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Innovation policy and funding

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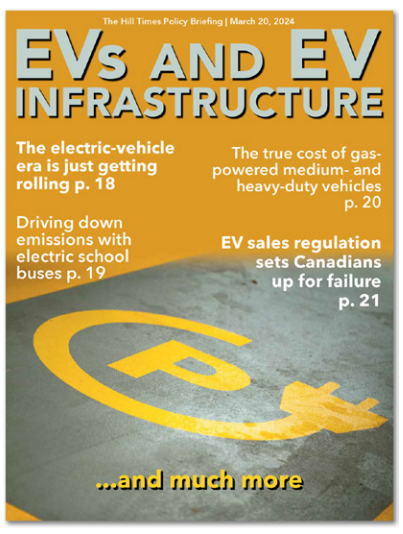
Designed by Naomi Wildeboer



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TELECOM

Funding gaps, policy shortfalls keeping rural Canada offline, experts say

‘What has constrained a lot of these rural communities is they still see it as something that either the federal government or big telecommunication companies are going to come and solve,’ says University of Alberta professor Michael McNally.

BY PHALEN TYNES-MACDONALD

Despite billions of dollars in government funding aimed at bridging the digital divide, Canada’s current connectivity policies are falling short by leaving rural and Indigenous communities behind, experts argue.

For a number of Canadians living in rural areas, the promise of reliable, affordable internet remains out of reach. While the Canadian Radio-television and Telecommunications Commission’s (CRTC) universal service objective and the federal government’s connectivity strategy have pledged Canada-wide access to internet download speeds of 50 Mbps and upload speeds of 10 Mbps by 2030, progress has been slow for residents outside of urban areas. With rural, remote, and Indigenous households making up a disproportionate amount of those still disconnected, some experts advocate for a shift in policy focus, moving beyond simply funding infrastructure and towards fostering an environment in which local initiatives can flourish.

“The irony is that the people that need the connectivity the most are typically going to be the last ones in line to get it,” said Wayne Kelly, director of Brandon University’s Rural Development Institute, in an interview with *The Wire Report*.

“Because this is all based on market stimulus funding, then you’re typically rolling it out on a model that’s based on market demand,” said Kelly, pointing to “easy-access” rollouts that prioritize areas with higher population density and market demand. By going incrementally from bigger towns, to slightly smaller ones, to the next tier of smaller ones, and so on, the smallest, most-remote communities are expected to be the last to be connected.

Despite the challenges of the current market-stimulus approach, Kelly acknowledged the benefits that recent funding initiatives have had for rural connectivity, noting “an expansion of networks across rural Manitoba.”

The CRTC’s 2016 establishment of the universal service objective was a “game changer,” he said. “It’s been really important from a policy perspective, and from an impact perspective.”

According to Innovation, Science, and Economic Development Canada (ISED), 94.8 per cent of Canadian households had access to high-speed internet as of the end of 2023. While the department did not provide specifics on the disparities between urban and rural households, a report from the federal auditor general shows that as of 2021, 99.3 per cent of urban households had high-speed internet access, compared to 59.5 per cent of households in rural and remote areas, and 42.9 per cent of households on First Nations reserves.

Although these communities present a less-profitable market for major providers, they are the most in need of connectivity because of existing barriers to accessing essential services, such as health care and education, as well as economic opportunities, Kelly argued.

“Building it isn’t enough. It’s not a ‘build it and they will come’ scenario, it’s just the very first phase. Is it a required element? Absolutely. But you need to build the digital infrastructure, then you need to build the digital capacity, and then you need to build the culture of use—and it’s only at that point that you really start to see the benefits of digital technology,” said Kelly.

To help rural and remote communities catch up on the digital usage front and know what is available to them, “it’s going to take targeted and dedicated supports,” said Kelly.

He argued that the connectivity for communities in these areas will continue to lag behind the rest of the country—even if they eventually gain access to target speeds of 50/10—unless the government implements supports for them to develop their own broadband solutions so they can upgrade their networks.

“Those targets were fantastic for 2016. The problem is the target was [set] for 2030, 14 years later,” he said, noting that in 2002, the broadband service target was 1.5 Mbps.

“The thought of having 1.5 Mbps speeds in 2016 was ridiculous, you couldn’t do anything,” said Kelly.

There is a risk that rural and Indigenous communities—particularly those that have been connected through fixed wireless or other technologies not considered future-proof—are going to continue to be left behind as technology and data needs evolve, he argued.

“We need to consider much more strongly how to incorporate community solutions in areas where markets are not providing the answer,” said Kelly.

Michael McNally, library and information studies professor at the University of Alberta, echoed Kelly’s sentiment.

“Even now, I think it’s questionable putting money into projects at 50/10 when the United States is looking at speeds double that, and the Europeans are building gigabit networks with the target of universal gigabit coverage by 2030,” he said.

Rural Economic Development Minister Gudie Hutchings said that ‘communities large and small need to have a reliable connection so they can grow their potential in this digital world,’ in a June press release. *The Hill Times photograph by Andrew Meade*

“Some of the projects we’re funding are not going to be scalable,” said McNally. “The speed target is one of the key things that needs to be addressed because it’s simply not going to be competitive in a few years’ time.”

According to Ian Baggley, director general of the Broadband Fund, the CRTC is focused on the 50/10 universal service objective.

“There are still areas that don’t even have that minimum level of service,” said Baggley in an interview with *The Wire Report*.

“The fact of the matter is, a significant number—if not the majority—of the projects that we have funded provide services that exceed that minimum standard,” he stated, noting that fibre speeds can go up to 1 Gbps.

Baggley said ISED will be examining the service standard “of their own accord” following recommendations from the auditor general report, but the CRTC will continue moving forward with its current funding plan “as it is.”

‘No one-size-fits-all solution for rural broadband’: Michael McNally

McNally noted the importance of mobile wireless for rural connectivity. According to the CRTC, 97.1 per cent of rural communities have mobile wireless coverage.

According to the Spectrum Policy Framework established in 2007, “market forces should be relied upon to the maximum extent feasible.” McNally argued that this fails to consider the reality of rural connectivity.

“That doesn’t necessarily work in rural communities where there are little to no market forces in telecommunications,” he said.

McNally called for the framework to be revisited so that “strategic considerations around how to get the most out of spectrum in rural context” could be carved out.

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Investing in Canada's connected future

Canada's telecom sector is laying the groundwork for Canadian businesses to enhance their productivity and competitiveness by investing in advanced network infrastructure and technologies, including gigabit networks, 5G, AI, Internet of Things (IoT), and cloud computing.

In addition to economic growth, this increased productivity creates better job opportunities for Canadian workers, raises living standards, and helps fund social programs that assist the most vulnerable.

However, for Canada to fully realize its productivity potential and stimulate economic growth, policymakers must support and encourage ongoing investment in advanced telecommunications.

Policies should also encourage the adoption of digitization across Canadian industries to increase output more efficiently. By fostering such an environment, Canada can combat stagnating productivity and ensure that its economy becomes more dynamic and competitive in the years to come.

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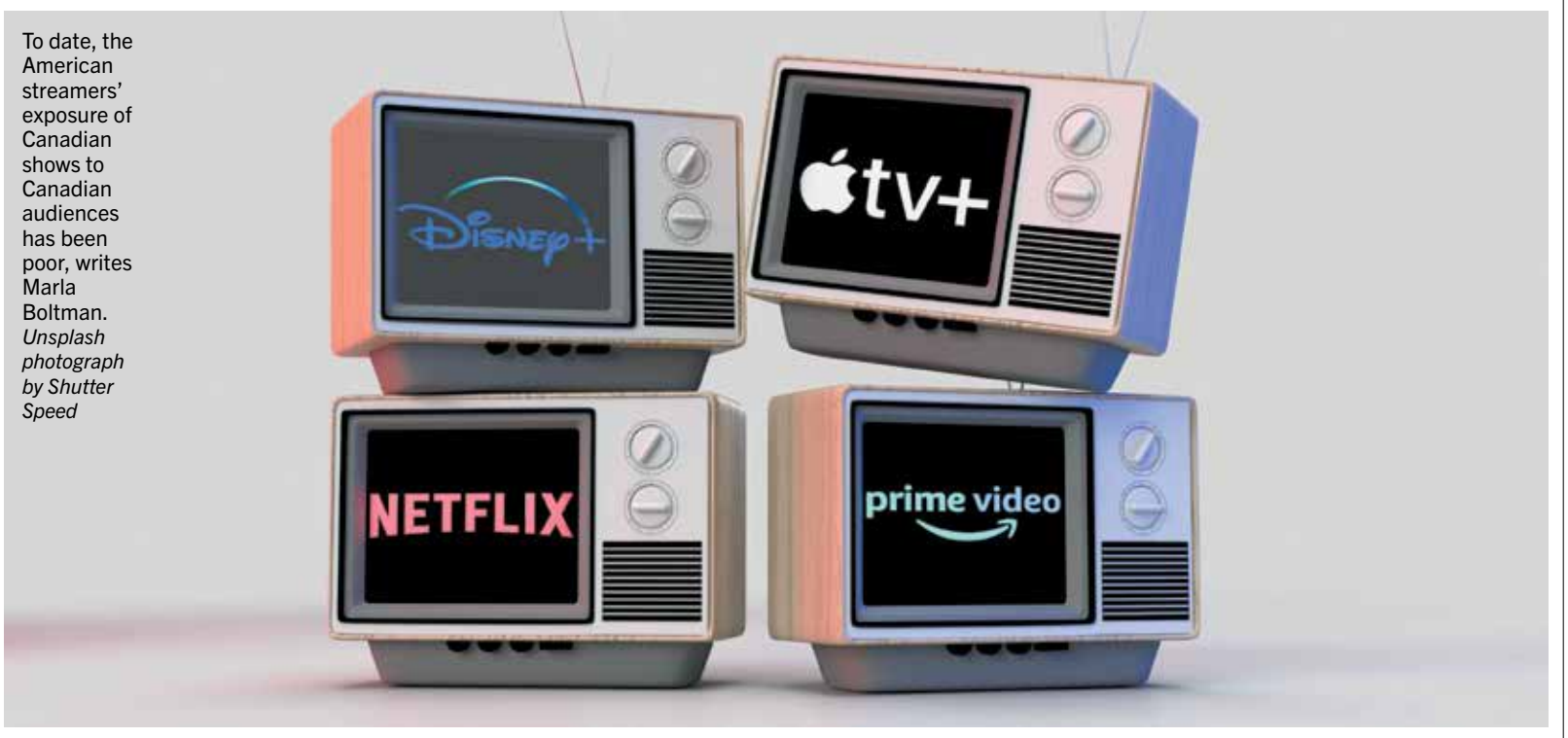
Canadian Telecommunications Association

The free ride is over for Netflix, isn't it?



