INNOVATION

Dedicated B.C. regional development agency to bring bigger focus to tech sector, innovation: MPs and stakeholders

The proposed B.C. regional development agency will be the seventh RDA in Canada, and will make Western Economic Diversification solely focused on the Prairies.

BY AIDAN CHAMANDY

Minister of Economic Development and Official Languages Melanie Joly, pictured on Oct. 2, 2020, will be participating in a number of roundtables on the new development agency in B.C. in the coming months. *The Hill Times photograph by Andrew Meade*

Parliamentarians and stakeholders from British Columbia are welcoming the government's efforts to establish a new regional development agency for the Pacific province, saying it represents a shift from viewing the West as a "monolith," will benefit the province's flourishing tech sector, and will help spur innovation in more traditional resource-based industries.

"The tech sector has tremendous potential in B.C.," said Jill Tipping, CEO of BC Tech, an industry association that has lobbied the federal government to develop a new agency.

Ms. Tipping said one challenge the sector faces is scaling up small tech companies into bigger enterprises to serve as anchor firms that then provide benefits like added knowledge, access to capital, and access to international markets to other smaller firms, allowing them to grow further.

She said one of her hopes is that the new development agency will help solve the issue by looking at approaches from other development agencies.

She pointed to FedDev Ontario, the development agency responsible for Southern Ontario, investing more than $50-million in Communitech, MaRS, and Invest Ottawa to help fledgling firms meet the needs of a fast-growing company.

Liberal MP Patrick Weiler (West Vancouver–Sunshine Coast–Sea to Sky Country, B.C.) said the province's tech sector is a big economic driver, more so than the Prairie provinces, which contributes to a need for a distinct development agency.

"The tech sector is much bigger here. Whether that's digital tech, clean tech, or life sciences, they're really important," he said.

B.C.'s tech sector accounts for about 6.5 per cent of the province's GDP and has been growing faster than the overall provincial economy every year from 2008 to 2018, except for 2015 and 2009, the most recent provincial government statistics show.

Nearly 125,000 British Columbians were employed in the sector in 2018, a 6.2 per cent jump from 2017 and the highest number recorded to date. The sector accounted for about 5.4 per cent of B.C.'s total workforce in 2018, when the average B.C. tech worker made $1,740 per week, compared to $970 per week for the average worker in the province.

In 2018, the sector's revenue grew 9.2 per cent to $34.7-billion, also the highest level ever recorded. Those gains were largely due to a 10.9 per cent revenue increase in the tech services sector, which accounts for more than 90 per cent of B.C.'s nearly 11,000 tech businesses.

Unlike the services sector, the tech manufacturing sector declined, taking a one per cent revenue hit from 2017 to 2018.

A November 2020 BC Tech survey showed the industry is struggling during the pandemic, with 80 per cent of companies reporting a negative revenue impact. Of the 80 per cent, half say they've experienced a drop of 30 per cent or more. Despite the losses, 60 per cent of companies reported feeling optimistic in their ability to navigate the pandemic's challenges.

Dan Baxter, director of policy at the British Columbia Chamber of Commerce, said the growing tech sector plays a key part in making the province's more traditional industries, such as forestry and mining, better suited for the 21st century economy.

"A lot of tech companies support those resource economies" in helping them to be more efficient and environmentally friendly, he said.

"There's always the challenge in today's world of how do we continue to balance our environmental goals and desires for that healthy, clean environment, with all that economic opportunity, and this is where it kind of bleeds into the tech sector," he said.

Bridgette Anderson, president and CEO of the Greater Vancouver Board of Trade, echoed Mr. Baxter's comments.

"Clearly, we know that digital transformation is key for every business in every sector. We encourage the government to think about, when it comes to this regional development agency, is being able to support the technology advancements that need to be made across sectors," Ms. Anderson said.

Mr. Baxter and Ms. Anderson's comments reflect the changes Susan Yurkovich, president and CEO of the Council of Forest Industries (COFI), said she has been seeing in the forestry industry in the past few decades. COFI represents dozens of B.C. forestry companies of all sizes.

"When you look at our sector, people think of it as being a traditional sector, but it's actually a tech sector. If you go into a pulp mill or a sawmill today, it's a very high-tech environment. It has been transitioning to that kind of place over the last 20 or 30 years," she said.

For Liberal MP Randeep Sarai (Surrey Centre, B.C.), the proposed regional development agency is perfectly placed to support the forestry industry's tech push and should make that a main focus.

"I think it should focus on retooling mills and retooling people to get different jobs. The old sawmill positions … they're still there, but they've become much more high tech, where it's almost like playing a video game in a booth and using joysticks and high technology. So training people, getting the most out of automation, getting the most use out of every single log, and getting the most value add for that product so that we can we can make high-end products," he said.

The plan to establish a B.C.-focused regional development agency was first announced in the 2020 fall economic statement. The document said the new approach is in recognition of Western Canada's "diverse regional economies." B.C. currently falls under Western Economic Diversification, which also covers Manitoba, Saskatchewan, and Alberta.

Liberal MP Randeep Sarai, pictured on Feb. 19, 2020, says there may be a need for sub-agencies in the future. *The Hill Times photograph by Andrew Meade*

In January, Minister of Economic Development and Official Languages Mélanie Joly (Ahuntsic-Cartierville, Que.) embarked on a virtual tour of the province to consult with stakeholders in six regions, including participating in a Jan. 22 roundtable with the Greater Vancouver Board of Trade.

Ms. Anderson said discussions with Ms. Joly began about two months prior, but Liberal MP Ken Hardie (Fleetwood–Port Kells, B.C.) said the idea goes back to at least 2015, when he was first elected and the earliest he could speak to.

NDP MP Alistair MacGregor (Cowichan–Malahat–Langford, B.C.), his party's critic for agriculture and rural economic development, also supports the proposal.

"We are definitely at a time where British Columbia needs to have its own regional development agency. I think this move just pays homage to the fact that we are a province that is pretty unique, both geographically, but also in our economy," he said.

It is not known if the government plans to use an order-in-council or legislation to establish the agency. In response to a *Hill Times* question, Ms. Joly's office did not answer whether she would prefer the RDA to be established through an order-in-council or a bill. Mr. MacGregor said "as a legislator, I'd probably lean towards it being in an actual bill" so as to allow for input from constituents outside those included in Ms. Joly's consultations.

"That being said, that's probably a long process, given the journey a bill has to take to become law. And so an order-in-council will be faster, but it doesn't seem like the government is in a terrible rush right now," he said.

Mr. Sarai said the proposed agency could be split further in the future to reflect the province's internal diversity. Ontario has two regional development agencies, FedDev and FedNor, for southern and northern Ontario, respectively.

"As we grow, there may be a need for two agencies, but currently just getting the first one off and going and focused on helping create jobs and creating GDP is our first priority," he said.

