groups of industry, research and educational activities taking place in a specific location. They can build on meeting places in a community, helping develop solutions for real needs in a specific community or beyond.

Industry clusters on the other hand, are geographically-connected groups that include companies, suppliers, communities, academia, and all levels of government working together in a particular field.

Innovation in action: Australia extracts opportunity from mining

Australia has a sizeable mining industry – but it isn't just extraction that has helped to fuel their economy. They have also developed a strong external market for home-grown mining technology.

More than 60% of the world's mines now operate with Australian-developed software, with suppliers also developing systems for use in other sectors.

R&D expenditures in mining in Australia more than doubled between 2006 and 2012. As a result, yields from extraction increased, operating costs were reduced and there was noted improvements to safety procedures and hazard detection.

A culture of collaboration between academia, research institutions and industry are also credited with helping the Australian mining industry maintain its competitive advantage.

Source: adapted from Deloitte, 2019

B.C. has other areas of technology strength, such as artificial intelligence, genomics, AR/VR and fusion, where we can highlight a visible centre for business and academic collaboration.

Fast-growing companies, particularly tech, thrive in an atmosphere where there is a critical mass of talent and knowledge – where companies can connect with customers, partners, start-ups, investors, universities, and vice versa. The few large companies that B.C. has are not necessarily well connected to these clusters or to the broader innovation ecosystem and could benefit from these productivity-enhancing relationships. Universities benefit from connectivity through researching needed applications, commercializing their inventions and in finding jobs for their graduates.

The development of the B.C.-led Digital Supercluster is a significant attempt to develop a critical mass of talent and knowledge that will drive business investment, innovation and scale-up, by bringing together emerging technology clusters with major organizations in selected areas such as health, natural resources and advanced manufacturing.

In short, development of clusters, aside from their ability to attract talent, grow companies and enhance technologies, puts B.C. in a better position to grow technology-enabled companies and jobs.

Recommendation 2:

Support the development of emerging technology clusters

Issue: Technology clusters can attract seasoned talent, help support companies to scale up and support tech-enabled firms across all sectors of the economy. However, clusters developing made-in-B.C. technology applications are currently lacking.

Recommendation: The Province of B.C. should work with the federal government to catalyse, align and co-fund key provincial cluster priority areas which would leverage dollars available from several sources such as the federal Strategic Investment Fund.

As a starting point, the Province should provide support for Artificial Intelligence (AI) as an emerging technology cluster, which will further enhance its business competitiveness in B.C.

B.C.'s clean, green reputation

Governments and industry around the world are coming to grips with how to tackle the challenge of climate change.

For more than a decade, British Columbia has taken a leadership role in environmental policy and the CleanBC plan, introduced in 2018, sets out a good, climate action vision.

One area where there is room to expand this vision, however, is in leveraging the requirements and any funding from CleanBC toward developing a supportive local ecosystem. In other words, how can the B.C. and Canadian supply chain benefit from our actions to address climate change?

For example, under CleanBC and related legislation, B.C. has set long term targets for zero emission vehicle sales through to 2040. While it is not reasonable to expect vehicle production to suddenly shift to B.C., by better utilizing this regulation, and others, there is an opportunity to incent domestic production of technologies which may feed into the supply chains for these vehicles. Otherwise, we are just adding to our negative balance of payments in B.C. by purchasing technology products and solutions abroad, with little advantage to our domestic industry, or our economy.

The Province has instituted programs to incentivize emitters to find innovative solutions to reducing emissions, for example the CleanBC program for Industry directs some of the carbon tax paid by industry toward incenting cleaner operation.

The government and Business Council of B.C. have signed an MOU to develop a low-carbon strategy, helping to maintain competitiveness of domestic companies who face pressure from industry in overseas countries without carbon pricing.

At the same time, in an effort to pair local innovation with targeted emissions, financing for pre-commercial clean energy initiatives are available through the Innovative Clean Energy fund.

However, there is currently no funding to encourage B.C. innovators to develop new technology, products or services required to supply systemic changes across various industries.

As well, by identifying expected areas of increased product demand, and generally staying ahead of, or signalling, innovation requirements demanded by CleanBC, an opportunity exists to advance local

Finland's Bioeconomy

Finland has branded itself as a global leader in bioeconomy, releasing a strategy in 2014 with the objective to “generate new economic growth and new jobs from an increase in the bioeconomy business and from high added-value products and services while securing the operating conditions for the nature’s ecosystems.”

Their goal is to push the bioeconomy output up to €100 billion (C\$145 billion) by 2025 (from €60 billion in 2014) and to create 100,000 new jobs.

Government made a €330 million (C\$480 million) commitment to implement the strategy.

This long-term vision has led to strong reduction in carbon footprint through innovative practices adopted by Finnish companies.

For example, the Finnish company Neste, the world’s largest producer of renewable diesel (HVO), reported a reduction in greenhouse gas emissions by 6.7 million tons in 2016 as a result of the global use of Neste’s renewable fuels.

economies by supporting innovation within small and medium enterprises, which makes up 98 per cent of the B.C. businesses.

As industry has stated, setting out long term regulations can provide much desired certainty for BC business, as seen, for example, through the B.C. Energy Step Code, supporting incremental steps to increase energy efficiency with the building code.

In summary, an opportunity exists to use the CleanBC strategy to grow British Columbia companies.

Recommendation 3:

Utilize the CleanBC plan as an economic driver

Issue: The Province's CleanBC plan sets out a good climate vision and brand but the opportunity exists to use the strategy to drive further economic growth in B.C.