To date, the American streamers' exposure of Canadian shows to Canadian audiences has been poor, writes Marla Boltman. *Unsplash photograph by Shutter Speed*

The CRTC must take seriously Parliament's mandate to make the streamers an equal partner with domestic broadcasters in producing and promoting Canadian storytelling.

Marla Boltman

Opinion

Back in September 2017, when the idea of an Online Streaming Act was off the Liberal table, then-heritage minister Mélanie Joly signed a confidential agreement with Netflix for $500-million of streaming production to be shot in Canada.

To this day, we don't know how much Netflix spent on shows you could honestly describe as Canadian content, as opposed to shooting American shows on Canadian soil. It was a Netflix plan for Canada instead of a Canadian plan for Netflix.

Now we have the Online Streaming Act. Yet Netflix and Hollywood's Motion Picture Association haven't stopped campaigning for a Netflix plan for Canada. The tip of their rhetorical spear has been reminding us how much shooting of American shows they do while using our world-famous facilities and talent, while cashing in on Canadian tax credits. Nobody on either side of the border has ever complained about that win-win arrangement.

But following the Canadian Radio-television and Telecommunications Commission's (CRTC) ruling to implement the new Act—which includes requirements for the streamers to contribute to local news and Indigenous production—you could hear the teeth grinding all the way from California. The streamers are indignant at the Canadian regulator, and they are hoping to go to court over it.

The streamers' court appeal will fail, and the CRTC's next challenge will be to soothe their savage passions.

The Commission got a head start on doing that in June, reducing the streamers'"initial basic (cash) contribution"to Canadian media funds from five per cent to 3.5 per cent of their Canadian revenues, provided the streamers devote the rebated 1.5 per cent to making their own Canadian content—which historically has required Canadian stories to be owned, controlled, and told by Canadians.

Going forward, the Commission has at least two other big pieces to fit into this regulatory puzzle.

The first is assigning"Canadian Programming Expenditures"for the streamers to earmark in their budgets; spending on actual Canadian content programming like *Blackberry*, *Kim's Convenience*, and Netflix's own *Jusqu'au déclin*.

For context, Canadian broadcasters spent $33-billion over the last 10 years doing just that.

The CRTC measures Canadian programming spending as a percentage of Canadian revenues. The streamers' 1.5 per cent discount is a down payment on their as-yet-undetermined Canadian content budgeting.

This number that the CRTC eventually puts to paper is where the rubber will hit the road. Expect the public hearing on the issue—not scheduled for another *year*—to benchmark streamer Canadian content spending against our Canadian broadcasters' own spending.

What is that benchmark? In 2023, Canadian cable licensees—including Montreal's Club Illico, Halifax-based Wildbrain, or Vancouver's OutTV—earned $3.83-billion in revenues while spending $1.83-billion on Canadian programming. That's a *48 per cent Canadian spend.*

Among all Canadian services, Netflix's most direct competitor is Bell Media's cable service Crave. Last year, it earned $115-million while spending $30-million on Canadian content, a 27 per cent Canadian spend (the CRTC has yet to release matching data from Crave's streaming platform).

Once the CRTC has fixed its number for streamer spending on Canadian stories, we must ensure their online discoverability, meaning the efforts streaming platforms make to push their Canadian shows to the foreground where customers are enticed to watch.

To date, the American streamers' exposure of Canadian shows to domestic audiences has been poor.

Visit the"Canadian"menu on Netflix.ca or any of the streamers' Canadian services. Mostly, you will find previous seasons of classic Canadian shows rubbing elbows with popular American programming that casts a Canadian or two in anything but a leading role. What you will rarely find is fresh, authentic Canadian content pushed for its own sake. By all means, log in and count the number of Canadian shows in the"top 10 watched in Canada,"or the"just for you" recommendations.

So here is the call to action. Both Canada and the European Union have told the streamers that they must deliver better results on local content. But it's hard to move the needle on discovering Canadian content unless the streamers redouble efforts to recommend Canadian shows, exactly what Members of Parliament told them to do by passing section 3(1)(r) of the Online Streaming Act.

The mission for the CRTC is to take seriously Parliament's mandate to make the streamers an equal partner with our country's broadcasters in producing and promoting Canadian storytelling.

Making great Canadian content that sells domestically and globally is well within the considerable abilities of the streamers. After all, Canadian broadcasters have been doing it for decades. The CRTC need only help the streamers see and do it.

Marla Boltman is the executive director for Friends of Canadian Media.

The Hill Times

Closing the connectivity chasm

Despite the successes, several crucial gaps in expanding rural coverage remain.

Michael B. McNally

Opinion

Digital connectivity is essential infrastructure for the 21st century. Broadband is ubiquitous in urban Canada, but rural, remote, and Indigenous communities continue to lag behind.

Since the Canadian Radio-television and Telecommunications Commission (CRTC) declared broadband an essential telecommunication service in late 2016 and set a national speed target of 50 Mbps download and 10 Mbps upload with an unlimited data cap—also known as"50/10"—availability of broadband has increased from 82 per cent of households to 93 per cent in 2022. The initial goal of increasing availability to 90 per cent of households by the end of 2021 was met, and the CRTC estimates that the goal of universal access to the target speed by 2031 is on track. Unprecedented federal funding—commitments over the last 10 years more than double expenditures over the previous 20 years—are an important factor in expanding rural coverage.

Despite the successes, several crucial gaps remain. Mobile wireless coverage in rural areas continues to trail urban areas. While in urban Canada 5G coverage is increasingly prevalent, less than two-thirds of rural Canadians have access to the latest wireless speeds. Although recent funding programs including both Innovation, Science, and Economic Development Canada's (ISED) Universal Broadband Fund (UBF) and the CRTC's Broadband Fund have in part targeted roadway coverage, the CRTC reports that the Trans-Canada Highway still has 600 km of roadway lacking a wireless signal. More broadly, there are more than 14,000 km of major roads and highways without mobile access. These roads and highways are often found in more northern and remote routes where cellular service is crucial for public safety.

The push toward universal access at 50/10 by 2031 belies another challenge. The 50/10 speed target was set in 2016, and while these speeds are currently sufficient for households, communities will need faster connections to support businesses and community anchor organizations

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Connectivity equals sovereignty

Building a connected Arctic will demonstrate our commitment to sovereignty, reconciliation, and a modern, inclusive Canada.

Erin O'Toole

Opinion

Northern Affairs Minister Dan Vandal. We need strategic federal investment and meaningful partnerships with Inuit communities and private-sector providers to create sustainable, long-term connectivity in the Arctic, writes Erin O'Toole. *The Hill Times photograph by Andrew Meade*

Canadian sovereignty in the Arctic and the path to reconciliation with Inuit and Indigenous Peoples demand one of the most significant telecom investments Canada has ever undertaken. The stakes are high: without connectivity, the economic opportunities, security measures, and community resources essential for northern Canadians will remain out of reach. Now is the time for the federal government to prioritize Arctic subsea fibre optic cables as the foundation of an inclusive, secure, and resilient northern future. Canada must make good on its commitments to invest in Arctic sovereignty and rural broadband by funding and building the critical infrastructure needed to bridge the northern digital divide.

In its landmark 2023 report, *A Secure and Sovereign Arctic*, the House Standing Committee on National Defence put forward a bold vision for Arctic sovereignty that includes Recommendation 17: a call for Canada to prioritize the laying of subsea fibre optic cables in the Arctic. The committee emphasized that these connections are critical not only to the functioning of northern communities, but also to Canada's national security, economic development, and social services. Fibre infrastructure will empower remote communities to engage fully in the digital economy, access vital government services, and ensure Arctic Canada remains a key component of our sovereign territory.

Alert, on the northern part of Ellesmere Island in Nunavut, is the most northerly inhabited point on the planet. Established as a critical Canadian Armed Forces and weather observation outpost in 1950, Alert was constructed to be the physical embodiment of Canadian sovereignty in the High Arctic. It still plays that role.

Grise Fjord, the nearest populated community, tells a very different story of Canada's historical assertion of Arctic sovereignty. It was here, in 1953, that Inuit families were forcibly relocated under the High Arctic Relocation program, effectively becoming "human flagpoles" in a Cold War-era strategy to populate the Arctic. Their lives were forever altered to exert Canada's sovereignty in the Far North.

Decades later, the Royal Commission on Aboriginal Peoples confirmed that the relocation "did contribute to the maintenance of Canadian sovereignty," and in 2010, the government issued a formal apology for the hardship these families endured. In the apology, then-minister John Duncan noted the "extreme hardship and suffering for Inuit who were relocated" to Grise Fjord and Resolute Bay, calling it a "dark chapter" in Canadian history.

However, apologies must be backed by action, and today, Grise Fjord and other Arctic communities remain among the most isolated places on Earth. They face an extreme digital divide, with less than half of Inuit households connected to the internet, according to the 2023 auditor general report on rural and remote connectivity.