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The Hill Times

McMaster University

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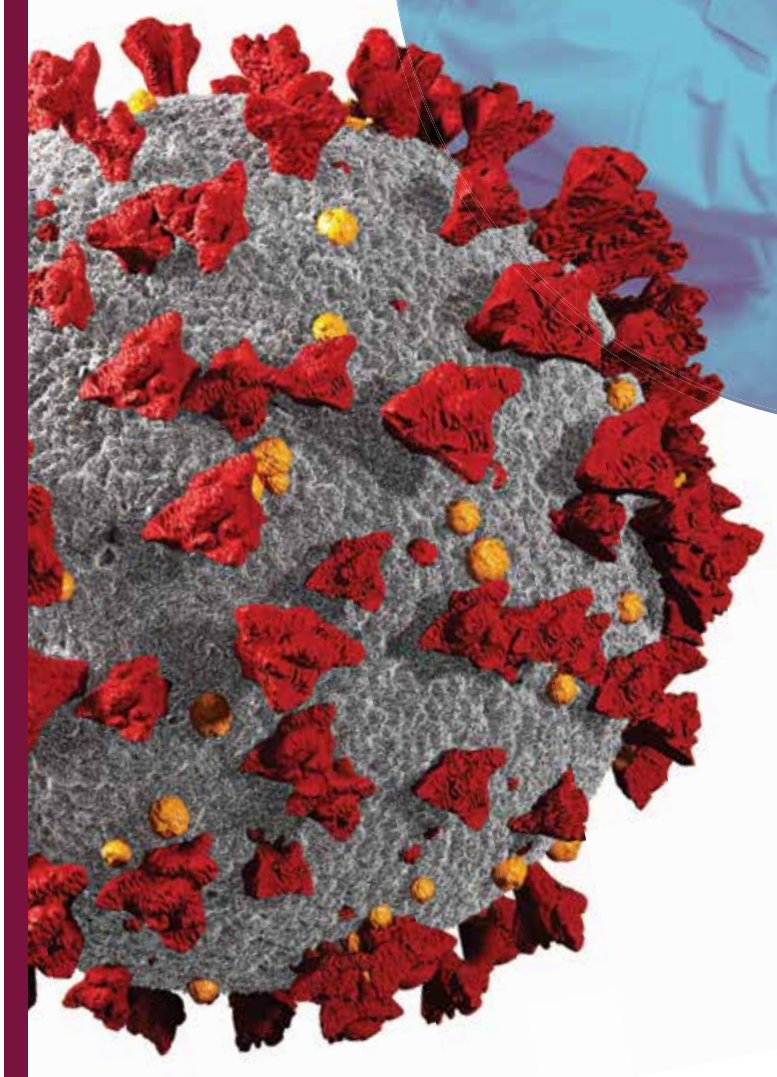
Charu Kaushic (right), scientific director, CIHR Institute of Infection and Immunity and postdoctoral fellow Allison Felker

Karen Mossman (right), vice-president, research and postdoctoral fellow Arinjay Banerjee



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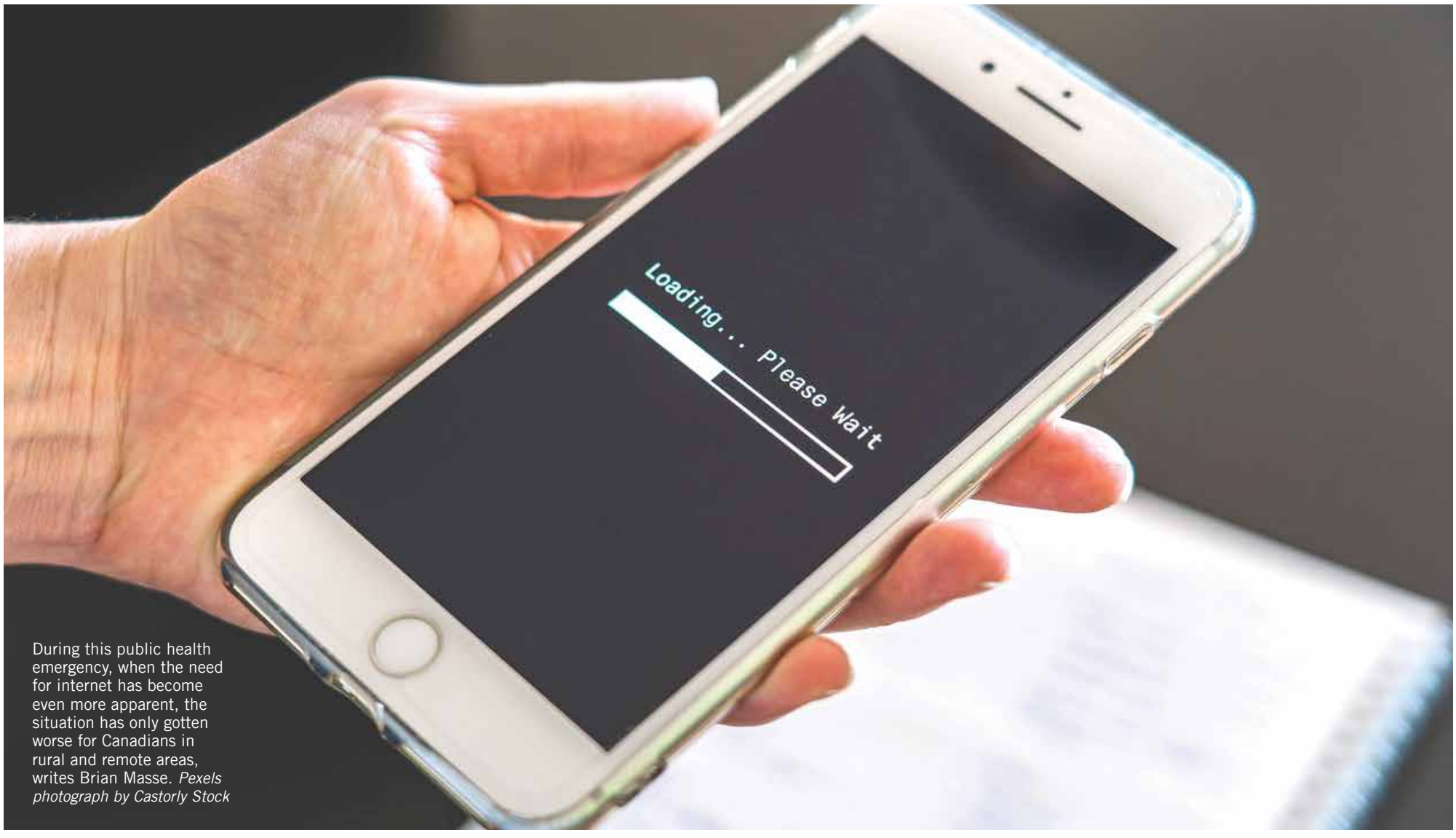

During this public health emergency, when the need for internet has become even more apparent, the situation has only gotten worse for Canadians in rural and remote areas, writes Brian Masse. *Pexels photograph by Castorly Stock*

Canadians cannot continue to wait for high-speed broadband everywhere

This pandemic has shown us that high-speed internet is a necessity and Canadians can't afford to wait 10 more years for it.

NDP MP Brian Masse

Opinion

The past several months have taught us a lot. One thing we know now, more than ever before, is how essential reliable and affordable high-speed broadband internet is for Canadians.

With people sheltering at home, and with schools and businesses closed, Canadians need a fast and reliable internet connection to communicate for work and school through online applications. It is an essential utility and must be treated as one. Unfortunately, the government has failed to treat this with the urgency it deserves.