Recommendation: The Province of B.C., under CleanBC, should incent companies to seek out B.C. solutions when working to meet government's climate targets and regulations. By better developing, or incenting the domestic supply chain, B.C. solutions can be encouraged, versus imported.

Government should also explore how regulatory changes might give a competitive edge or encouragement to B.C.'s growing cleantech industry.

The Province should also focus efforts on increasing value of sustainable natural resources in ways aligned with the CleanBC brand, such as the bioeconomy.

Growing B.C. Companies by Building Intangible Assets

Growing any company requires maintaining its value – this includes intellectual or intangible assets. By protecting them, companies can preserve their competitive advantage.

Most successful firms have taken significant steps to protect their Intellectual Property (IP), considering it central to growing their business.

Statistics Canada data shows that small and medium enterprises in Canada which have formal IP are two to four times more likely to export, and 60 per cent more likely to be high growth. While a European study on small and medium enterprises, undertaken by research centre Paristech Mines, suggested start-ups were three times more likely to be successful if they had one patent, and five times more if they had multiple patents.

As the Public Policy Forum has noted in its New North Star publication, the current policy toolkit of most OECD countries is “mainly designed for a world of tangible assets, where capital and labour are the main factors of production.” The future, however, is expected to be driven, increasingly, by intangible assets – data, software, branding and emerging technology – where IP becomes ever more important.

Measured by its innovation outputs such as levels of patent registration, commercializing IP and medium-term growth of start-ups, B.C. performs poorly relative to most OECD countries.

Understanding IP

IP, or intellectual property, refers to “creations of the mind”. There are several types of IP protection, including patents, trademarks, trade secrets and copyright.

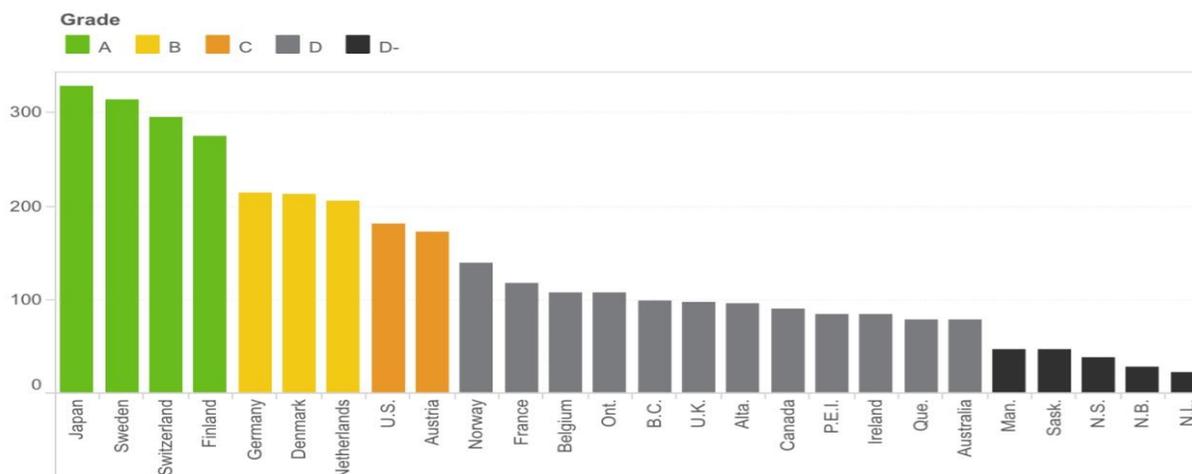
Most relevant to B.C.’s IP challenge are patents, which apply to newly developed technology and to improvements on products or processes. They provide a time-limited, legally protected, exclusive right to make, use and sell an invention in the country that issues the patent.

Patents provide businesses with some confidence that they can invest in creating and developing ideas without having them copied by competitors for a certain duration.

Source: World Intellectual Property Organization

Figure 6: Patents by Population, Provinces and International Peers, 2013

(PCT patents per million population)



Source: Conference Board of Canada, How Canada Performs, 2017

Patents per population are measured as the number of patents filed under the Patent Cooperation Treaty (PCT) per million population. As seen in Figure 6, prepared by the Conference Board of Canada, Canadian provinces perform poorly relative to their international peers.

B.C.'s challenges include IP leakage, a poor incentive structure, the cost of patents and relatively low levels of business investment in research and development.

IP Leakage

For years, B.C. universities have struggled to turn on-campus inventions into valuable IP, often lacking the resources and skill set needed to commercialize research. As a result, universities are increasingly turning to companies to work directly with academics to commercialize their research because industry partners have the resources to advance early academic research into more valuable intellectual property. As B.C. generally lacks companies of sufficient scale to do this kind of work, foreign companies are the likeliest to engage in these types of agreements with universities here.

"Most agreements end up with newly developed IP wholly-owned by the industry partner because they have the vision to harness the value in the IP. These industry partners are almost always foreign multinationals, leading to critical leakage of IP out of Canada. This explains why Canadian universities have developed world-leading IP in highly valuable fields such as regenerative medicine, Ebola vaccines, machine learning and AI, but most of the IP is currently owned by foreign firms, moving the resultant wealth and associated economic benefits outside Canada. Ensuring that IP generated in Canada with taxpayer funding is available to Canadian innovators is critical to beginning to boost our innovation outputs."

- James Hinton & Peter Cowan
Opinion: Canada needs an innovative intellectual property strategy
published in The Globe and Mail, 2017

Poor Incentive Structure:

How IP is taxed in this country, also plays a role in where companies consider bringing ideas to life.