To be connected in the Arctic is not simply about fast internet—it's about addressing this legacy, empowering communities, and ensuring access to education, health care, and emergency services. Yet, current telecommunications in these areas rely on satellite or microwave transmission, which is costly, prone to environmental and electromagnetic disruptions, and geopolitically precarious. The recent controversy around the control of commercial satellite options—such as Starlink—has highlighted how vulnerable the North's connectivity remains. By contrast, subsea fibre provides a reliable, high-performing solution that would also securely connect our military and observational facilities, but it requires a federal commitment and a strategy to construct and safeguard these critical networks.

In 2019, Canada launched *High Speed for All*, a rural and remote internet strategy with a mandate to provide high-speed connectivity across the country, built on three pillars: access, investment, and partnerships. The auditor general's 2023 report confirmed that we're failing to meet the goal of "high speed access for all." However, we still have a path forward through the other two pillars: we need strategic federal investment and meaningful partnerships with Inuit communities and private-sector providers to create sustainable, long-term connectivity. This infrastructure must serve a dual purpose: reconciling with the Inuit for past wrongs, and ensuring the sovereignty of Canada's High Arctic.

Building subsea fibre optic networks to link our Arctic communities would be as transformational for the North as the railway was for Western Canada. By investing in subsea cables, the government can finally make good on its apologies and promises. Building a connected Arctic will demonstrate our commitment to sovereignty, reconciliation, and a modern, inclusive Canada. It will open new economic pathways, support education and health care, and provide remote communities with the tools needed to thrive in the digital era. More importantly, it will be an investment in Canada's security, sovereignty, and unity—a step toward ensuring that our true north remains strong, connected, and free.

Erin O'Toole is the president of ADIT North America, and former leader of the Conservative Party of Canada.

The Hill Times

Towards a new Canadian broadband future?

We will need to face the reality that the fundamental competition now is not primarily between the telecom carriers, but with other value systems.

Erik Bohlin

Opinion

There have been renewed concerns about Canada's lagging productivity and weak investment climate, especially around broadband infrastructure, which provides a foundation for a thriving digital economy. Turning adversity into opportunity, now is the time to develop new visions for enhancing prosperity and growth against the backdrop of telecom infrastructures.

Long-standing gaps with the United States in both labour productivity, and information and communications technology investments have been identified by the Organisation for Economic Co-operation and Development, and more recently, productivity concerns have been raised in the construction sector and high tech in Canada. One of our technology sectors—telecoms—is facing increasing problems with growth, profitability, and falling stock prices.

Research over the last 20 years has established that broadband plays a significant role in enhancing productivity and economic growth. Moreover, the importance of an inclusive digital infrastructure for all to benefit from the opportunities has been recognized since the start of commercial internet in the 1990s. However, an investment paradox has emerged since then, both for wireline and wireless networks. While relying on the telecom infrastructure, the so-called Big Tech companies have developed strong platforms and applications that wield substantial market power and capture significant value, and even-newer players have started to dominate artificial intelligence.

This paradox is not being reversed by 5G. The build-out of 5G has been most extensive in markets where telecom is rapidly expanding, such as China and India. Countries—such as Canada—which had expansion in 4G are relatively slower in 5G, reflecting typical investment cycles.

Moreover, the traditional broadcasting industry is meeting the same challenges where—increasingly—the old broadcasting style of programmed and pervasive TV is being replaced by on-demand and online streaming where new players produce content that captures the audience. Some broadcasters around the world have been able to transit towards online platforms, but others are remaining in the old style, and losing out.

In this context, the recent Canadian Radio-television Telecommunications Commission decision directing the major telephone companies to provide wholesale access to fibre networks may prove pivotal for investment incentives.

For 25 years, the European Union has followed a primary emphasis on mandated access in telecoms, and has lower rates. However, the recent debate initiated by the European Commission to push Big Tech to compensate the telecom carriers for investment shortage suggests that all is not well in Europe. A telecom investment shortage of more than 150-billion euros has been identified in recent well-publicized EU reports.

The crises in productivity, inclusion, growth, and complex regulations present themselves as an opportunity. What we need is an increased dialogue about Canada's objectives and about the impact of long-term infrastructure development on citizens' welfare because telecom even has potential benefits on climate change and resilience. There is a need for government funding, as well as collaboration between government and industry. New modes of infrastructure finance and public-private partnerships need to be developed.

We also need an increased dialogue between industry and government about the fundamental objectives for developing a strong, viable Canada, and the enabling role that telecom infrastructure may play in achieving that vision—a vision that will need to face the reality that the fundamental competition now is not primarily between the telecom carriers, but with other value systems.

Ivey Business School is taking some small steps toward that end by hosting a series of workshops where government and industry are invited to reflect on the pressing situation for the telecom infrastructure for Canada. The workshops have centred on broadband policy and new frameworks for resilience, with a recent one centred on satellites.

Erik Bohlin is an expert in telecommunications policy, an inter-disciplinary topic concerned with the impact of digitalization in the economy and society. Bohlin holds the Ivey Chair in Telecommunication Economics, Policy, and Regulation at Ivey Business School at Western University.

The Hill Times

CRTC chairperson and CEO Vicky Eatrides. The CRTC's decision to impose contributions on streaming services before addressing the definition of Canadian content reflects its capture by legacy broadcasters, write Len St-Aubin and Philip Palmer. *The Hill Times photograph by Andrew Meade*

Updating Canada's broadcasting policy framework: a process gone awry

The CRTC's inability to respond with agility or openness to the possibilities of the internet age undermines the purposes of its consultative processes.

Len St-Aubin & Philip Palmer

Opinion

The delivery of audio and audiovisual content over the internet poses a host of issues for Canadian cultural policy, and directly threatens the traditional broadcasting industry's business model. Yet, despite this fundamental shift in how content is created and consumed, Canada has failed to modernize its policy framework to reflect this new reality.

It is hard to enforce borders on the internet. It's in this context of a global online content market and distribution that Canada faced two important policy questions:

1. What content do we want to support? Traditionally, that included audio and audiovisual content created by Canadians (CanCon), as defined by industrial policy criteria.

2. What is best way to support CanCon? Historically, that was done through legacy broadcasting quotas, levies on distributors, tax incentives, and public financing.

Both government and the Canadian Radio-television and Telecommunications Commission (CRTC) can define CanCon. The government for tax credits and public financing, and the CRTC for regulatory obligations. Yet neither Bill C-11—the Online Streaming Act—nor subsequent government policy addressed this key issue, leaving it for the CRTC to define.

So, with the enactment of C-11, the CRTC now faces two key questions:

1. What does "Canadian content" mean today if you take into account how Canadians create, produce, market, and access content online?

2. With that in mind, what are the most effective measures to promote CanCon today?

Bill C-11 amended the Broadcasting Act to give the CRTC the power to regulate streaming services such as Netflix and YouTube as if they were broadcasters, subject to CanCon obligations. Rather than modernizing broadcasting policy and regulation to reflect the reality of the internet, the Act pulls streaming services into the outdated framework of Canadian broadcasting.

Early in the parliamentary process, observers—including regulatory experts—identified the prime area of regulatory risk: if foreign streamers were to be required to invest in and present CanCon, would content they produce and finance, and/or upload using Canadian creators, talent, and crews be considered CanCon? Some streamers were already doing that, and Canadian creators of unregulated online content were reaping the benefits.

Had the CRTC addressed that issue in its first round of consultations, we would now have clear ground rules. Foreign streaming services, Canadian creators, and producers would all now have a degree of regulatory certainty.

Instead, CRTC regulatory proceedings—a once-in-a-generation opportunity to modernize Canada's broadcasting policy and regulatory framework—failed to address this foundational issue. As a result, the consultative and regulatory processes have gone awry.

This has led to foreseeable consequences that risk undermining Canadian broadcasters, producers, creators, and Canadians' ability to access online content of our choice. These consequences include:

- A CRTC process that extends regulatory uncertainty for online streaming until at least the end of 2025—and likely much longer as appeals play out.
- Predictable legal challenges to an initial, mandatory "base contribution" of five per cent of online streamers' Canadian revenues to an array of special-interest CanCon funds, some unrelated to streamers' content offerings. And the CRTC suggestion of more obligations to come.
- A definition of CanCon applied to online streaming that remains grounded in mid-20th-century radio and TV distribution models, reliant on quotas and subsidies.
- No apparent recognition of streamers' market-based investments in CanCon, and production in Canada that supports an outsized, world-class production sector.
- Netflix's consequent withdrawal of more than $25-million in support to Canadian organizations, including First Nations groups, which had been focused on developing next-generation creators.
- For Canada's young digital-first creators who use streamers to reach global audiences, continued uncertainty about the potential impact of regulating social media.
- The possibility that some streamers will block access from Canada, diminishing Canadians' ability to access content online.

The CRTC's fumbling regulatory initiatives take place against—and exacerbate—a challenging real-world environment. Faced with increased competition from global streamers for Canadian audiences—and now for publicly financed CanCon, too—Canadian broadcasters are seeking reductions in their own CanCon obligations.

The CRTC's decision to impose contributions on streaming services before addressing the definition of Canadian content reflects its capture by legacy broadcasters, and those who benefit from the closed Canadian audio and audio-visual production community. It also disregards the thousands of Canadian creators who produce content for a global audience without subsidy or regulatory protection.

In its initial exercise of its new powers under C-11, the CRTC has signalled its clear preference for the protectionist system created for the era of over-the-air broadcasting. Its inability to respond with agility or openness to the possibilities of the internet age undermines the purposes of its consultative processes. No segment of Canadian society benefits from participation in a consultation that has approached the issues in the wrong sequence and leans in favour of outdated, legacy regulation.