In 2019, the Liberal government promised to connect everyone in Canada to reliable high-speed internet by 2030. This pandemic has shown us that high-speed internet is a necessity and Canadians can't afford to wait 10 more years for it.

In Canada, 63 per cent of rural households do not have access to high-speed broadband—classified as 50 megabits per second (Mbps) download speed and 10 Mbps upload speed, with unlimited data—and 14 per cent of highways and major transport roads do not have access to LTE wireless services. In the Northwest Territories, Yukon, and Nunavut, no households have access to high-speed broadband (50/10 Mbps with unlimited data) and 72 per cent of highways and major transport roads do not have access to LTE wireless services.

Good access to high-speed internet is especially important in rural areas where people tend to be more isolated from family members and friends. During this public health emergency, when the need for internet has become even more apparent, the situation has only gotten worse for Canadians in rural and remote areas.

As part of its Internet Performance Test that was submitted to the CRTC for their consultation on barriers to rural broadband deployment, the Canadian Internet Registration Authority released data on May 8, 2020. It found that in April, median rural download speeds were measured at 3.78 Mbps, compared to 44.09 Mbps in urban Canada—a difference of 11.7 times higher.

Since the COVID-19 pandemic began, median speeds have continued to fall for rural users, while urban speeds have increased. Typical download speeds vary from four to seven Mbps. Since February, speeds have fallen to 3.78 Mbps.

At the end of May last year, the NDP released a plan to fix this. The plan would declare high-speed broadband internet an essential service, with the requisite consumer price protections for universal affordable access. It would also establish a comprehensive broadband buildout plan to be started in the next 12 months, with 95 per cent to be completed in 36 months and the remaining geographic challenges being addressed to reach 100 per cent within 48 months. Finally, our plan would see the federal government fund the entire $6-billion buildout, with the revenues from the spectrum auctions, which took in $3.45-billion in 2019 alone, and more auctions are scheduled for next year.

Another significant area of innovation that affects two important sectors of our economy, mining and the automotive industry, both of which have been neglected by several previous governments for the past two decades, is the development and manufacturing of electric vehicles (EV).

While recent investments by Ford and Fiat Chrysler regarding EV production in Ontario have been made due to the successful negotiations between Unifor and the companies, a National Auto Strategy for Electric Vehicles is needed more now than ever. As General Motors leads the way with commitments to go to majority EV production by 2035 with investments of more than $27-billion over the next five years and Ford spending at least $22-billion on EV production through 2025 along with numerous other automakers having similar targets, the opportunity for Canada to take advantage of this once-in-a-century transition demands immediate action.

Canada is in a unique position, as we have the necessary minerals and the companies to extract them, for EV battery production, the research and development expertise, a long-standing automotive supply chain with world-class manufacturing firms, and a skilled work force that has been essential partners with the best productivity in the industry. All that is needed is a concerted and co-ordinated government strategy to combine all these elements and competitive advantages to return Canada to be the global leaders in the automotive industry that we were more than 20 years ago.

One last thought: with the full-scale electrification of vehicles comes the next debate on privacy, digital rights, and consumer choice. Buckle up, as these decisions will forever change the personal vehicle in our lives.

Brian Masse is the MP for Windsor West, Ont., and the NDP's critic for innovation, science, and industry.

The Hill Times

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This is the time to harness the potential of technology to provide better and more efficient services to rural residents. Telemedicine/remote health holds great promise for health service delivery in rural areas where access is a significant challenge, resulting in poorer health outcomes for rural residents, write Annamie Paul and Marta Cabral. *Pexels photograph by Anna Shvets*

We must ensure that innovation leaves no Canadian behind

By transforming existing systems and investing in scientific research to fuel innovation, we have the power to solve a number of structural issues with just a handful of creative solutions.

Green Party Leader Annamie Paul & Marta Cabral

Opinion

As the saying goes, necessity is the mother of invention. For instance, back at the beginning of the pandemic, we never imagined that the world would produce several effective COVID-19 vaccines in less than a year. Whether it is telemedicine, vaccines, rapid tests, or automation, the urgent needs associated with the COVID-19 pandemic have given rise to a great deal of innovation. Continuous innovation will be needed as we exit the pandemic and begin to consider how to complete our social safety net and launch a green recovery.

Rural communities face a widening equality gap in the provision of services when compared with urban centres, which the pandemic has only exacerbated. This is the time to harness the potential of technology to provide better and more efficient services to rural residents.

Telemedicine/remote health holds great promise for health service delivery in rural areas where access is a significant challenge, resulting in poorer health outcomes for rural residents. Expanded telemedicine services would help to better meet residents' needs through remote consultations, in-home monitoring, outsourced diagnostic analysis, remote specialist consultations, and virtual consultations for urgent care needs. Telemedicine benefits several vulnerable rural populations, including rural residents with disabilities, seniors, and Indigenous communities. It could also be a critical part of service delivery for people living in remote areas affected by climate disasters who require urgent care. This innovation should be here to stay.

The pandemic has also underscored the importance of access to broadband as an essential service. A universal broadband strategy to provide reliable access to internet services everywhere is long overdue. Broadband infrastructure would support the revitalization of rural economies by drawing businesses and employers to rural communities and creating employment opportunities. It would also improve the lives of a wide range of rural residents—from post-secondary students taking classes online, to professionals who may end up teleworking beyond the end of the pandemic. A necessary, complementary action is to regulate rates for internet access to ensure universal accessibility.

With advances in health care, many Canadians can expect to live to the age of 85 or older. Our long-term care (LTC) population has surged to the hundreds of thousands, with approximately one-in-three Canadians over the age of 85 now living in some form of LTC facility. We need to shift policy towards investing in innovative community care, recognizing that an overwhelming majority of Canadians prefer to live at home for as long as possible. Canada only spends 13 per cent of LTC funding on community and home-based care, lagging behind the OECD average of about 35 per cent. Naturally occurring retirement communities, co-housing models, and enhanced home-support programs should be supported. A Guaranteed Livable Income would also support families in caring for loved ones at home. These programs not only respect the autonomy of our seniors, but they are also cost effective as they utilize existing infrastructure.

COVID-19 reminded us of how interconnected our society is, and that is the framework we must use to build a better future. A green recovery would address a number of areas in need of innovation with a domino effect: investing in cleantech will lead to better renewable energy systems, which will create better infrastructure and transportation, which will in turn support rural and Indigenous communities—all while creating new jobs as we move towards an economy that preserves our planet.

Cleantech is estimated to be worth US$3-trillion globally by 2030, and Canada's highly skilled engineering and IT workforce is more than capable of making us a leader in this field. Cleantech will create more jobs than those lost in fossil fuels, including opportunities for those without college degrees. Enabling renewable electricity to be moved and stored across provincial and territorial boundaries would boost long-run economic growth. There may be no better opportunity than the coming months for provincial, territorial and federal governments to invest in a national electrical grid strategy.

The Green Party has also been sounding the alarm about the depletion of public transportation systems in Canada, especially in rural areas. We need zero-carbon public transportation, with rail serving as the hub and spokes of light rail and electric bus connections everywhere. While electric cars are an important element of "greening" our communities, a transition to efficient public transit will ultimately take cars off our roads, and make our communities more livable and more connected.