As a CD Howe Institute commentary notes, "in most circumstances, IP-based income earned by a Canadian company is fully taxable, while income of a foreign affiliate of a Canadian company located in a low- or zero-tax jurisdiction is subject to a lower rate of foreign tax, and usually can transfer such active business income to Canada free of Canadian tax. This lack of neutrality in the tax treatment of IP-derived income – a feature common to most countries' international tax rules, including those of the United States and the United Kingdom – is an incentive for Canadian companies to locate and commercialize developed or acquired IP in low-tax foreign jurisdictions."⁴

Cost of Patents:

In addition to filing fees, legal costs related to patent filing are often prohibitive, especially for SMEs or individual researchers, with the average cost of patenting reaching \$20,000.

⁴ https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Commentary_379_0.pdf

Helping with a first patent

For entrepreneurs, going about protecting their potentially valuable idea can be a challenge, and even a game changer. To help, the Québec government launched its First Patent Program in 2015 to encourage small and medium-sized businesses to patent their inventions.

Québec's program offers eligible businesses a subsidy on expenses related to obtaining their first patent. The credit equals 50 per cent of incurred expenses, up to \$25,000.

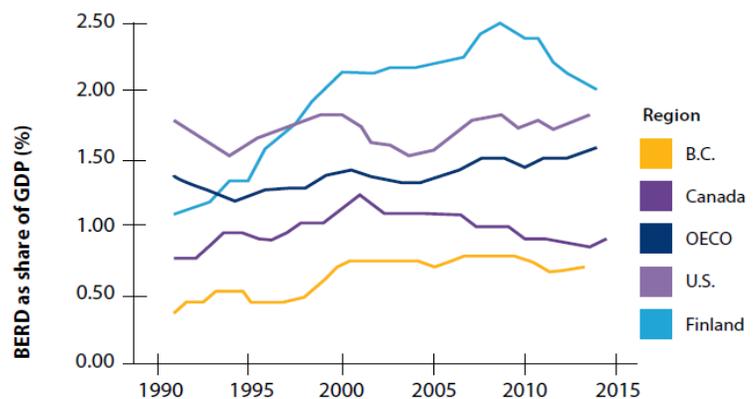
Levels of Business Investment in R&D:

Data suggests countries and provinces with higher business expenditures on R&D (BERD) as a percentage of GDP (and by extension, companies generating innovations) have higher patent rates.

As figure 7 indicates, B.C. has relatively low levels of BERD compared other provinces and countries. This, in turn, can be partially explained by the relatively low numbers of larger, anchor firms in B.C., and, where these firms do exist, they are typically in traditional industries.

Figure 7:

Business Expenditures on Research and Development (BERD) as share of GDP (BC, Finland, the U.S., Canada, OECD), 1990 -2015



Source: the Conference Board of Canada, adapted from OECD, Main Science and Technology Indicators; Statistics Canada, CANSIM table 358-0001, GERD by Science Type and by Funder and Performance Sector; Statistics Canada, CANSIM table 384-0038, GDP, Expenditure-Based, Provincial and Territorial

Recommendation 4:

Incent and protect intellectual property

Issue: B.C. can do more to improve its track record in growing and retaining home-grown anchor firms based on B.C. innovations.

Recommendation: The Province of B.C. should provide matched funding to B.C.-based small and medium enterprises to assist them in seeking patent protection, helping inventors and start-ups overcome the expenses related to protecting their intellectual property.

The B.C. government could also consider a form of tax incentive for income related to the sale of patented products, effectively encouraging companies to locate intellectual property activity, and associated jobs, in B.C.

Developing Leadership Talent

B.C. has a strong pool of talent and a well-respected post secondary system. However, it has become clear there are opportunities for improvement. While talent development and lifelong learning are being addressed in various ways, one area of economic need is talent attraction, retention and c-suite training.

Employers in Canada report a “strong pipeline” of junior talent, but found it very difficult to recruit senior talent, especially those willing to lead teams⁵. At the same time, the peak age of emigrants leaving Canada were aged 25-49, between 2006-2011 when the latest data was available, with management making up the highest percentage occupation of Canadians residing in the United States, where opportunities can be more lucrative.

While Innovate BC and its partners currently deliver programs that help entrepreneurs start-up companies, connect with experts and validate their markets in the very early stages of business, there is currently a gap in B.C. in terms of taking the most promising of these start-up companies and supporting them to become high-growth scale-ups and future anchors.

Many technology company CEOs say the biggest obstacle to growth is finding and hiring experienced business talent. They are particularly hard pressed to find senior managers in areas such as business development, sales, and marketing, particularly those with global experience. This is another result of the scale problem: B.C. has relatively few companies that have scaled through all stages of growth nor large companies to train this type of talent.

The Victoria Innovation, Advanced Technology and Entrepreneurship Council, or VIATEC, has articulated that “the biggest thing holding back the growth of our tech community (just like everywhere) is our ability to attract experienced, senior talent”⁶.

VIATEC and Accelerate Okanagan have been addressing training needs by delivering the RevUp program, a six-month program connecting established companies and leaders with experienced mentors or Executives-in-Residence “designed to help tackle rapid-growth issues and promote future success”⁷. Furthermore, training for scale up is an area that Innovate BC has identified as a key focus area where substantial impact to industry exists.

In Germany, Zukunft im Norden is a collaborative initiative between the public sector, educational institutions and companies intent on improving the overall skill level of the region. Within the initiative, a network of human resources consultancies was formed to provide advice to SMEs to help them with talent retention, in recognition they often don’t have access to the same level of these services that larger companies⁸ do. Retaining talent within B.C. SMEs will help to target the majority of private sector employment.