Len St-Aubin is an independent internet and telecoms consultant whose clients have included streamers, carriers, government, and not-for-profits. He is a former director general of telecommunications policy at Industry Canada, and a past member of the policy teams that developed both the 1991 Broadcasting Act and the 1993 Telecommunications Act. Philip Palmer, vice-president of the Canadian Internet Society, is an Ottawa-based lawyer specializing in internet and telecommunications law. He is a former a senior general counsel at the Department of Justice. Palmer has helped develop the Broadcasting, Radiocommunication, and Telecommunications Acts, Canada's Anti-Spam Legislation, and has frequently testified before parliamentary committees and appeared in notable telecom cases.

The Hill Times

Telecom's role in solving Canada's productivity crisis

Telecom networks are the critical infrastructure underpinning the digital economy, and the foundation for Canada's future economic growth.

Robert Ghiz

Opinion

Innovation Minister François-Philippe Champagne. It's crucial policymakers ensure telecom regulations provide sufficient incentives to promote continuous investment in innovation and network infrastructure, writes Robert Ghiz. *The Hill Times photograph by Andrew Meade*

Canada is experiencing a productivity crisis. The wealth gap between Canada and the United States has widened, and Canada's GDP per capita has dropped below the Organisation for Economic Co-operation and Development average. Carolyn Rogers, senior deputy governor of the Bank of Canada, recently highlighted this issue, calling it a "productivity emergency."

A key contributor to our lagging productivity is Canada's weak record of business investment. Boosting productivity requires Canadian industries to increase their investments in the latest tools and technologies that will make their workforce more productive and their businesses more competitive.

Increasingly, this involves adopting digital technologies and data to increase productivity by streamlining processes, automating operations, and using data to drive continuous improvement in efficiency and sustainability. A recent Statistics Canada report shows that industries heavily reliant on digital technologies saw productivity gains during the post-COVID recovery period.

Despite the benefits of digital transformation, too few Canadian businesses are embracing it. More must be done to understand the reasons behind this reluctance. Governments at all levels should also consider policies and programs that encourage the adoption of productivity-enhancing technology.

However, encouraging the adoption of digital technologies by industries is only part of the solution to Canada's productivity crisis. The telecom sector provides the critical infrastructure and services that new digital technologies—such as the Internet of Things, artificial intelligence, cloud computing, and robotics—depend upon. Only through sustained private sector investment in expanding and enhancing high-speed and high-capacity wireless and wireline technologies can Canadian industries fully realize the productivity benefits of digital transformation.

Telecom: the backbone of economic growth

Telecom networks provide more than faster home internet or better mobile phone service—they are the critical infrastructure underpinning the digital economy and the foundation for our future economic growth. In 2023 alone, the telecom industry contributed nearly $81-billion to this country's GDP, and supported more than 780,000 jobs across industries. The expansion of the digital economy—particularly through advanced connectivity solutions—is projected to add an additional $112-billion to Canada's GDP by 2035, according to consulting firm PwC.

These contributions to the domestic economy are fuelled by the investments made by the telecom sector to expand and enhance its network infrastructure and services. Since 2010, the sector has invested more than $177-billion in capital expenditures, including $29-billion in payments to the Government of Canada for radio frequency spectrum licences. In comparison to peers in the U.S., Japan, Australia, and Europe, Canadian telecom providers invested—on average—42 per cent more in capital expenditures per subscriber in 2023.

But there is more work to be done. Demands on telecommunications networks

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Rural connectivity divides: a case for public fibre transport and a reframing of affordability

While there appears to be little appetite in provincial or federal government to support public broadband infrastructure, this could change in the right hands.

Michel Mersereau

Opinion

At a recent panel discussion hosted by the Youth Internet Governance Forum of Canada, I was happy to share my thoughts with a representative from North End Connect, a not-for-profit working to build connectivity solutions in north Winnipeg. The technical, economic, and sustainability challenges faced by northern Winnipeg residents in obtaining and maintaining reliable internet connectivity are not dissimilar to those reported by community practitioners in rural and remote regions, and that various levels of government have taken steps to resolve in the years following the pandemic.

We can observe successes in some rural and remote communities as a result of these efforts, including federal funding of transport fibre in northern Quebec, Ontario, Manitoba, Alberta, and in Nunavut. Through 2021, the Ontario government tabled legislation to ease access to provincially regulated public infrastructure, and allocated $4-billion in a reverse auction that resulted in fibre projects across 339 underserved communities. On the consumer side, in 2023 the federal government's Connecting Families program was expanded to Far North communities for the first time through Northwestel.

At the household level, data collected by local governments and NGOs indicates that while progress has been made in overall levels of household broadband adoption, there are indications that affordability remains a problem in low-income households. The issue of affordability is not simply one of upfront service costs, but is comprised of a number of in-use fees including overage, late, and reconnection charges. The data also suggests that households most affected by these issues tend to opt for mobile as their primary, and—frequently—sole means of remaining connected to the internet. This highlights how—for low-income households—maintaining internet connectivity consumes larger portions of their budgets, and often puts them in an either/or position when it comes to connectivity options.

In the summer of 2022, and in response to Innovation, Science, and Economic Development Canada's proposed direction to the Canadian Radio-television and Telecommunications Commission on a renewed approach to telecommunications policy, I penned a letter of comment that was jointly signed by the city managers of Calgary, Edmonton, Halifax, Montreal, Ottawa, Toronto, Vancouver, and Winnipeg. The recommendations contained in that letter speak directly to the issue of affordability. We encouraged the federal government to establish a more meaningful metric for assessing affordability by framing the combined costs of connectivity—i.e. mobile *and* fixed—as a percentage of household income. When viewed this way, disparities across income quintiles are both apparent and stark.

On the telco side, notable successes have been achieved by non-dominant community-based carriers in rural and remote regions, but these entities face significant capital works and interconnection barriers. One pathway to resolving this is to undertake policy action that is more broadly supportive of publicly owned transport infrastructure. With new forms of access agreements, public networks could provide openly accessible transport capacity, as well as public oversight of pricing that would be instrumental to the continuity of small carrier operations. This model has been successfully implemented in the United States, and is regarded as one of the most efficient ways of achieving broad fibre-to-the-premises coverage.

While there appears to be little appetite in provincial or federal government to support public broadband infrastructure, this could change in the right hands. A receptive provincial government could table legislation that would see deployment of public transport infrastructure as-of-right in capital works projects. A receptive federal government could insist that a fixed percentage of excess capacity be built into any project benefitting from public funding; capacity that could be reserved for wholesale access. The barrier and risk to all of this is politicization of public broadband infrastructure, which tends to result in governments selling off these assets. Until then, I'll continue to look to the small pockets of success in rural and urban regions for inspiration.

Michel Mersereau is an assistant professor of policy studies at the University of Toronto's faculty of information, with a research focus on the political economy of telecommunications infrastructure.

The Hill Times

Canada needs to up the ante against copper thieves

When copper wire theft occurs, telecom, cable, and internet services are disrupted, putting the safety of Canadians at risk.

Brian Lakey

Opinion

Public Safety Minister Dominic LeBlanc, left, and Justice Minister Arif Virani. We must legislate stiffer penalties in order to prosecute, and—ideally—deter copper thieves, writes Brian Lakey. *The Hill Times photograph by Andrew Meade*

Right now, Canada's cities and rural communities are facing significant threats to public safety and economic stability, many of which remain under-recognized by the Canadian public. While auto theft has rightfully garnered national attention with insurance claim costs rising by 254 per cent and losses amounting to more than $1.5-billion in 2023 alone, there is another equally devastating crime that consistently goes underreported: copper wire theft. Given the serious risks it poses, this issue demands our immediate focus and legislative action.

The scale of copper theft is staggering. Since 2015, Telus has repeatedly experienced copper wire theft from its telephone lines in Alberta, British Columbia, and Quebec. As of writing, Telus has seen a 46 per cent increase in major copper theft incidents since 2023. When this occurs, telecom, cable, and internet services are disrupted, putting the safety of Canadians at risk. In 2023 alone, Calgary saw a 400 per cent increase in major copper wire thefts and vandalism, leaving thousands of customers without landline, internet, and cable services.

The power of public awareness and targeted efforts can yield positive results, as demonstrated by the recent 17 per cent decrease in auto theft during the first half of 2024 compared to the same period in 2023. It's time we apply this same level of attention to the dangerous rise of copper theft plaguing our nation. By doing so, we can address the glaring disparity between the severity of this crime and its current ineffective legal consequences, ultimately safeguarding our communities and the critical infrastructure that helps to keep them safe.

We've seen the impacts and heard the stories directly from our customers about what happens when they lose connectivity due to copper theft. Families are unable to reach first responders during emergencies. Small business owners face operational shutdowns for days, resulting in financial losses. Vulnerable residents—such as elderly individuals living alone—are left without a means to call for help. These examples underscore the critical importance of protecting telecommunications infrastructure from theft and vandalism.

The persistence of copper theft incidents underscores the complex challenges faced by the justice system in effectively deterring these crimes. While the factors contributing to the frequency of such offenses are multifaceted and require further study, there's a growing concern about the impact of repeat offences on critical infrastructure and community safety. When copper thieves do get caught, they often face minimal consequences—if any at all—despite the significant impact of their actions.

To help fight these thefts, Telus partners with various levels of law enforcement using security tools that enable an enhanced response to repeat copper wire cuts and thefts, and we have invested significantly in security cameras, specialized locks, fencing, and GPS trackers on wires in high-risk areas. Additionally, the company liaises with local law enforcement—including RCMP and various municipal agencies—on theft investigations, and works with the Criminal Intelligence Service Alberta on trends and communications. Unfortunately, these measures have not sufficiently deterred thieves, and the impacts are compounded by the justice system's failure to recognize the severity of copper theft. Currently, it is viewed as being akin to bicycle theft, with charges falling under the banner of "theft under $5,000." This lack of a significant legal deterrent frustrates law enforcement, telecom companies, and the communities we serve, who must deal not only with the fallout and expense of connectivity being compromised, but also the prospect of it happening again and again because there is no sufficient punishment for stealing copper.