Ultimately, we must ensure that innovation leaves no Canadian behind. Ensuring equality of access to essential technologies in all communities, and the introduction of a Guaranteed Livable Income as a response to the accelerated displacement of labour by automation and artificial intelligence, are critical.

By transforming existing systems and investing in scientific research to fuel innovation, we have the power to solve a number of structural issues with just a handful of creative solutions—it's time for Canada to become the leader it should be in the innovation economy.

Annamie Paul is the leader of the Green Party of Canada. Marta Cabral is a special projects adviser to Ms. Paul.

The Hill Times

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Innovation Policy Briefing

The time for innovation in higher education is now

Research and innovation in universities across the country help the world become a better place and improve the quality of life of Canadians. But innovation in higher education is an uncomfortable discussion.

Ann-Louise Davidson & Nadia Bhuiyan

Opinion

Universities must make conscious efforts to bring together various instances of innovation on campuses with the purpose of offering opportunities for creative collisions that can help foster a nation of much-needed innovators, write Ann-Louise Davidson and Nadia Bhuiyan. *Photograph courtesy of Pexels*

This month, Concordia University is launching its Innovation Lab, a bold move to support students to become skilled and confident innovators who can turn ideas into solutions that make the world a better place.

The Lab is one response to the era of profound changes arriving at dizzying speeds, prompted by the growth and spread of artificial intelligence and by the Fourth Industrial Revolution. Such exponential changes exacerbate inequalities that were already present in our system, such as the skills and pay gap in our labour market. Highly skilled workers are in demand, while the demand for lower skilled workers continues to decrease, with little attention given to the malaise of the shrinking middle class, which used to be a measure of a nation's progress.

In this turmoil, Canada wants to build a nation of innovators because the country recognizes that the path to dealing with rapid change is through recognizing that "innovation fosters a thriving middle class and opens the country to new economic, social and environmental possibilities."

Research and innovation in universities across the country help the world become a better place and improve the quality of life of Canadians.

However, let's face it, innovation in higher education is an uncomfortable discussion.

Money for nothing and no ROI leaves innovation in universities in dire straits

A recent AUTM report reveals a gloomy picture about innovation in universities. The large sums of money invested in innovation get very little return on investment. In 2018, $4.5-billion in research and development yielded slim revenues of $54.4-million in intellectual property—merely 1.2 per cent in return on investment (ROI). This is disappointing. This report omits that much of the university's mission consists of training highly qualified personnel in rich and authentic contexts such as those offered through funded research. Also, innovation in universities is not only about R&D and it should not only be the only measure we use to say if they do well or not.

When it comes to measuring the value of innovation in universities, we have to remove the blinkers of R&D and intellectual property (IP) and start looking at it from a systemic perspective.

Traditionally, universities were places where students came to gain knowledge and where professors conducted fundamental research with the purpose of contributing to a body of knowledge that could serve an industry or society, or not. This has changed with the current funding structures, and universities are taking quantum leaps, while conserving antecedent gains from their traditional roles.

Indeed, universities are filled with support structures and programs that enable teaching and learning, and research. But there are also ongoing transformation-savvy groups and communities of practice that are self-organized. Through punctual events such as seminars, conferences, workshops, competitions, and bootcamps, these groups push the boundaries of knowledge, they ideate, and accelerate startups, and can benefit from mentors, investors, and alumni networks.

Innovation ecosystems in research universities are habitats for people and groups who embrace various innovation directions. On a daily basis, information and knowledge flow between individuals, units, and across the groups that compose the innovation ecosystem. These exchanges exist through panels, conferences, brainstorming sessions, and a variety of thematic events that bring interdisciplinary groups together. The challenge is to create structures with porous membranes that allow mentors, partners and collaborators from the outside to interact with students and groups on the inside.

Why an Innovation Lab?

The purpose of the Innovation Lab at Concordia University is to offer a non-competitive, risk-free, and failure-positive playground environment where students and partners play, take risks, fail, experiment, test, iterate, learn, network, and develop key skills for the 21st century, in ways they could never conceive of in a classroom setting. The lab functions in collaboration with various units within the Concordia University innovation ecosystem, with partners and mentors such as Dawson College, Collège Saint-Sacrement, Momentum Labs, and Maison des Jeunes, who work alongside students. Our aim is to use the lab as a springboard to launch students onto their desired path, with an innovative mindset.

Universities must make conscious efforts to bring together various instances of innovation on campuses to contribute to enhancing the student experience, curating challenges, offering stimulating exchanges during open lunches, and building skills through workshops and matchmaking events with the purpose of offering opportunities for creative collisions that can help foster a nation of much-needed innovators.

Ann-Louise Davidson is the director of the Concordia University Innovation Lab, Concordia University Research Chair in Maker Culture, and associate professor in the Department of Education. Nadia Bhuiyan is vice-provost of Partnerships and Experiential Learning and professor in Mechanical, Industrial, and Aerospace Engineering at Concordia University.

The Hill Times

Indigenous Services Minister Marc Miller is pictured at a Feb. 10 press conference in Ottawa. Promises, like improved high-speed internet access, are made to Indigenous communities quite a lot and there always seem to be issues around delivery on the promises being made, writes Jason Bird. *The Hill Times photograph by Andrew Meade*

Indigenous connectivity and federal funding: a priority or hope deferred?

That's governance for you, making steps towards achievement, but it's a slow roll some years. What level of concern are Indigenous communities in the priority list?

Jason Bird

Opinion

In the Sept. 23, 2020, Throne Speech, Prime Minister Justin Trudeau promised to invest $1.75-billion into internet connectivity for all Canadians, with a focus on rural and Indigenous communities as part of that priority.

"The prime minister said the government is now on track to connect 98 per cent of Canadians to high-speed by 2026, an increase over the previously promised 95 per cent benchmark, and to link up the rest by 2030," said a CBC News report. This focus became more urgent with the new reality the pandemic threw upon Canadians as they began working from home, both as employees and students, to further protect society from the spread of COVID-19.

However, promises like this are made to Indigenous communities quite a lot and there always seem to be issues around delivery on the promises being made. One can simply look at the drinking and running water crisis in 57 bands and see if that has been resolved, or how long it has taken to get to that number. Or what about housing issues in First Nations communities? The funding always seems to fall behind the level of the promise being made. That's governance for you, making steps towards achievement, but it's a slow roll some years. What level of concern are Indigenous communities in the priority list?

Indigenous communities have always lagged in internet connectivity, lacking the proper infrastructure to deliver higher internet connectivity rates. According to the Canadian Radio-television and Telecommunications Commission (CRTC) 2019 Communications Monitoring report, 31.3 per cent of First Nations reserves meet the objective of a 50 megabits per second (Mbps) download/10 Mbps upload capacity; this is the federal equality level as designated by the CRTC. If you take a closer look at broadband rates, the numbers for some First Nations are bewildering.

Alberta, Saskatchewan, and Manitoba First Nations in the West are well below average once you get to 25 Mbps and higher download capacity, and at the 50/10 benchmark, Alberta is the highest of the three at 2.4 per cent of communities having this ability. In the North (territories and Nunavut), Newfoundland and Labrador, and Saskatchewan, not one of them have access to broadband services at the 50/10 mark; the first three only have five Mbps download capabilities as their max capacity.