Multinational corporations have established brands and experienced executives; by welcoming so-called anchor companies, B.C. can attract new talent and offer training ground for others who are looking to build their skill-set, including managers. As well, when experienced anchor company employees are ready to change roles, there are many SMEs who could benefit from their insight and experience.

⁵ Brookfield, 2018

⁶ <https://www.viatec.ca/articles/getting-victorias-tech-sector-to-10billion-by-2030-dan-gunn>

⁷ <https://www.accelerateokanagan.com/programs/revup/>

⁸ Andersson, 2014

But, as noted earlier, one of the fundamental reasons for B.C.'s lacklustre business investments and innovation performance is that even though provincial entrepreneurs are good at launching companies, very few companies achieve significant scale. Starting a business in B.C. is relatively easy: in fact, according to rankings by the World Economic Forum, Canada ranks second in ease of establishing a new firm. The problem is that many companies are purchased or do not grow after a certain point.

Addressing our leadership gap, therefore, in turn helps our BC companies grow and ultimately improves innovation performance.

Recommendation 5:

Invest in talent retention strategies

Issue: B.C. has a highly skilled and talented workforce but lacks a pool of experienced leaders, who can scale and grow companies, as a result B.C. firms are at higher risk of acquisition by larger companies based in other jurisdictions.

Recommendation: Government should build on the successes of the RevUp and similar programs, developing mentorship and leadership skills across the province, incorporating them as a key component of precincts, and as a means to supporting local companies' growth.

Provincial government as an innovative leader

“In the classical economic development model, prosperity is derived from selling natural resources. Prosperity is thus limited to the amount of resources available. In a model like this, governments act as owners and distributors of wealth.

In a more modern view of economics, prosperity is created through innovation by firms that create more valuable products and services and thus improve productivity. The government’s role is to create the enabling conditions that allow companies to innovate and create productivity and prosperity. Therefore, the key to success and economic growth in the modern world is through innovation.”

- Impact Centre, University of Toronto
The Myth of a Better Mousetrap, 2019

While these five recommendations will make a difference in the short-to-medium term, it is important to realize there are many other ways the government itself can play a direct role in building the B.C. economy.

Digital Government

Within government itself, through the Digital Framework, notable efforts are being made to set direction for transforming service delivery, make better use of data and co-develop services that help the digital economy grow. This move toward digital government must continue.

Programs like the BC Developers’ Exchange, where public and private sector developers work collaboratively on challenges, and the BC Startup in Residence program, where start-ups are paired with public sector to work short term on tech solutions, are good examples of how we can maximize public investments.

Government Procurement

The Province, particularly through Ministry of Citizens’ Services, is planning significant steps forward in its approach to procurement.

Given nearly \$7 billion is spent annually on goods, services and construction, government’s new procurement strategy is planning to streamline processes, remove barriers for small and medium sized businesses and encourage innovation, collaboration and better social and environmental outcomes.

Government needs to make greater use of procurement as a significant government lever to encourage tech and innovation in B.C., particularly in the health sector which is, and will continue to, dominate government’s overall budget.

Estonia finding e-solutions

Twenty years ago, Estonia had no digital data about its citizenry and most people didn't have access to the internet, never mind a device in which to access it. Today, it's been described by Wired magazine as the most advanced digital society in the world.

Estonia's transformation to e-governance comes from an investment in a strong IT infrastructure and a population eager for e-solutions.

The use of digital identity and e-signatures now saves Estonia two percent of GDP, and reduces hassles for people and business. Virtually all public services are available online 24/7, with benefits like: shrinking the time needed to establish a business to just three hours (from five days) and allowing tax declarations to be filed in minutes. Every resident has an e-health record, enabling safe access to digital records country-wide and creating a centralized, paperless system for issuing and handling prescriptions.

Innovation in Health

Several years ago, the federal Parliamentary Budget Officer warned that health care costs in Canada were becoming unsustainable, compounded by our ageing population and lack of productivity growth. Indeed, our health care budgets continue to increase, which is precisely why health innovation is critically important.

We need to think about using our very large investments in our health care system to not just solve problems, but also to use B.C.-based products and services.

When we do make capital improvements and investments in health, such as purchasing modern equipment, access to it is often rationed. Indeed, it is structurally difficult to implement innovation across the health care system, for a variety of reasons, including overcoming complications like the lack of digital record keeping, concerns around digital access and the confines of the current fee for service structure, among many others.

Innovate BC

Throughout his term, the Innovation Commissioner has met with innovation leaders to learn about policies in international, national and subnational jurisdictions successful in advancing economic development and positioning their countries and provinces for participation in the innovation economy.

A common thread has emerged when visiting or researching these international markets: jurisdictions that are actively participating in the innovation economy have significant government investments in business development agencies that operate at arms-length to government to provide seed/R&D/scale up funding, consultative services, and international export assistance and intelligence.

In British Columbia, Innovate BC is the only government funded agency that is intended to be a "one-stop service centre connecting innovators with funding, tools, resources and support." It received \$8 million last year from the Province of B.C.

In comparing the average budget of innovation agencies in subnational jurisdictions elsewhere, where there is similarity to B.C. in terms of agency functions, existing economy, and political environment, the analysis shows budgets are in the range of ten times higher. Alberta Innovates budget, for example, is \$202 million for 2019/20 (down from \$278 million in 2018/19). Leading jurisdictions in Germany, the UK, Ireland and Finland also have very significant budgets. In summary, an order of magnitude increase to the budget in line with other like-provinces, must be strongly considered if we wish to be a true leader in innovation.

InnovateBC should also play a key role in bringing about the recommendations contained in this report.