Addressing these critical issues requires comprehensive reform. Copper theft should be recategorized as a serious crime, similar to our southern neighbours in California where any thefts over $950 are considered a felony offence, and can result in state imprisonment. This approach has shown promising results, as evidenced by recent efforts in Los Angeles. According to a July 30 *Los Angeles Times* report, the L.A. Police Department arrested 82 people and seized 2,000 pounds of stolen copper wire in a major crackdown on copper theft. The operation resulted in 60 felony charges, demonstrating the effectiveness of treating copper theft as a serious offence. The Scrap Metal Recycler Act, a crucial link in deterring copper theft, needs to be updated with stricter identification and record-keeping requirements. This could complement law enforcement efforts, as seen in L.A. where recyclers were targeted and successfully prosecuted. Collaboration across industry and all levels of government is key to protecting critical infrastructure, and ensuring universal service availability.

By aligning punishments more closely with the true nature and consequences of crimes, and by closing loopholes in related legislation, we can create a more effective criminal justice system that better protects Canadian communities and deters future offences. Shutting down a telecoms network is not the same as stealing a bike, and shouldn't be treated as such. We must recognize the real effect that copper theft has on individuals and communities, and legislate stiffer penalties in order to prosecute, and—ideally—deter criminals.

We've seen firsthand that network infrastructure—which is vital for keeping Canadians connected and safe—is under threat from copper thieves. With collaboration across industry and all levels of government, we can better protect universal telecommunications service availability. Together, we can make changes that improve the security of our communities, and support economic vitality through connectivity.

Brian Lakey is the vice-president of the Reliability Centre of Excellence at Telus, and co-chair of the ISED Canadian Telecommunications Network Resiliency Working Group.

The Hill Times

In 2023 alone, Calgary saw a 400 per cent increase in major copper wire thefts and vandalism, leaving thousands of customers without landline, internet and cable services, writes Brian Lakey. *Photograph courtesy of Unsplash*

Tackling the 'wicked' rural broadband gap

Policymakers must resist the temptation to throw up their arms in frustration, or—worse—leave the entire problem to the whims of Elon Musk.

Gregory Taylor

Opinion

Elon Musk's Starlink satellite internet service is a boon to many in rural and remote regions, but Canada may wish to ask whether internet access should be left to the fancies of a foreign-owned company whose CEO has recently shown disdain for the democratic process, writes Gregory Taylor. *Photograph courtesy of Daniel Oberhaus (2018)*

The trendy term for Canada's intractable rural connectivity issue is that it's a "wicked problem": a seemingly insurmountable obstacle. And while there may be no simple solution, policymakers must resist the temptation to throw up their arms in frustration, or—worse—leave the entire problem to the whims of Elon Musk. We are hardly in uncharted policy waters here. As professor Harold Innis noted in 1930, "The economic history of Canada has been dominated by the discrepancy between the centre and the margin."

The urban-rural split in Canada's broadband internet access has clear precedent in the growth of Canadian communications infrastructure. From the telephone to radio and television coverage, Canada remains an enormous challenge to connect. In the West, most telephone service of the 20th century was provided by public provincial, and, in some cases, municipal services—MTS, SaskTel, Alberta Government Telephones, Edmonton Telephone, and BC Tel—which had to step in when the private sector came up short. Simply put, there is no money to be made hooking up Canada's hinterland. While most small towns in Canada currently have access to CBC Radio coverage, that is largely thanks to the federal government's Accelerated Coverage Plan announced in 1974. CBC Radio launched in 1932. Clearly, some patience is required.

A key problem for Canada's quixotic effort to connect every home in the country to high-speed internet is that for much of the last two decades, our regulator had one hand tied firmly behind its back. In 2006, then-industry minister Maxime Bernier issued a rare directive to the Canadian Radio-television and Telecommunications Commission (CRTC). The order was explicit that the regulator was to "rely on market forces to the maximum extent feasible." The 2006 directive was foregrounded in every CRTC decision until it was officially repealed in 2023. For 15 years, this ahistorical faith in markets to deliver communications to sparsely populated regions left rural areas further behind as broadband deployment flourished in the cities. As observed in the expansion of the telephone, radio, and television signals to rural and remote regions of Canada, sometimes markets do not deliver without a regulatory push.

The shortcomings for rural internet are well-documented. A 2023 report from Auditor General Karen Hogan found that the federal government's 2019 connectivity strategy had improved some coverage but failed to deliver equal access to high-speed Internet and mobile cellular services for many rural and remote communities and First Nations reserves across the country compared with services available in urban areas.

Perhaps expecting equal access to our wired cities would be something of a lofty goal. Still, one would expect a closer gap than the CRTC's most recent data, which lists high-speed broadband access in 91.4 per cent of Canadian households; however, the number drops to 62 per cent for rural communities. The national media regulator is clear: "many Canadians, particularly those in rural and remote areas, do not have adequate access to these services."

There are a range of well-funded programs available trying to bridge our national digital divide. The CRTC has the $675-million Broadband Fund, which has existed in various forms since 2016; and Innovation, Science, and Economic Development Canada oversees the $3.225-billion Universal Broadband Fund. There are also provincial, regional, and municipal programs. Yet, despite our best efforts, the problem persists.

It has been eight years since the CRTC made the bold 2016 objective that "Canadians in urban, rural, and remote areas can access affordable, high-quality telecommunications services," and set 50 megabits per second (Mbps) download and 10 Mbps upload as the ambitious targets to qualify as the required speeds. That audacious goal doubled the 2015 Federal Communications Commission (FCC) target when the American regulator set benchmark speeds at 25/3 Mbps. However, this once-bold policy stand is starting to look increasingly timid in 2024. In its recent 2024 Broadband Deployment Report, the FCC raised its fixed speed benchmark for broadband to 100 Mbps download and 20 Mbps upload.

Despite the many reasons to bemoan Canada's inability to fully fix the rural digital divide, there are recent sprouts of green in this perpetual issue. Yes, Musk's Starlink satellite internet service has proven a boon to many in rural and remote regions. Still, as a country, Canada may wish to ask whether something as essential as internet access for a portion of our citizens should be left to the fancies of a foreign-owned company whose CEO has recently shown disdain for the democratic process. At the very least, a secondary option is required. Closer to Earth, regional and municipal fibre build outs are providing real alternatives to the major providers. In 2023, in an effort to increase competition, the CRTC ruled that Canada's largest telephone companies—Bell Canada, SaskTel, and Telus—which have vigorously protested the decision, must provide competitors with workable wholesale access to their fibre networks.

Add these elements together and the rural broadband divide is decreasing in Canada, however slowly. However, looking at the growth of other communication technologies in Canada over the last century, the work is just beginning.

Gregory Taylor is an associate professor in the University of Calgary's department of communication, media, and film.

The Hill Times

Closing the connectivity chasm

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such as schools, hospitals, and libraries. Other nations are staking out more ambitious speed targets. The Federal Communications Commission in the United States recently increased its target speed to 100 Mbps download and 20 Mbps upload—double Canada's speeds. In the United Kingdom, the government is aiming to have speeds of 1,000 Mbps (or one Gbps) available to 85 per cent of households by the end of 2025, increasing to 99 per cent by 2030. The European Union's Gigabit Infrastructure Act legislates universal household availability of one Gbps speeds by 2030. According to ISED's response to the auditor general's 2023 evaluation of rural broadband, only 80 per cent of UBF-funded projects are capable of being scaled up to one Gbps. In other words, Canada is funding some infrastructure that cannot keep up with its peers' investments.

The CRTC reports that the Trans-Canada Highway still has 600 km of roadway lacking a wireless signal, writes Michael McNally. *Pexels photograph by Tara Robinson*

Fortunately, several policy options remain for the federal government that do not involve massive new expenditures. Revisiting the national speed target—especially as other nations take on more ambitious ones—will help ensure funds spent today are able to best serve future needs. For mobile coverage, ISED should be recognized for developing several new policy approaches, from more granular licensing areas to new frameworks for accessing spectrum, including the in draft Indigenous Priority Window. However, ISED should also revisit its *Spectrum Policy Framework for Canada*. The 2007 document lacks special considerations for the unique challenges of rural deployments, and is premised on the guideline "market forces should be relied upon to the maximum extent feasible." The same approach was repealed as a CRTC policy direction in 2023 resulting in ISED's wireless policy using an outdated and mismatched set of policy guidance.

Increasing strategic alignment between ISED and the CRTC will also increase the effectiveness of broadband policy. Canada remains unique on the global stage by splitting regulatory, policy, and funding responsibilities between two regulators. The Organisation for Economic Co-operation and Development as well as several national blue-ribbon panels, have recommended streamlining Canada's regulatory structure, and this approach enables wireless policy, which is the purview of ISED, to be better aligned with the CRTC's broadband policies. To address future funding concerns, Canada's lucrative spectrum revenues could be earmarked for rural connectivity rather than going to the general federal coffers.

Canada's telecommunications policy objectives—outlined in Section 7 of the Telecommunications Act—are clear: reliable, affordable, high-quality services are for all. Rural Canadians should not be left waiting to connect.

Michael B. McNally is an associate professor in the faculty of education at the University of Alberta. He is a co-founder of the Alberta Rural Connectivity Coalition (ARCC), and co-chair of ARCC policy committee. In addition to a variety of academic articles on broadband, he is also an author of Understanding Community Broadband: The Alberta Broadband Toolkit.

The Hill Times

Funding gaps, policy shortfalls keeping rural Canada offline, experts say

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He also called for policy measures aimed at providing local governments with the necessary training and expertise needed so they can make their own informed decisions about what connectivity solutions are best for their community.

"There's no one-size-fits-all solution for rural broadband, but what has constrained a lot of these rural communities is they still see it as something that either the federal government or big telecommunication companies are going to come and solve," he said.