What is disconcerting is that the United Nations Human Rights Council, at its May 2011 General Assembly, had this to say about internet access for member states: "Each State should thus develop a concrete and effective policy, in consultation with individuals from all sections of society, including the private sector and relevant Government ministries, to make the Internet widely available, accessible and affordable to all segments of population." They have deemed internet connectivity a human right and that it needs to be accessible to all to provide a fair and even playing field in society. That was in 2011, 10 years ago, and the numbers mentioned previously are where we are at with progress on that front in 2019-2021.

What can be done now to push this forward quicker and more efficiently? The Internet Society, which facilitates the annual Indigenous Connectivity Summit, have a few ideas about speeding this process up in a June 2020 article entitled, "Ensuring every Canadian has access to the Internet."

The Internet Society suggests three key ideas. 1. Quick access and movement on infrastructure building including timely delivery systems, prioritizing keys areas in need, and increased funding; 2. Remove barriers to access including a longer, more inclusive rolling application timeline, build community ownership into projects, fast track public permits, flexible finance options, and an accurate broadband system map to identify need. 3. Make resources easier to access by licensing smaller internet service providers, including Indigenous companies, and revisit satellite "public benefit" licensing rules to move priority to the North and under-served broadband areas.

Internet broadband connectivity is something we enjoy in most urban areas and we tend to overlook what is happening in rural communities and Indigenous reserves, usually side by side with the same problem, and expect them to have the same access to information and technologies as cities. With this influx of federal money, how quickly can they get to the problem spots? I am really hoping this isn't hoped deferred once again.

Jason Bird is program co-ordinator, lecturer, Indigenous Business and Public Administration at First Nations University of Canada.

The Hill Times

Pandemic highlights needed change in broadband funding regime, says critic, access expert

The various funding streams aimed at increasing internet access beget confusion and hurt uptake, says NDP industry critic Brian Masse.

AIDAN CHAMANDY

As the COVID-19 pandemic approaches its one-year anniversary, with Canadians flocking to Zoom, *Call of Duty*, and Netflix to manage work and life under lockdown, an internet policy expert and the NDP's industry critic say the way Canada approaches bridging the digital divide is not working, and is falling hardest on rural and remote communities.

"For going on 30 years now we've approached connecting people to the internet by trying to connect as many people as we can for as little money as possible. That worked really well for Toronto, Ottawa, and Vancouver. But for the rural and remote areas, it really hasn't worked well because there's not a lot of return on investment," said Mark Buell, North American regional bureau director for the Internet Society, an international nonprofit organization that works on increasing internet access.

"That means that Indigenous peoples are disproportionately affected by the digital divide, predominantly in rural and remote areas," he continued.

The latest attempt to bring reliable internet access across the country is the Universal Broadband Fund. Announced in the 2019 budget, it earmarks $1.75-billion over seven years to "fund broadband infrastructure projects that will bring high-speed internet at 50/10 Megabits per second (Mbps) to rural and remote communities," according to the Innovation, Science, and Economic Development Canada statement.

Access to 50/10 Mbps broadband, the federal government's stated target, varies widely depending on where one lives.

Across Canada, 87.4 per cent of households hit the target, according to the 2020 Communications Monitoring Report issued by the Canadian Radio-television and Telecommunications Commission (CRTC). For rural and remote communities, however, the number is far lower at just 45.6 per cent of households. First Nations reserves are even lower, with just 34.8 per cent of households having reliable access.

Those numbers are up slightly from the 2019 report, which showed 85.7 per cent of Canadian households, 40.8 per cent of rural households, and 31.3 per cent of households on First Nations reserves having access to the 50/10 Mbps target.

Across the provinces, British Columbians have the best access and Saskatchewanians the worst.

In B.C., 93.5 per cent of the province gets 50/10 Mbps, with nearly 100 per cent of households in urban areas hitting the target. More than two-thirds of households on reserves, and 62.5 per cent of rural households meet the target.

In the Land of the Living Skies, however, the numbers drop precipitously for rural and Indigenous communities. Only 23.9 per cent of rural households and 1.7 per cent of First Nations households on reserves get 50/10 Mbps.

NDP innovation critic Brian Masse, pictured in March 2018, is trying to change how spectrum auctions work in Canada. *The Hill Times photograph by Andrew Meade*

A major issue with getting money to communities in need is the sheer number of funding streams offered by the federal government, said NDP industry and telecommunications critic Brian Masse (Windsor West, Ont.)

In addition to the $1.75-billion Universal Broadband Fund run by the CRTC, Indigenous Services Canada (ISC) has the First Nations Infrastructure Fund that can be used for broadband. The Canada Infrastructure Bank's $10-billion growth plan has $2-billion pegged for broadband expansion, and Innovation, Science, and Economic Development Canada has the $585-million Connect to Innovate program.

"What we have in broadband right now is a dog's breakfast of programs. They seemed to be geared to favour some particular niche or political moment, versus out of a larger comprehensive strategy," he said. "I think that at this point in time, you have to look at rolling these funds together into a larger, more basic fund that just connects people with those expectations."

Mr. Buell said the disparate funds speak to a lack of "a coherent vision to connect Canadians."

"What's lacking is the coordination between the departments and agencies. Even to have something as simple as a centralized database that includes all the funding opportunities would be tremendously helpful," he said.

"We're doing it piecemeal right now when what we're really trying to do is akin to building the railroads. That was a grand vision, we need a grand vision now," he said.

Mr. Buell said the ISC fund is not well suited for broadband projects because "it's broadband competing against roads or housing or water. It's maybe not seen as as much of a priority."

During the pandemic, however, "we're really seeing the importance of quality internet connections," he said.

ISC admitted competition for funding is an issue in response to an Order Paper question from Conservative MP Cathy McLeod (Kamloops–Thompson–Cariboo, B.C.) in late 2020. The department also said no money had been dedicated to broadband in the 2016, 2018, and 2019 federal budgets.

Both Mr. Buell and Mr. Masse say the federal government should look south of the border for ways to better connect Indigenous communities.

In February 2020, the Federal Communications Commission (FCC), the U.S. equivalent to the CRTC, started to allow federally recognized tribes to access unassigned spectrum over their lands before it went to a general auction. The 2.5 GHz spectrum was previously used "for schools and municipalities to broadcast educational material on the radio or TV," Mr. Buell said.

Minster of Indigenous Services Marc Miller is pictured on Feb. 10. ISC said in an Order Paper response that money from its infrastructure funding stream rarely goes to broadband projects. *The Hill Times photograph by Andrew Meade.*

"The FCC decided to repurpose it for broadband. They opened up what was called a Tribal Priority Window. So any tribes could apply to get that spectrum for free, before it went to an auction," Mr. Buell said.

"More than 200 tribes applied. This year, we're starting to see tribes roll out community networks, or partner with other organizations to build the network and use the spectrum developed for free. I think that could go a long way, a long way, in Canada," he said.

The FCC attached access conditions to those tribes that were approved. Two years after the licence is granted, the licensee must prove that they are providing access to service to 50 per cent of the population.

"This means that 50 per cent of the population must be able to access the service if they choose; it does not require a 50 per cent adoption rate," the FCC said.

The threshold jumps to 80 per cent five years after the licence is granted.