Lifelong Learning

Government has taken action in many ways to prepare British Columbians for the jobs of the future – updating the K-12 curriculum, undertaking labour market projections, funding in-demand post-secondary seats and supporting older workers being displaced from the workforce.

In the modern economy, it is ultimately an individual responsibility to stay skilled, but one way the government can help in encouraging ongoing skills training is through establishment of life-long learning savings accounts or through matching the federal government's non-taxable training credit. While these come with cost implications for government, there can also clearly be costs to the economy if people aren't maximizing their potential.

Investment in Infrastructure

The government can lead, not only in creating the right environment for business success and ensuring the quality of life in B.C. is supported through investment in education, health, community development and tourism, but also in the strategic deployment of infrastructure to help enable the emerging economy.

These infrastructure investments could include high-speed internet connectivity throughout B.C., rapid transit, and extending the gateway concept, in key corridors such as UBC - Vancouver - Delta - Surrey - Fraser Valley, and encouraging regional development in key hubs in B.C. such as Victoria/South Island, Kelowna, Kamloops and Prince George.

Tracking Progress

As this report has started to outline, there are many ways that innovation can be supported – and everyone has a role in our success. While it is not wholly in government's control, government can be a significant enabler, as we have explained in this document.

To assist going forward, benchmarking or progress tracking, such as developing a scorecard, undertaken by an independent assessor with measures specific to innovation, could help government in understanding where progress is being made and where further assistance may be required.

Final Thoughts

As B.C.'s Innovation Commissioner, my report offers some insights on how the B.C. government can focus short term and affordable efforts to help grow B.C. companies, which will position us well for the emerging economy and ultimately enhance our province's competitiveness in the world.

Although the provincial government can become a leader and convener in helping to drive priorities in innovation in the province, we need the whole provincial ecosystem including the federal government, municipal governments, crown corporations, businesses, academia, not-for-profits, and people across the province to play their part in ensuring prosperity for B.C. in the future.

By turning our attention to success in the emerging economy in this way, we can ensure that innovation is working for British Columbia!

Appendix

Mandate

Dr. Alan Winter was appointed as B.C. Innovation Commissioner in February 2018. Reporting to the Minister of Jobs, Economic Development and Competitiveness, Dr. Winter had six areas of focus:

- Seek and maintain strategic partnerships with federal government representatives;
- Advocate for B.C.'s share of federal innovation-related program funding;
- Champion B.C.'s technology sector in Ottawa and abroad;
- Promote B.C. as a lucrative investment location;
- Connect B.C. technology companies with national and international partners to expand market opportunities; and
- Support implementation of innovation and technology-related mandates and priorities of the provincial government.

Activities

The following table summarizes some of the Innovation Commissioner’s activities since appointment:

Responsibilities:	Activities and progress:
<p><i>Federal Partnerships & Funding:</i></p> <ul style="list-style-type: none"> ▶ Seek and maintain strategic partnerships with federal government representatives ▶ Advocate for B.C.’s share of federal Innovation-related program funding 	<ul style="list-style-type: none"> ✓ To build and foster relationships with key senior federal representatives, traveled to Ottawa meeting officials at Innovation, Science and Economic Development; NSERC; NRC; Defence Research Development Canada; Infrastructure Canada; Sustainable Development Technology Canada; Health Canada; and Agriculture and Agri-Food Canada ✓ Met with key senior federal representatives based in B.C., including: CFB Esquimalt; Pacific Forestry Centre and CFIA/Sidney Centre for Plant Health; Environment Canada’s Pacific & Yukon Lab; Pacific Enterprise Science Centre; and Dominion Radio Observatory
<p><i>Champion B.C.’s technology sector in Ottawa and abroad</i></p>	<ul style="list-style-type: none"> ✓ Since appointment, nearly 450 unique meetings, speaking engagements or visits to private sector organizations and other levels of government. ✓ Met Invest in Canada and the Information Technology Association of Canada in Ottawa ✓ In support of BC Trade & Invest, led missions to USA (San Francisco, Los Angeles, Seattle, BIO conferences in Boston, Philadelphia), Europe (UK, Germany, Ireland, Belgium, Netherlands, Estonia, Finland), Israel, and Asia (Singapore, Korea, Japan)
<p><i>Promote British Columbia and BC tech:</i></p> <ul style="list-style-type: none"> ▶ Build and leverage a network of international investors, promoting B.C. as a lucrative investment location ▶ Connect B.C. technology companies with national and international partners to expand market opportunities 	<ul style="list-style-type: none"> ✓ Continuing engagement with series of MNCs with existing BC operations ✓ Hosted series of roundtable discussions with BC’s tech sector association leaders ✓ Visited Prince George, Vanderhoof, Fort St John, Comox Valley, Kamloops, Trail/Rossland to connect with regional entrepreneurs and tech organizations ✓ Visited Ottawa’s Cours Bayview Yards ✓ Met with consular officials from France, Israel, Ireland, UK, Germany and delegations from Emilia-Romagna (Italy); Australian government; Japan External Trade Organization; and UK Quantum Experts. ✓ Participated in BIO International life sciences conference (2018, 2019); presented at International Healthcare Summit (2018); Eureka Fest (U.S. startup festival, 2018) & Milken Institute Global Conference (2018); GLOBE forum (2018); Interface Health CEO Summit (2018); PNWER Health Innovations seminar (2018); UBCM Green Innovation and Clean Growth Communities session (2018); South Island