Individual communities do not have to go it alone, noted McNally. He pointed to several examples of groups of communities consolidating demand and taking up their own projects to tackle connectivity challenges, including initiatives like Southwestern Integrated Fibre Technology, the Eastern Ontario WardenRegional Network, and K-Net.

These initiatives can be structured in various ways, such as community-owned and operated internet service providers, co-operatives, non-profits, or public-private partnerships with regional providers.

"Ownership is the key to broadband development" in rural and Indigenous communities, said Tim Whiteduck, chair of the First Mile Connectivity Consortium (FMCC) and technology director of the First Nations Education Council.

He said he believes community ownership is essential for ensuring the long-term sustainability and responsiveness of internet services in rural and Indigenous communities, noting that when communities control their own networks, the benefits that stem from those networks stay within the community.

Community ownership—while often a more affordable option—does not automatically mean that networks in high-cost service areas are sustainable, noted Whiteduck. He emphasized the importance of optimizing operational costs and trying to support them through different means.

Sustaining services "can become costly when you're remote. You've got to pay for your engineering, your network maintenance contract, which is huge." He noted that contracts for next-day service repair in some areas can run as high as $30,000.

Currently, the Broadband Fund administered by the CRTC does not consider any costs incurred after a broadband build is complete as eligible for funding.

Redundancy builds should also be considered eligible, Whiteduck said.

As chair of the FMCC, Whiteduck is responsible for relaying messages from the First Nations that the consortium represents, one of which is the community of Opitciwan in the Mauricie region of Quebec.

"The only way we could get to them is by road, and the closest corridor where we could make the connection into the network was 160 kilometres away," said Whiteduck. It is connected by one fibre cable buried under a main road, which he noted is "highly likely to be dug up somewhere, and the fibre will break."

"If something were to happen to that fibre, [the community is] in trouble," said Whiteduck.

Members of the Independent Telecommunications Providers Association (ITPA) also advocated for more financial support on the operational side.

Government subsidies have been a "great boon" in helping make the business cases for internet justifiable in rural areas, said Ken Naylor, general manager of Mornington Communications Co-operative. Without them, the typical return on the initial investment could be around 10 years or more, he noted.

"After 10 years, the electronics on both ends of the fibre starts to age out and you have to do replacements—and there's just ongoing maintenance and such. So to have this massive investment, and then not to keep throwing money into it to maintain it, is a losing proposal," said Naylor.

"So some support on the [operational expenses] would be appreciated. The concern is, if that doesn't happen, then the only resource left is to increase rates for consumers, which then you get into this divide about consumers in urban areas having access to affordable services, whereas in rural areas—just to maintain services—we have to increase prices."

Fellow ITPA member Richard Biron, vice-president of business development for Sogetel, agreed and noted that subsidizing the operational costs of telcos in high-cost service areas is not without precedent.

"There used to be a mechanism for telephony to be subsidized," said Biron, referring to a now-removed provision of the CRTC's revenue-based contribution regime. "I think in the long term, the CRTC or the government will have to think about such a mechanism to make sure that the networks that we have deployed, we can maintain them in rural areas."

The office of Rural Economic Development Minister Gudie Hutchings (Long Range Mountains, N.L.) did not respond to questions by publication deadline.

Phalen Tynes-MacDonald is a reporter with The Wire Report, *a sister publication of* The Hill Times *that covers telecommunications, digital media, regulation, and more. Sign up for* The Wire Report*'s daily newsletter at thewirereport.ca/sign-up.*

phalentm@thewirereport.ca

The Hill Times

Minister of Innovation, Science, and Industry François-Philippe Champagne on Sept. 24 in Ottawa. *The Hill Times photograph by Andrew Meade*

Telecom's role in solving Canada's productivity crisis

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are increasing rapidly. Businesses adopting the latest digital technologies need faster data speeds, reduced latency, and more coverage. This will require continued private sector investment in networks that deliver high-bandwidth and speed, support a massive number of connected devices, and can deliver services tailored to each business' connectivity requirements.

The need for sustained investment comes at a time when the telecom sector is encountering several challenges, including high borrowing costs, increased network building costs, heightened climate-change risks, and declining service prices. For instance, while telecom operators were increasing their investments in expanding and enhancing their wireless networks, Statistics Canada's Cellular Services Index revealed a nearly 50 per cent decline in cell service prices in the five years ending September 2024, while the overall consumer price index increased by more than 18 per cent during the same period.

That is why it is crucial for policymakers to ensure that telecom regulations provide sufficient incentives to promote continuous investment in innovation and network infrastructure. Policies that discourage investment in telecom infrastructure put Canada at risk of falling behind in network performance, service quality, and reliability, thereby prolonging our productivity crisis.

Canada's telecom sector is renowned for delivering world-class services thanks to substantial investments made by service providers in network infrastructure and services. These networks enable Canadian industries to leverage the latest digital innovations to modernize their operations, increase their productivity, and contribute to the growth of Canada's economy. Maintaining a healthy telecom sector that has the continuous capacity to invest in its network infrastructure and services—as well as encouraging Canadian industries to adopt digital transformation—is critical to increasing productivity in this country.

Robert Ghiz is the president and CEO of the Canadian Telecommunications Association, and was previously premier of Prince Edward Island.

The Hill Times

INNOVATION

THE HILL TIMES
POLICY BRIEFING
OCTOBER 21, 2024

National innovation STRATEGY NEEDED

CANADA'S BIO ECONOMY opportunity

SOLVING CANADA'S INNOVATION PARADOX

SEEDING INNOVATION
in Canada's agri-food sector

CANADA NEEDS solutions-focused INNOVATION

Unlocking Canada's AGRICULTURAL POTENTIAL IN A CHANGING WORLD

WHY NOT FIX CANADA'S biggest innovation program?

WILL INNOVATION
support or undermine rural and Northern Canada?

CANADA'S ENTREPRENEURIAL MINDSET STARTS WITH ITS STUDENTS

Innovation Minister François-Philippe Champagne, pictured on the Hill. *The Hill Times photograph by Andrew Meade*

Innovation Minister François-Philippe Champagne speaks with reporters in the House of Commons foyer on Sept. 24, 2024. *The Hill TImes photograph by Andrew Meade*

National innovation strategy needed to address funding and other issues, say sector experts

This country is 'one of the worst' for business research and development spending, according to the Canadian Chamber of Commerce's senior director of advanced manufacturing.

BY JESSE CNOCKAERT

Experts from Canada's innovation sector view the Liberal government and Innovation Minister François-Philippe Champagne as making positive strides towards supporting innovation, but say a national strategy is still needed to coordinate solutions for issues including a complex regulatory environment, and under-funding in research and development.

"This government, I think, has championed a number of key initiatives around innovation," said Alex Greco, the Canadian Chamber of Commerce's senior director of advanced manufacturing and value chains. "Ultimately, for all governments, there has to be accountability, and I think we've seen we can't put the cart before the horse. We need to get serious on reversing some of the short-term measures in order to be able to focus on the necessary things that are required for an industrial strategy."

Greco described Canada as having a dynamic and evolving innovation landscape, but still lagging behind many peer Organisation for Economic Co-operation and Development (OECD) countries in terms of business investment and innovation growth.

Canada's overall research and development (R&D) expenditures in 2021 reached $4.6-billion, which was up $4.0-billion from 2020, and marked the largest growth in year-over-year spending ever for this nation, according to Statistics Canada. However, Canada's R&D intensity—the nominal share of gross R&D expenditures as a percentage of gross domestic product—still decreased to 1.86 in 2021, down from the 1.93 ratio in 2020 despite the increase in spending. Compared with other member countries in the G7, Canada continued to rank below average in R&D spending in 2021, and among OECD countries, Canada fell two spots in 2021 to 19th position, according to Statistics Canada.

"We are one of the worst countries in terms of business research and development spending," said Greco. "For an innovation strategy to work, there has to be transparency, clear targets and goals, accountability measures, [and] clear, consistent engagement with industry. It cannot be done in silos."

In a follow-up email on Oct. 2, Greco said that the federal government needs to help firms find the resources necessary for commercialization and innovation. He suggested the government could become involved in product commercialization and innovation through the procurement process as a direct buyer and funder in a model similar to the Defense Advanced Research Projects Agency (DARPA) in the United States.

DARPA is a research and development agency for the U.S. Department of Defense. Greco described the agency as responsible for making "pivotal investments in breakthrough technologies for national security."

A national innovation strategy must also focus on investing in research and development that leads to new product commercialization because demand from consumers for advancing technology requires manufacturers to be always innovating, according to Greco.

"We have to look at simplifying regulations and ensuring that they support innovation because that will create a more conducive environment for industry to experiment and grow," said Greco. "At the end of the day, I think an innovation strategy needs … greater focus on research and educational excellence. There has to be a suite of fiscal, trade, and regulatory policies, and it has to encourage the following elements: facilitating risk taking, removing unnecessary barriers to innovation, fostering entrepreneurship and economic activity based on the talent skills and research capabilities that Canada has, and there has to be a more goal-oriented approach to support business innovation to achieve our goals."

To help support innovation in this country, the 2024 federal budget announced an additional $600-million over four years, with $150-million per year ongoing, towards enhancements to the Scientific Research and Experimental Development (SR&ED) tax incentive program intended to encourage firms to conduct research and development in Canada.

Two public consultations were held this year—between Jan. 31 and April 15, and between April 25 and May 27—to gather input on questions such as how the SR&ED program can better support the growth and success of R&D-intensive domestic businesses going forward.

The Canadian Chamber of Commerce submitted a letter to Maximilian Baylor, director general for Finance Canada, on April 15, which included recommendations such as simplifying the SR&ED application process, and harmonizing the SR&ED regime across all provinces.