Mr. Masse said Indigenous-owned spectrum in Canada should be looked at as an option, but that retooling the existing funds is also very important.

Mr. Masse said he's trying to shift the debate around spectrum to align more with what the FCC is doing with the Tribal Priority Window where the government auctions it and sets specific terms and conditions on its use.

"We should be changing our spectrum auction to a request for proposal process, where we bring in less money, but more more accountability and connectivity and lower costs. There's a big philosophical difference. We won't need these programs if we actually have the RFP and we have terms and conditions about the use of spectrum," he said. "We take less money, but we get more product and service."

"Everything relies upon changing our attitude about how we actually auction off spectrum, how we leverage support from the industry. And the priority should be to connect Canadians," he said.

Short of a fundamental rework of how the government auctions off spectrum, Mr. Buell said another solution could be to dedicate funds raised from the auctions to providing better service, akin to surcharges on telephones bills that were used to bolster phone networks in the past.

"It's almost a natural link," he said.

"We've kept doing the same things over and over and over. You still have poor service and unaffordable service for far too many Canadians. There's something behind that," he said.

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Asking 'Isaac Pewton' to innovate out of a crisis

Intellectual property is a powerful legal tool to foster innovation. However, COVID-19 has amplified the challenges faced by our brightest researchers and innovators.

Giuseppina D'Agostino

Opinion

With Canadians' mounting frustration and the dwindling prospects of exiting this pandemic any time soon, it is vital that we unite as a nation to innovate. How Canada continues to respond to the pandemic will also define how we respond to future global challenges. Leading the development of new vaccines, more effective personal protective equipment, and new and improved systems of distribution and administration of the vaccine are just some instances of what is necessary now. This pandemic has highlighted our societal inequalities and our fractured innovative landscape.

The university, one of Canada's cradles of innovation, must continue to innovate out of this crisis and future crises. With innovation more critical than ever, how do we increase collaboration, co-ordination, and access to salient data and information during prolonged isolation?

Intellectual property (IP) is a powerful legal tool to foster innovation. It merits a context-specific approach on when, and whether, to protect assets from the inventor/startup stage to the scale-up phase. However, COVID-19 has amplified the challenges faced by our brightest researchers and innovators. They are unable to access laboratories, have limited access to funds to start up a company, lack the know-how and support, and do not know where to go to obtain the needed help to protect their inventions. Under these conditions, IP can go undetected until it is too late. Patents, trademarks, and copyrights protecting valuable work are not well understood, and often never see the light of day. Finally, when IP is detected and advised to be protected, the innovation costs are prohibitive, starting with the patent process costing upwards of $20,000 to protect a single patent.

It is no wonder then how Canada, a country with so much talent and potential, is still playing catch up to other countries' patent filings and, importantly, commercialization successes in the form of licensing deals, startups, and scale-ups from their own valuable IP.

As a response, closer partnerships between universities and industries are becoming commonplace. Take as an example the University of Oxford and AstraZeneca trailblazing partnership to tackle the global pandemic with a COVID-19 vaccine. While these university-industry partnerships can help, they also risk a power imbalance between Canadian universities and multinational companies. There is no guarantee that Canadian jobs will be generated and retained in Canada, even though they may be founded on Canadian science and innovation.

Another promising mechanism is the use of university commercialization clinics such as the IP Innovation Clinic at York University's Osgoode Hall Law School. The clinic is the first of its kind, where law firms supervise law students who work directly with clients to formulate an IP strategy. This initiative accounts for more than 6,000 hours of pro-bono work, saving innovators close to $2-million to date during a nascent stage where resources are scarce.

One of the clinic's success stories is Skygauge Robotics, a drone robotics company that landed a $3.3-million funding deal, and did so during a pandemic through the clinic's support. Skygauge's ambition is to build a company that keeps people innovating and working in Canada—a perfect example on how providing a friendly and supportive innovation ecosystem can be a game changer to Canada's innovation economy.

Seeing the need to continue innovating, especially during the pandemic, the IP Innovation Clinic, seized on the possibilities of artificial intelligence (AI). Enter Isaac Pewton, the IP Innovation ChatBot that can now answer any number of intellectual property questions. Powered by AI, the ChatBot learns and becomes smarter the more questions are asked of it. The goal is to balance the informational asymmetry in the innovation ecosystem and make valuable IP knowledge accessible to everyone for free.

This ChatBot is more important than ever to underrepresented communities, including women and Indigenous peoples who have typically not fared well in our innovation ecosystem, and whose conditions are exacerbated from the pandemic. The ChatBot empowers these disenfranchised and remote communities with valuable information, and direct access to the clinic for further services for free.

The ChatBot itself is an innovative example of a successful university-government-private partnership. Funded by Innovation, Science, and Economic Development Canada's IP Clinics Program, pursuant to the federal government's National IP Strategy and developed by a team of lawyers and technical experts at Norton Rose Fulbright Canada LLP, and Osgoode Hall Law School, the AI-powered ChatBot, by providing highly valuable IP information, can help Canadian entrepreneurs scale and learn quickly to innovate us out of this crisis and help future proof Canada against the next one.

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The Hill Times

Charging onward: Canadian expertise helping to revolutionize how energy is used, created, and redirected

Canada has virtually all the raw materials needed for the production of lithium-ion batteries and is home to several companies that work on producing finished products.

Jeff Dahn

Opinion

It's hard to deny that the Earth's climate is changing. We're seeing warming temperatures, shifting rainfall patterns, and more severe weather events. The science is clear that if we continue to burn fossil fuels at the same rate we are now, we're going to heat the planet to death. This has made managing and developing new and renewable energy resources, while minimizing their environmental impact, one of our most pressing challenges.

Fortunately, Canada has significant strengths in this area, including lithium-ion (Li-ion) battery research and development; battery manufacturing; materials development; electric vehicle manufacturing; and access to battery materials. It's an effort that requires not only universities across the country, but companies, both in the public and private sectors.

In 2015, Dalhousie University signed an exclusive partnership with Tesla—the first between the leading American electric vehicle company and a Canadian university. This partnership has been integral to our work, and given us new stimulus to take research on Li-ion cells to the next level. Recently, we were pleased to extend the partnership until 2026 and have had two advanced battery scientists recently join this partnership in research chair roles.

Nova Scotia is also home to a battery research and development hub, led by Novonix, which serves industrial clients from around the world. The company has a partnership with Dr. Mark Obrovac, whose work focuses on designing new materials that can store large amounts of energy for next generation Li-ion and beyond.

In Montreal, there are strong efforts on Li-ion battery materials by Dr. Mickael Dolle at the Université de Montréal; Dr. Steen Schougaard at the Université du Québec à Montréal; and Dr. Eric McCalla at McGill University. In addition, Hydro-Québec has a state-of-the-art research centre with facilities for Li-ion battery research and development.

Ontario's Dr. Linda Nazar, from the University of Waterloo, and Dr. Andy Sun from Western University, have world-class efforts on solid state batteries and advanced lithium-ion batteries. And Dr. Zhongwei Chen and Dr. Pu Chen (both from the University of Waterloo) have made large efforts on Li-ion and other advanced batteries.

In Mississauga, there's Electrovaya, which has a research and development facility coupled to its Li-ion battery manufacturing facility.