	<p>Prosperity Project lead investors group (2018); VR/AR Global Summit (2018); Business Council of BC Innovation and Productivity Committee (2018); VI Economic Summit (2018);</p> <ul style="list-style-type: none"> ✓ LifeScienceBC Investor Summit panel (2018); UVic Bioengineering Partnership Day keynote (2018); Canadian Science Policy Conference panels (2018); BC Natural Resources Forum (2019); InnovateBC Executive in Residence Summit (2019); Canadian Accelerator Summit (2019); Providence Health medical staff innovation presentation (2019); Comox Valley Economic Development Society (2019); Lower Columbia Community Development Team Society (2019); Clean Energy BC AGM (2019); Cleantech Innovation Showcase, Seattle (2019)
<p>Support provincial tech-related mandates:</p> <ul style="list-style-type: none"> ▶ where appropriate, support implementation of innovation and technology-related mandates and priorities of the BC government 	<ul style="list-style-type: none"> ✓ Appointed as ex-officio member of Innovate BC board ✓ Appointed as ex-officio member of Emerging Economic Task Force ✓ Served on Deputy Ministers' Committee on Clean Growth Strategy ✓ Engaged with presidents of BC Association of Institutes and Universities; BC Colleges, Research Universities' Council of BC and UBC's Research and Innovation Council; participated in Cascadia Corridor Conferences (2018, 2019); LifeSciences BC Investor Summit (Oct); launch of CleanBC (Dec); presented to BCAFN Summit (2019) on Innovation opportunities; participated in panels at BCTECH Summits (2018, 2019)

Engagements

Over the course of 24 months in his role as Innovation Commissioner, Dr. Winter has met with nearly 450 unique organizations external to government:

- #BCTECH Summit
- A*STAR (Singapore)
- Accelerate Okanagan
- Accel-RX
- Advantage BC
- Aerospace Industries Association of Canada
- Agriculture and AgriFood Canada
- AlnBC
- Alacrity
- Altech Inspections
- Amazon
- Ambassador of Czech Republic
- Ambassador of Israel to Canada
- Analytic Systems (tour)
- Asia Pacific Foundation of Canada
- Association of British Columbia Marine Industries
- Avista Corp
- Axine Water Technologies
- Axis Forestry (Kamloops)
- Ayogo
- Babcock (Canada)
- Babcock (UK)
- Babylon by TELUS
- Babylon Health (UK)
- BAE Systems (UK)
- Bank of Israel
- Bardel Entertainment
- BC Academic Health Science Network (BCAHSN)
- BC Assembly of First Nations (presentation)
- BC Association of Institutes + Universities
- BC Business Council
- BC Cancer Research
- BC Chamber
- BC Colleges
- BC Construction Association
- BC Ferry Services Inc*
- BC Investment Management Corporation
- BC Natural Resources Forum
- BC Pulp and Paper BioAlliance
- BC Tech Association
- BCAIU Presidents
- BDC
- Ben Franklin Technology Partners (BIO)
- BGN Technologies (Israel)
- Biba Ventures Inc
- BIO International Convention
- Bioenterprise
- Biogen Canada (BIO)
- Bioindustrial Innovation Canada
- Blue Fuel Energy Corp
- Boehringer Ingelheim
- Boeing HorizonX Ventures (Seattle)
- Boeing
- Borealis GeoPower
- British Consul General (Vancouver)
- Bundesministerium für Bildung und Forschung (BMBF) - German Federal Ministry of Education and Research
- Bundesministerium für Wirtschaft und Energie (BMWi) - German Federal Ministry of Economy and Energy
- Business Council of Canada
- Business Finland (Finland)
- Cambridge Innovation Centre & BioLabs (BIO)
- Cambridge Wireless (UK)
- Camosun College
- Canada Business Seminar presentation (Korea)
- Canada Food Inspection Agency (Sidney Centre for Plant Health)
- Canada Foundation for Innovation
- Canada Health Infoway
- Canada Investment Seminar presentation (Korea)
- Canada UK Chamber of Commerce - Technology Forum
- Canada UK Joint Science and Technology Committee
- Canada-Israel Industrial Research & Development Foundation
- Canada's Digital Technology Supercluster
- Canada's High Commissioner to the UK
- Canadian Accelerator Summit presentation
- Canadian Ambassador to Israel
- Canadian Consulate (San Diego)
- Canadian Council for Public-Private Partnerships
- Canadian Embassy (Estonia)
- Canadian Embassy (Finland)
- Canadian Embassy (Germany)
- Canadian High Commissioner to Singapore (Singapore)
- Canadian Manufacturers and Exporters British Columbia
- Canadian Representative Office to the Palestinian Authority
- Canadian Science Policy Conference (panel)
- Canfor
- Carmanah Technologies