Aminah Robinson Fayek, vice-president of research and innovation at the University of Alberta, told *The Hill Times* that she is seeing increasing levels of awareness in Canada that innovation is a necessity, but "we need

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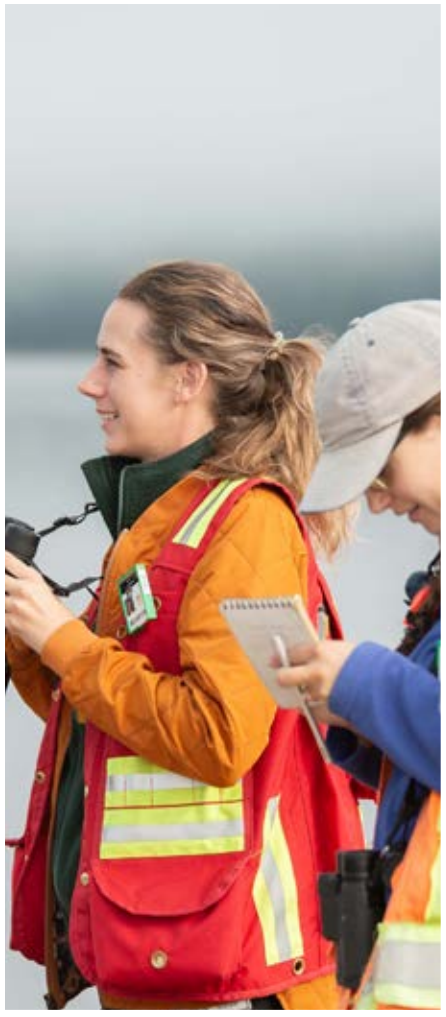

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National innovation strategy needed to address funding and other issues, say sector experts

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to continue to prioritize that to make it happen consistently."

"I think having a national innovation strategy is a wonderful idea, and I think it's important that all of the players in the innovation ecosystem have a role in that strategy," she said. "Very importantly, we need to continue to support basic research and discovery. This is where future innovations come from, and if we do not continue to strengthen basic research and discovery, we will not be competitive in the future, and I think we're making good strides to do so."

Robinson Fayek said that more investment is also needed for applied research, which aims to solve practical problems in the real world. More support for applied research helps post-secondary institutions to de-risk technologies under development so they can be adopted by industries, according to Robinson Fayek.

"We also need to continue to support our entrepreneurs in developing new technology and markets, and at the same time helping them to de-risk their inventions. That includes continued investment in training and entrepreneurship, market assessment, training and resources and matching funds for early-stage companies who do get investments," she said. "Finally, I think we need to support … market entry and growth scale-up of new technologies, helping to provide incentives for Canadian companies to adopt new innovations."

Robinson Fayek said that Champagne has done a fantastic job on his portfolio, and has championed innovation in this country.

"He really has shown that he believes that it is the responsibility of government to invest in the visionaries right from the start, and so that includes the researchers, it includes businesses and industry," she said. "I think one of the things is the recognition that innovation is an ecosystem and that all parts need to be supported and functioning well. So, that includes research in the post-secondary sector, industry collaboration, talent and workforce, public and private funding and innovation resources and supports."

Graham Carr, president and vice-chancellor of Concordia University in Montreal, told *The Hill Times* that a highly educated workforce should be at the core of a possible national innovation strategy.

"In order for universities to play their part in developing and supporting that workforce, we obviously need resources. We need funding. Funding for universities is a provincial jurisdiction in Canada, and I think if you look over the course of the last 10 years, there's really been an incredible gap developing between the level of funding that universities receive on the one hand, and the cost of delivering higher education on the other."

Aminah Robinson Fayek, vice-president of research and innovation at the University of Alberta, says, 'we need to continue to support basic research and discovery,' because 'this is where future innovations come from.' *Photograph courtesy of Aminah Robinson Fayek*

Graham Carr, president and vice-chancellor of Concordia University, says, 'in order for universities to play their part in developing and supporting that workforce, we obviously need resources. *We need funding.' Photograph courtesy of Universities Canada*

Dugan O'Neil, vice-president of research and innovation for Simon Fraser University in British Columbia, told *The Hill Times* that post-secondary institutions in Canada have a strong research system that produces a lot of talent, but there are gaps when it comes to retention.

"The translation out of the laboratory and into the market is something that Canada has always kind of lagged on, and then the investment in research and development by Canadian companies is an area that we've also lagged on," he said. "We have some tremendous researchers and we have some of those researchers in what are really hot emerging areas for commercialization, [such as] clean technologies or quantum or [artificial intelligence] and agri-tech, but we're not realizing the full potential of having those researchers in those hot emerging areas."

O'Neil argued that there are several examples of federal programs that are going in the right direction for supporting innovation, such as the Lab to Market grants, which is administered by the Natural Sciences and Engineering Research Council of Canada in collaboration with the Canadian Institutes of Health Research, and the Social Sciences and Humanities Research Council. Through the program, eligible institutions such as universities, colleges, and hospitals could apply for a grant of up to $10-million per year for a period of up to five years with the possibility of renewal. The application deadline closed on Sept. 9, 2024.

However, there's still a lot of work to do to improve Canada's innovation ecosystem, according to O'Neil. He raised concern regarding a recent international student study permit cap.

On Jan. 22, 2024, Immigration Minister Marc Miller announced an intake cap on foreign student permit applications for two years, expected to result in about 360,000 approved study permits, representing a 35 per cent cut compared to 2023.

"There is a concern right now around the damage to our reputation, and our ability to attract talent from around the world because of our changes in visa policies," said O'Neil. "We really want to be careful about discouraging graduate students to come to Canada, especially in those areas where they're likely to create new technologies and start new companies."

A press release from Immigration Canada stated that an international student study permit cap is intended to "stabilize" the number of foreign students in this country. According to the press release, more students have been arriving "without the proper supports they need to succeed," and that rapid increases in students from abroad also puts pressure on this country's housing, health care and other services.

Individual provincial and territorial caps were established, weighted by population, intended to create more significant decreases in regions with the most unsustainable growth in the international student population.

Steven Murphy, the president of Ontario Tech University, told *The Hill Times* that the state of innovation in Canada has been at a perpetual crossroads with everyone knowing something must be done, but without much action taken.

"I think the most fundamental question is: what is Canada known for, and where could we realistically own a space in innovation, given what we do?" he said. "It feels like we want to dabble in every space in tech, but to me, it's all about, I think, honouring our past. I happen to be a big proponent of: if Canada is going to legitimately own a space in innovation, it's probably going to be in the energy resources space. That's not a very far cry from our past or what we've done well."

Dugan O'Neil, the vice-president of research and innovation for Simon Fraser University, says 'the translation out of the laboratory and into the market is something that Canada has always kind of lagged on.' *Photograph courtesy of Dugan O'Neil*

Murphy argued that the most innovative and R&D spenders in this country are largely made up of resource-based firms.

"To say that resources are Canada's past, and something else is our future, is just not, to me, the reality of Canadian life. If there are companies like Suncor, for instance, who continues to spend money on R&D, then why don't we amplify those messages and say, 'Yeah, we want to lead the world in carbon capture,' or 'we want to lead the world in nuclear technologies,' or so many things that Canadians have shown strength in?"

Adrien Coté, executive director for Velocity, an incubator at the University of Waterloo for pre-seed technology startups, told *The Hill Times* that universities are the origin point for much of innovation, especially in Canada.

"We need to continue to support the work that universities do, not just in research, but also getting that research out the door," he said. "It's the talent as well, too, because often the inventors are the best people to bring that technology to market."

Coté said that working towards the goal of improving the innovation sector will involve more clearly defining Canada's "Norh Star," or key performance indicators.

"We, as universities, business incubator accelerators, venture capitalists, whatever, what is that North Star we're working toward, in terms of an economic future for Canada?" he said. "Is it a total number of jobs? Is it how much a number of Canadian companies grow to a certain size, etc? I think that would really help in crystallizing how we can all work together as ecosystems towards that future."

jcnockaert@hilltimes.com
The Hill Times

Canada business innovation statistics

- The 2020-to-2022 period was marked by the pandemic, which introduced major challenges and disruptions to the global economy. According to findings from the 2022 Survey of Innovation and Business Strategy covering this period, the innovation rate (**71.9 per cent**), which is the proportion of businesses that introduced product or business process innovations, declined compared with the previous reference period (**79.8 per cent** in 2017 to 2019)
- The innovation rate dropped for both product and process innovations. From the 2017-to-2019 period compared to the 2020-to-2022 period, the product innovation rate declined just over six percentage points to **46.6 per cent**, and the business process innovation rate decreased almost 10 percentage points to **63 per cent**.
- The ranking of the propensity to innovate across enterprise size groups and regions did not change with the pandemic. Large businesses (**78.4 per cent**) were more likely to innovate than medium businesses (**75.1 per cent**) and small businesses (**71 per cent**).
- The top four sectors with the highest innovation rates continued to be concentrated in the services-producing sector in the 2020-to-2022 period. These included the information and cultural industries (**79.5 per cent**), finance and insurance (excluding monetary authorities) (**79 per cent**), professional, scientific, and technical services (**78.2 per cent**), and wholesale trade (**77.4 per cent**). The agriculture, forestry, fishing and hunting (**50.9 per cent**) sector had the lowest innovation rate.

Source: Survey of Innovation and Business Strategy, 2020-2022, released by Statistics Canada on Feb. 20, 2024.

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Solving Canada's innovation paradox

It's time for a new way of thinking about how to support innovation so we can dismantle the innovation paradox.

Ted Hewitt

Opinion

The word "innovation" permeates headlines as well as public and private sector policies, programs, and projects. But what does it actually take to implement innovative practices that improve lives?

The challenge of transforming creative concepts into tangible outcomes was underscored in a Conference Board of Canada report that explored the "innovation paradox": despite strong research capacity, entrepreneurial talent, and resources, Canada is falling behind peer countries on many indicators of innovation and productivity. Reasons include declining expenditures in R&D, low levels of commercialization and intellectual property protection, and a risk-averse culture.