Looking further west, Dr. Venkataraman Thangadurai at the University of Calgary is a world expert on solid electrolytes. And, Maple Ridge, B.C., is home to E-One Moli Energy Canada Ltd, which is the research and development arm of E-One Corp. of Taiwan. The company has roughly 70 people doing R+D on advanced Li-ion batteries.

When it comes to manufacturing Li-ion cells for sale, there are two companies involved—Electrovaya and E-One Moli Energy Canada. E-One moved its manufacturing to Taiwan in 2009, but is looking to re-establish Canadian manufacturing. Government support would go a long way in facilitating this. In addition, Tesla recently acquired Hibar Systems in Richmond Hill, Ont. They manufacture high-speed battery manufacturing equipment.

Although there has been some talk from major automakers about building electric vehicle plants in Canada, I believe this is still a little further down the road.

At this time, a significant success story is Lion Electric Energy of Saint-Jérôme, Que. Lion manufactures electric school buses and electric garbage trucks using Li-ion battery modules sourced at this time from BMW, and in the near future from Romeo Power (in California).

There's also New Flyer of Winnipeg, which is offering two models of all-electric buses at this time. New Flyer manufactures 43 per cent of all transit and touring buses in North America, and obtains its Li-ion batteries and battery modules from Xalt Energy of Michigan.

Canada also has virtually all the raw materials needed for the production of lithium-ion batteries and is home to several companies that work on producing finished products. Avicenne Energy forecasts an annual consumption of 600,000 tons of lithium by 2025 (as lithium carbonate), 1.25 million tons of positive electrode materials by 2030, and 1.05 million tons of graphite for Li-ion batteries by 2030. Canada can play a big role here.

Although it's clear that there is significant work already happening in these areas, there's much more to do. I see a better future for how we power our planet, and it's a future that we can all help build together.

Jeff Dahn is a professor in the department of physics and atmospheric science at Dalhousie University where he holds the NSERC/Tesla Canada Industrial Research Chair and the Canada Research Chair in Battery and Fuel Cell Materials.

The Hill Times

COVID-19 innovations hold lessons for national policy

The ability to lead in the future economy or respond to the next crisis is already under development at Canada's world-class research universities and innovative start-ups.

Santa J. Ono & Gail Murphy

Opinion

As the COVID-19 pandemic erupted in early 2020, we witnessed an unprecedented mobilization of the world's scientific community to develop solutions. Canadian researchers and companies are making vital contributions to these efforts, especially in the area of therapeutics and vaccines. These accomplishments should be celebrated, but also studied, as they can teach us a great deal about shaping a globally competitive national innovation ecosystem.

In B.C., labs at the University of British Columbia and several life sciences companies have played an outsized role in global efforts to address COVID-19. As a hub for nanomedicine and precision medicine, B.C.'s life sciences sector was well prepared to contribute, with three Vancouver-based companies in particular leading the way.

One notable success, Acuitas Therapeutics, has developed critical drug delivery systems and contributes the lipid formulations needed for the Pfizer/BioNTech vaccine to enter human cells.

AbCellera—which has pioneered an artificial intelligence- and microfluidics-powered antibody discovery platform—partnered with pharmaceutical company Eli Lilly and Co. to develop an antibody treatment for COVID-19 authorized by Health Canada and the U.S. Food and Drug Administration. AbCellera went on to post the largest-ever IPO for a Canadian biotechnology company, becoming the country's most valuable biotechnology company with a market capitalization of more than $14-billion at the time of writing.

Vancouver's Precision NanoSystems has multiple clients working on COVID-19 vaccines and recently announced that, with federal support, they will leverage their cutting-edge biomanufacturing platform to build one of Canada's first large-scale manufacturing facilities capable of producing mRNA vaccines and other genetic medicines.

Each of these companies has been celebrated as a success story of Canadian science and innovation, not only in response to COVID-19, but in an increasingly competitive and global biotechnology industry. As Canada turns toward recovery, these successes hold important lessons for policymakers and our efforts to strengthen Canada's innovation economy.

A core commonality is how these companies got their start. Each is a spin-off from the University of British Columbia, formed initially around research at university laboratories and fostered on campus. This ongoing connection to the university's scientific enterprise remains vital to their success today.

Their success has been enabled by fundamental research, with UBC scientists advancing our understanding of natural processes over many years—in some cases, decades—to a point where it was possible to develop breakthrough platform technologies. In the case of Acuitas, the foundation was laid in the 1980s by a team of UBC researchers who started with a desire to understand the roles of lipids in biological membranes and realized the applications for precision drug delivery technologies.

The first lesson to be gleaned from this is the importance of broad and sustained investment in scientific research. Canada has made important strides in this area following the Fundamental Science Review and historic research investments in Budget 2018. Yet, in inflation-adjusted dollars, funding for Canada's research granting councils is roughly the same today as it was in the mid-2000s. And the picture worsens when you consider overall spending on R&D activity in Canada, where we consistently rank in the bottom half of OECD countries and are one of the few where R&D intensity is in decline. Addressing the R&D funding gap—from universities through to the private sector—will be critical for sustaining Canada's technology ecosystem.

A second lesson comes from the important role graduate students and post-doctoral fellows played in launching these companies. Talent development and attraction is essential to Canada's knowledge economy. We must invest more in producing talent that drives growth and innovation in high-growth sectors through graduate scholarship and industrial internship programs. AbCellera currently plans to hire hundreds of highly skilled employees to fuel its growth, many of whom will need the capacities gained through advanced study.

Finally, Canada does not have a strong track record of maintaining its competitive edge in sectors where we've built an early lead. In the biomedical sciences, this edge is hampered by a lack of infrastructure for early stage translation to clinical studies, something that has been developed in the U.S. and U.K. over many decades. It is important that we complement a strong scientific foundation and broad innovation supports with targeted investments in infrastructure and the needs of emerging industries. We see that opportunity now in advanced therapeutics, but also in several other areas where Canada has early research and commercial strength that would be wise to focus on as a nation, including quantum technologies, artificial intelligence, bioproducts, agricultural technologies and clean technologies.

Canada's ability to lead in the future economy or respond to the next crisis is already under development at Canada's world-class research universities and innovative start-ups. The question is: can we nurture those strong starts into lasting leadership, growth, and prosperity?

Dr. Santa J. Ono is the president and vice-chancellor of the University of British Columbia. Dr. Gail Murphy is a professor in the department of computer science and vice-president, research & innovation, at the University of British Columbia.

The Hill Times

Collaborative effort needed to bridge the digital divide

Technical stakeholders, including ISPs, major content providers, and application developers like Netflix, YouTube, and Facebook, must lend a hand to connect remote communities.

Catherine Rosenberg & Andrew Lappalainen

Opinion

Many Canadians in remote northern communities cannot depend on the internet for essential tasks for school or work, or for leisure activities like entertainment or social media. There is, in short, a deep digital divide between remote communities and the rest of the country.

Historically, internet service providers (ISPs) have been the primary stakeholders tasked with keeping Canadians well connected. However, ISPs have struggled to provide adequate service to remote communities, and this problem is getting more difficult with the increasing requirements and complexities of modern web content and applications. To solve this problem, other technical stakeholders, including major content providers and application developers like Netflix, YouTube, and Facebook, must also lend a hand.