- Cascadia Corridor Conference
- Catapult Programme (UK) - Cell and Gene Therapy Catapult
- Centre for Drug Research and Development
- CFB Esquimalt Base Commander
- Check Point Software Technologies (Israel)
- Chief Medical Officer, UK Government
- Chief Scientist, Government of Australia
- Children's Hospital of Philadelphia (BIO)
- Chrysalix Venture Capital
- Churchill Club Top 10 Tech Trends Banquet (SF)
- CIFAR
- City of Fort St. John
- City of Kamloops
- City of Philadelphia / State of Pennsylvania (BIO)
- City of Victoria
- CityAge
- Clean Energy BC (presentation)
- Cleantech Delta (Netherlands)
- Cleantech Innovation Showcase presentation (Seattle)
- Cloudhead Games
- Coastal First Nations
- Comcast LIFT Labs for Entrepreneurs (BIO)
- Comox Valley Economic Development & Tourism AGM
- Comox Valley technology roundtable meeting
- Consul General of Canada to the Pacific Northwest Seattle
- Consul General of France
- Consul General of Ireland
- Consul General of Israel
- Corvus Energy (tour)
- Council of Canadian Academies
- Cours Bayview Yards
- Creative BC
- Creative Industries Showcase
- Creative Labs
- CreativeBC
- CureMetrix (San Diego)
- Cypress Robotics (Kamloops)
- Daiya Foods
- Data Effect AI Conference
- DataCloud (Seattle)
- Defence Research and Development Canada
- Deloitte
- Department for Business, Energy and Industrial Strategy, UK Government
- Department of Foreign Affairs and Trade (Ireland)
- Department of Foreign Trade (Israel)
- DigiBC
- Digital Moose Lounge gathering (SF)
- Discovery Foundation
- Dominion Radio Observatory (Penticton)
- D-Wave Systems Inc (tour)
- Edifecs (Seattle)
- E-Estonia
- e-Governance Academy (Estonia)
- Embassy of Canada in Dublin (Ireland)
- Emilia-Romagna Regional Ministry of Agriculture delegation
- Emily Carr University of Art + Design
- Employment and Social Development Canada
- Enterprise Estonia
- Enterprise Ireland
- Entertainment Technology Awards (presentation) (Los Angeles)
- entrepreneurship@UBC
- Environment Climate Change Canada's Pacific and Yukon Lab
- EPAM Systems (BIO)
- Epscan
- Esri Canada
- EUREKA Stakeholder Conference (Netherlands)
- EurekaFest
- European Commission Horizon 2020/Horizon Europe (Belgium)
- Eventbrite (SF)
- Fingerfood Studios
- Finning
- Finnish Canadian Business Club (Finland)
- Finnish Forest Industries Federation (Finland)
- First Nations Technology Council
- Fisheries, Oceans and Coast Guard, Minister of
- Foresight
- Fort St John and District Chamber of Commerce
- Fortinet
- FPInnovations
- Fraunhofer Institutes - Berlin Center for Digital Transformation
- Futurpreneur Canada
- Galapagos NV (Belgium)
- Gav Yam Advanced Technologies Park (Israel) tour
- GE Business Innovations
- General Electric
- General Fusion
- Genome Canada
- GenomeBC
- Geoscience BC
- German Consul General (Vancouver)
- Gevity Inc
- GH Associates (UK)
- Global Affairs Canada
- Green Village lab (Netherlands)
- Greentown Labs

- GSK
- GSTAR 2019 conference (Korea)
- Gyeonggi Center for Creative Economy & Innovation (Korea)
- Gyeonggi Government Provincial Office (Korea)
- Hasso Plattner Institute (Germany)
- Health and Social Services Innovation, Province of Quebec
- Health Canada
- Hebrew University of Jerusalem
- Helmholtz Association (Germany)
- Hustle Fund (SF)
- I4C (Trail)
- IBM Canada
- iCRAG Research Cluster (Ireland)
- IFS Innovative Foundation Solutions
- IMC Canada
- IMEC (Belgium)
- Industrial Development Authority (Ireland)
- Industrial Light & Magic
- Industry Canada
- Information Technology Association of Canada
- Infosys
- Infrastructure and Communities Canada
- Infrastructure Canada*
- Innovate BC
- Innovate BC Executive in Residence Summit
- Innovate UK
- Innovation Boulevard
- Innovation Canada
- Innovation Central Society
- Innovation Island Technology Association
- Innovation Israel
- Innovation Quarter (Netherlands)
- Innovation, Science and Economic Development Canada
- Innovative Medicines Canada
- Innovative Medicines Canada
- Innovative Medicines Initiative (Belgium)
- Institute of Ocean Sciences
- Integral Strategy Network
- Intel (Israel)
- INTERFACE Health CEO Summit 2018
- International Healthcare Summit Kelowna
- Inventysinc
- Invest in Canada
- Invest Ottawa - Ottawa Autonomous Vehicle Program
- Island Coastal Economic Trust
- Israel Innovation Authority
- Israel Institute of Technology
- Japan External Trade Organization (JETRO)
- Japan Investment Mission presentation (Japan)
- Jefferson Health XR Lab (BIO)
- Jerusalem Institute for Strategic Studies
- JETRO (Japan)
- JR West Innovations (Japan)
- JSR Corporation (Japan)
- Kabam/Netmarble
- Kamloops Innovation Centre
- KPMG Ignition
- Kwantlen Polytechnic University
- LEDCOR
- Leibniz Association (Germany)
- Lifesciences BC Investor Summit (panel)
- Lifesciences BC
- Lightship Works (Kamloops)
- LNG Canada
- London & Partners (UK)
- London Ventures (UK)
- Los Angeles Venture Association (Los Angeles)
- Lower Columbia Community Development Team Society Board (Trail)
- LUKE/Natural Resources Institute (Finland)
- Masimo
- Mass Challenge
- Max Planck Society (Germany)
- Maxar
- Medtronic
- Metsa Wood (Finland)
- Michael Smith Foundation for Health Research
- Microsoft
- MIDAS (Trail)
- Milken Institute Global Conference
- Mining Association of BC
- Ministry of Economic Affairs (Estonia)
- Ministry of Employment & Economy (Finland)
- Ministry of Foreign Affairs (Israel)
- MITACS
- Mitsui
- MNP (Fort St John)
- Momentum Capital (Netherlands)
- Monetary Authority of Singapore (Singapore)
- NaiKun Wind Energy Group
- National Research Council of Canada - Industrial Research Assistance Program
- National Research Council of Canada - Dominion Astrophysical Observatory
- National Research Council of Canada
- Natural Gas Innovation Fund
- Natural Resources Canada