To understand why remote communities pose a unique challenge to ISPs, it is important to understand how these communities get online. Due to their isolation, remote communities depend on satellite to access the internet and other telecommunication services. In most of the country, network links are largely built alongside pre-existing, wired TV, and telephone infrastructure.

Satellite-based internet connections have several performance limitations relative to wired connections. First, satellite connections have very high latency (the time it takes a data packet to travel between both end points of a connection) due to the distance at which a satellite orbits the Earth. Next, due to costs, they have limited bandwidth, restricting the amount of data that can be sent over a given instance. Lastly, the bandwidth must be shared by all users served by the same satellite. These limitations result in slow web site response times, poor quality video, and an overall frustrating online experience.

Bridging the digital divide is about providing remote users with the same quality of experience as users elsewhere despite satellite limitations. To accomplish this, ISPs can try to add more bandwidth to the satellite link, but bandwidth is very costly and limited. They can also use shared web caches so that when users download content it can be saved in the community, allowing future users who request the same content to access it locally instead of via the satellite link. Additionally, ISPs can use specific protocols on the satellite link to better manage latency and data rates.

Why then are large content providers and app developers needed to help? First, there is a trend towards richer web content and applications, which bring high-resolution multimedia and advertisements that demand greater bandwidth. Second, web sites and apps are increasingly adopting deeper levels of encryption to hide not only private user data, but also connection-related data as well, making it impossible for ISPs to use caches and specific protocols on the satellite link. That all means major content providers and app developers, who dominate internet traffic today, directly influence how successfully ISPs can manage their networks and improve service to remote users.

If the digital divide is to be successfully bridged, content providers and application developers must therefore deliver content to remote communities differently than they do elsewhere. They should continue delivering rich content to users provided that it is useful, but make connections "lighter weight" by forgoing unnecessary, bandwidth-wasting data. This includes many advertisements, which have questionable relevance for individuals in hard-to-reach locations. They should also scale back deep encryption that prevents ISPs from employing caches and specific protocols. Encryption is still necessary to protect users, but it cannot hinder ISPs from efficiently managing the satellite link.

Some content and application providers may be motivated to adopt this approach out of goodwill—indeed, YouTube and Facebook have previously adopted light-weight approaches in some developing countries. Nonetheless, we cannot rely on their goodwill alone since it may conflict with their business interests.

For this reason, it is time for the creation of a special remote status for communities requiring special treatment. This status could be controlled by the United Nations' International Telecommunication Union, and content providers and application developers could be mandated by the government to recognize remote communities and treat them accordingly.

It is realistic to expect that large content providers and application developers would be receptive to this proposal given they have willingly helped in developing regions in the past and because they would only have to change their practices for the most disadvantaged communities.

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The Hill Times

We need to remember that cities are places where innovation is about more than creating shiny new toys. It's about generating new ideas and implementing new policies and processes, writes Shauna Brail. *Pixabay photograph by Bohdan Chreptak*

COVID-19 driving change in Canada's urban centres

To better understand how innovation provides a pathway for cities, we can look to innovations in data, municipal actions, and sector-specific responses. These new ideas are guiding adaptation under uncertainty.

Shauna Brail

Opinion

Cities are the economic engines of the country. As such, they are also centres of innovation: places to test out new ideas, spaces to combine new ways of thinking and doing, and sites to advance new technologies. COVID-19 has temporarily turned our urban worlds upside down and has made dense urban life seem dangerous rather than attractive—at least in the short term. In the long term, however, Canada's cities will continue to lead both economically and creatively.

To better understand how innovation provides a pathway for cities, we can look to innovations in data, municipal actions, and sector-specific responses. These new ideas are guiding adaptation under uncertainty.

Although COVID-19 is primarily a public health crisis, it has spawned an economic crisis in its wake. Almost 11 months in, we know that the pandemic has affected different economic groups in vastly different ways. We know about these uneven impacts thanks to rapid data gathering and analysis, from both traditional government sources and non-traditional private-sector sources. And we know that, within cities, innovation can help to address these changing inequities.

Researchers from Harvard University's Opportunity Insights research team created a tracker to examine the immediate economic impacts of COVID-19 in the United States. Using real-time data from private sources such as credit card and payroll companies, the team built a new database available to the public. In part, their work suggests that we need fine-grained data at different scales, including at the urban scale. But ultimately, the team's research emphasizes the role of innovation in real-time data collection. To develop more precise policy responses, governments must collaborate with others to access new private-sector sources of big data.

In Canada, too, this conclusion matters for understanding cities as centres of innovation. For tech companies and banks that have seen growth during the pandemic, and for professionals who can work remotely, the economic impacts have been nearly negligible. But for those who have lost jobs, those who have continued to work in factories and kitchens and long-term care homes, and those who live in housing that does not permit adequate distancing, COVID-19 has been devastating. At the municipal level, to develop policies and plans to improve outcomes, governments have relied on current, precise information that reveals these inequities. Access to new sources of data has been crucial.

Municipal governments have been at the forefront of urgent pandemic responses. Declines in public transit ridership were among the first signs of economic crisis in large Canadian cities. As work-from-home orders took hold and continue in some regions, and as physical distancing remains one of the best ways to reduce the spread of COVID-19, transit ridership has shrunk. Measured at the end of January, for instance, transit ridership in Toronto was at 24 per cent of pre-pandemic levels. Tri-government collaboration and funding are helping to bridge the current revenue gap and to ensure that public transit services can continue to serve the public good in cities across Canada. Driven by circumstance, innovation in urban transit funding models will continue to change, considering the federal government's recent public transit funding announcement.

Cities have also innovated by repurposing public outdoor spaces. In some cases, municipal governments are changing regulations to permit creative new uses and activities. For instance, Edmonton has added temporary bike lanes, Montreal has pedestrianized streets, Calgary has "warmed up" some parks with winter fire pits and Ottawa has designed online reservation systems for outdoor skating rinks. Pilot projects—experiments that test out new ideas or test old ideas in new places—have provided local governments with a chance to accelerate change. Ironically, pandemic-induced innovations may make our cities more livable places.

Some hard-hit sectors of the urban economy are also responding to the crisis by innovating. Under pandemic lockdowns, restaurants have been forced to focus on takeout menus, to reduce or shut down indoor dining, and to prepare food in kitchens where distancing is impossible. Many have also shifted to digital systems for taking orders, accepting payments, and managing delivery logistics. To survive, some restaurants have transformed their business models.

We continue to see innovation in the restaurant and food services sector across cities. This new thinking includes not only governments capping commissions on delivery platforms but also partnerships between city governments and local delivery services. Furthermore, the growth of ghost kitchens means that businesses can locate a "restaurant" in a space that is, strictly speaking, a commercial kitchen with a door. In some parts of downtown Toronto, you can order your dinner on an app, and a pink robot will drop it off at your front door.

There remain great unknowns and urgent questions. What will happen to our downtown office districts? Will the pandemic nudge cities towards greater inclusion or increasing inequity? A certainty is that our cities will change. Innovations that we cannot contemplate today will mark our future.

Yet we need to remember that cities are places where innovation is about more than creating shiny new toys. It's about generating new ideas and implementing new policies and processes. Innovation is about creating the conditions for people, cities and society to thrive.

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The Hill Times