- Natural Science and Engineering Research Council of Canada - Pacific
- Neste (Finland)
- Netherlands Enterprise Agency RVO (Netherlands)
- Netherlands investor roundtable (Netherlands)
- Netmarble
- New Hippo Health
- Nortal LLC (Estonia)
- Northeastern University
- Northern Development Initiative Trust
- Northern Lights College
- Novartis (BIO)
- Novus
- Ocean Networks Canada
- OCTANE Medical Technology Association (Los Angeles)
- Ofcom (UK)
- Okanagan Community Partner Roundtable
- Okanagan Entrepreneur Roundtable
- Omers Ventures
- One Nucleus (UK)
- OneEleven
- Ontario Centres of Excellence
- OrCam Technologies (Israel)
- Osaka Prefecture Government (Japan)
- OSI Maritime (tour)
- Otsuka Holdings (Japan)
- OurCrowd (Israel)
- OVO (Singapore)
- Oxygen Capital Corporation
- PACCAR
- Pacific Forestry Centre
- Pacific Science Enterprise Centre tour (GC)
- Palestine Technical University / Palestine Academy of Science & Technology
- Penn Centre for Precision Medicine (BIO)
- Pennovation Centre (BIO)
- Philadelphia Alliance for Capital and Technologies Venture Capital Roundtable (BIO)
- PNWER Conference
- Port of Vancouver
- Portable Electric
- Postmates (SF)
- Precision Nanosystems
- Premier's Chinese Canadian Community Advisory Committee (presentation)
- Presentation to St Paul's Hospital doctors
- Public Services and Procurement Canada
- Quadrant AI
- Queen's University
- Radical I/O
- Research Universities Council of BC
- Rick Hansen Institute
- Rising Tide Fund (SF)
- Riskified (Israel)
- Roundtable PG Tech Leaders
- Royal Roads University
- Sakler Medical School, Tel Aviv University
- Salesforce (SF)
- Saltworks Technologies
- Samsung Canada
- Samsung Electronics (Korea)
- Sanctuary AI
- SAP Labs Canada
- Science Fair Foundation of BC
- Science Foundation Ireland
- ScienceWorld British Columbia
- Seaplane launch
- Semaphore Solutions
- Servier Canada
- SFFxSWITCH Conference (Singapore)
- Siemens (UK)
- Sinclair Group Forest Products
- Singapore Investment Roundtable (Singapore)
- Singaporean High Commissioner to Canada (Singapore)
- SK Telecom (Korea)
- Skillz (SF)
- Small Business Task Force
- Smart Cities Challenge Directorate
- Softbank (SF)
- Sony Pictures Imageworks
- Soundview Innovation Campus (Seattle)
- South Island Prosperity
- ST Engineering Land Systems (Singapore)
- St. Paul's Foundation
- Star Capital (Singapore)
- Start Up Nation Central (Israel)
- STEMCell
- Stewart World Port
- Stratford Managers
- Summit Electric (Kamloops)
- Supercluster VIP Dinner
- Sustainable Development Technology Canada
- Tableau Software
- Taglit Innovation Centre (Israel)
- Tata Consultancy Services
- Teck
- Tel Aviv-Yafo Municipality
- TELUS Health
- Terramera
- The Catapult Programme (UK)
- The Catapult Programme (UK) - Digital Catapult
- The Catapult Programme (UK) - Energy Systems Catapult
- The Catapult Programme (UK) - Future Cities Catapult
- The Catapult Programme (UK) - Transport Systems Catapult
- The Evidence Network
- The VRARA
- Thompson Rivers University

- Thought Exchange (Rossland)
- Tokyo Gas (Vancouver)
- Totem Capital Corporation
- Traqspera Technologies (Kamloops)
- TRIUMF
- TRIUMF Innovations Inc
- Tri-University Partnership Office
- TRU Generator (Kamloops)
- Tsunami XR (San Diego)
- UBC Forestry
- UC Irvine Innovation Center (Los Angeles)
- UK Department of Business, Energy and Industrial Strategy
- UK Quantum delegation
- UK Research and Innovation
- UK Science Innovation Network
- UK Trade Envoy to Canada
- Union Bank (Singapore)
- Union of BC Municipalities Annual Convention
- University City Science Centre (BIO)
- University of British Columbia
- University of Northern British Columbia
- University of the Fraser Valley
- University of Tokyo TODAI TLO (Japan)
- University of Victoria
- urthecast
- US Tech Meeting
- Uvic Bio Engineering Partnership Day (speech)
- UW CoMotion Labs (Seattle)
- Vancouver Economic Commission
- Vancouver Island Economic Summit (panel)
- Vancouver Island Engineering Society (presentation)
- Vancouver Island University Initiatives Trust
- Vanderhoof Regional Business Forum
- Vanedge Capital
- Varjo (Finland)
- Vector Institute
- Venture Cafe Foundation (BIO)
- VIATEC
- Viking Air
- Vision Critical (Singapore)
- VR Health (Israel)
- VRAR Global Summit
- Washington State Government
- Weizmann Institute of Science (Israel)
- West Fraser Timber
- Western Economic Diversification Canada
- Western Innovation Forum
- WestGrid
- WeWork (Seattle)
- WeWork (SF)
- whoknowzme
- Women in Science, Health & Innovation event
- World of Walas
- Xenon-Pharma
- Zehner Group (Los Angeles)
- Zillow (Seattle)

*Meeting List captures engagements from Feb. 5, 2018 – Dec. 31, 2019

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