It's time for a new way of thinking about how to support innovation so we can dismantle the innovation paradox.

We need to start by understanding that successful innovation is only partly about science and technology. While invention lies at the heart of innovation, it also relies on human processes such as defining problems, recognizing the value of new technologies, and understanding how new products will be received by potential consumers. This leads to creative pathways to product development, helps overcome barriers to productivity, and accelerates market success.

Research that comes from the social sciences and humanities (SSH) is the missing ingredient. To be effective, however, SSH research must be incorporated into innovation projects from the outset. Only then will we be able to crack the innovation paradox and ensure higher standards of living for all.

A great example is the Sustainable Agriculture Research Initiative. This net-zero initiative brings together Agriculture and Agri-Food Canada, the Social Sciences and Humanities Research Council (SSHRC), and the Natural Sciences and Engineering Research Council to build capacity and fill knowledge gaps in this sector. One project based at NSCAD University in Halifax is connecting farmers, fibre mills, craftspeople and consumers to revitalize Atlantic Canada's capacity to grow fibres and produce textiles, lessening dependence on unsustainable global supply chains. Another project based out of the University of Toronto is bringing partners together to improve the management and expansion of sustainable urban and peri-urban systems, which will help meet greenhouse gas emissions mitigation and food production targets in our domestic agriculture sector. Yet another illustration is the Pan-Canadian Artificial Intelligence Strategy, which integrates SSH research into AI development and implementation.

Understanding social demand and responsibility for transformational technologies like AI, quantum, and genomics will help commercialize these technologies while ensuring they benefit people in Canada and around the world, writes Ted Hewitt. *Image courtesy of Pixabay*

Understanding social demand and responsibility for transformational technologies like AI, quantum, and genomics will help commercialize these technologies while ensuring they benefit people in Canada and around the world.

SSH research can sharpen Canada's innovation strategy by offering critical insights into the business dynamics that shape innovation, as well as changing labour markets. That includes helping improve understanding of skills gaps, recruitment challenges, the attraction and integration of immigrants, and the effects of an aging population.

For instance, several major Canadian industry partners are collaborating with University of Windsor professor Dr. Anne Snowdon on research to improve supply chains in this country's health care. The project enables co-ordination among the many supply chain teams and stakeholders across Canada to strengthen supply chain resilience, enhance our global competitiveness, respond to supply disruptions, and protect health and safety.

SSH research can also improve understanding of emerging trends that might affect Canada's ability to innovate. Through our Ideas Lab initiative, SSHRC is working with partners to better understand coming challenges and chart effective responses. For instance, one initiative is examining the circular economy. By focusing on extracting maximum value from resources, the insights from this initiative can inform decisions to improve productivity, and reduce carbon emissions. This is only possible by examining the role of human and social behaviour in these complex systems.

Applying SSH research insights to innovation policy and practice can pay huge dividends. But the jump from insight to innovation requires active efforts to strengthen academic–business partnerships so theory can lead to tangible gains. That's why SSHRC is looking for ways to better understand the private sector's need for knowledge and expertise to inform how we facilitate research impact across sectors.

SSH research is the key ingredient that can help us achieve more transformative innovation. We must bring SSH into innovation initiatives, and build on and accelerate existing academic–business partnerships.

We must also leverage and invest in SSH talent. At SSHRC, we are cultivating a cohort of researchers with the skills, evidence and insights to inform innovation and industrial policy for Canada in a rapidly changing and increasingly competitive global environment.

With SSH research guiding the way, we can solve the innovation paradox by enabling whole-systems thinking, underpinning smart and responsible innovation, addressing global challenges, creating impact, and sharpening our innovation policy, to the benefit of people in Canada and across our planet.

Dr. Ted Hewitt is president of the Social Sciences and Humanities Research Council of Canada.

The Hill Times

Time for a shift: Canada must treat Alzheimer's like other progressive diseases

By Adam Morrison, Senior Director, Public Policy & Partnerships, **Alzheimer Society of Ontario**

Every day, more than 350 people in Canada will develop Alzheimer's disease or another form of dementia[1]. The Alzheimer Society of Canada's Landmark Study found that by the end of this decade, more than 1 million Canadians will live with this disease and by 2050, this number will surpass 1.7 million[2]. There is no denying that Alzheimer's disease is one of the most significant public health challenges of our time, but unlike other progressive conditions such as cancer, it lacks the urgency and comprehensive care it deserves.

There are many misconceptions and stereotypes that have become synonymous with Alzheimer's. When a disease this prevalent continues to be poorly understood, it creates an environment for false beliefs to spread and thrive. This means for those living with the disease, symptoms including cognitive decline and personality changes are regularly dismissed or met with uncertainty and fear – forming a culture where barriers to early diagnosis, treatment, and social support for those living with it are all too prevalent.

Through our work, we have seen firsthand how this narrative has lasting impacts on patients and their loved ones. Many feel ashamed, isolated, or hesitant to seek care until the disease has drastically progressed. Compare this with cancer, where early detection is praised, and patients from the beginning are regularly encouraged to pursue aggressive treatment options. If we want to improve the lives of those with Alzheimer's, we must actively dismantle these falsehoods, normalizing conversations about cognitive health and dementia.

Inequality in treatment approaches is evident in research funding. While Alzheimer's is the seventh-leading cause of death worldwide, it receives less than 1.5 per cent of health research funding[3]. Despite this, new and emerging treatments are shaping the future of the disease. Significant efforts by researchers and patients, including those in Canada, have led to full U.S. FDA approval of two disease modifying treatments that can slow the progression of Alzheimer's in the past year. These medications target individuals with mild cognitive impairment or mild dementia due to Alzheimer's to help slow decline[4].

With Health Canada's decision on the approval of these medications still to come, efforts to help shift the approach to Alzheimer's care must continue. This starts with ensuring that patients have equitable access to testing, community support services, and care partner support – no different than those facing other progressive conditions.

The approval of new treatments – the first in 20 years – is an important and welcomed first step in the fight against Alzheimer's. We share the excitement of hundreds of thousands of Canadians impacted by this disease as advancements help inspire hope about a new future. As these treatments move closer to approval, policymakers must take action now to prepare the health system. This includes improving access to screening and assessment in the community, diagnostic testing that includes biomarker and genetic tests, making more flexible use of existing imaging devices, and increasing the number of dementia specialists, such as neurologists and geriatricians.

Alzheimer's disease, like cancer, deserves to be treated with urgency, compassion, and comprehensive care. Changing the narrative surrounding the disease is crucial to normalizing early diagnosis and providing the resources and support necessary for both patients and care partners. We must invest more in Alzheimer's research, expand treatment options, and create healthcare models that address the full spectrum of patient needs—from early intervention to end-of-life care.

By rethinking Alzheimer's care in this way, we can give those impacted by this disease the chance to live out their life on their own accord.

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Alzheimer Society ONTARIO

Innovation Policy Briefing

Seeding innovation in Canada's agri-food sector

Every day, the agri-food value chain impacts us all. As an employment sector, it creates one in nine jobs in Canada, and generates $150-billion or seven per cent of our GDP, writes Amy Proulx. *Image courtesy of Pixabay*

Skills for food systems innovation must be democratized through non-formal pathways, with emphasis on youth, recent immigrants, and Indigenous nations.

Amy Proulx

Opinion

Every day, the agri-food value chain impacts us all. As an employment sector, it creates one in nine jobs in this country, and generates $150-billion or seven per cent of our GDP. Despite its importance to our economy and food security, our food sector faces tremendous challenges related to labour shortages and declining productivity. Add climate change, population growth, geopolitical tensions, competition issues, and trade barriers, and there's a maelstrom facing the sector.

Many of these challenges can be solved through innovation, which typically refers to inventions and technological breakthroughs. However, innovation is so much more. It is a multifaceted process involving creativity, problem-solving, and collaboration. Innovation isn't just about technology, but also about creating value, meaning, and uniqueness within a system.

When we think of traditional innovators, we think of a highly skilled workforce. A trend analysis on Ontario's academic programs, using data provided by Ministry of Colleges and Universities, shows that enrollment of undergraduates in food and agriculture programs began to decline in 2016, with no increase predicted through 2030.

Ontario colleges produce approximately 20 times more graduates in food and agriculture programs than universities. With colleges, our trend analysis predicted strong growth—thought to be mostly due to an increase of international students. A reduction in foreign student visas and the recent loss of their post-graduate work permits calls these projected increases into question.

Only a fraction of the higher education graduates focus on the agri-food sector—for example, an estimated 400 university undergraduates and 8,000 college graduates per year in Ontario. This is a small percentage of the sector's workforce, estimated by Ontario Ministry of Agriculture, Food and Agribusiness at 750,000. For sectoral growth, Canada needs to invest in non-formal education that promotes skill development, and encourages innovation within our agrifood sector, particularly targeting youth, immigrants, and Indigenous nations.

Our skills development strategy also needs to be broad. Training must include not just technology development, but also look at how we can learn from traditional sustainable practices, other countries or other sectors. Innovation is not limited to higher management and executives, as good ideas for improving products and processes come from all levels of the workforce, including those most in touch with the operations of the system. The general workforce needs to use, service and maintain new technologies, and will require related skills. Investments in innovation must come with skills training, workforce development, and youth engagement strategies so that the entire sector moves towards longevity as well as increased productivity.

Contrary to popular belief, innovation skills are not something people are born with, and there is rarely a "eureka" moment when groundbreaking ideas occur. Innovation is a deliberate process requiring idea stimulus, planning, experimentation, and analysis. It requires a willingness to learn by doing, and to learn through failure as a natural consequence of the process. Young people are some of the best innovators because they take a playful approach to their ideas, and they are not biased by what has been done in the past.

Innovation also occurs by looking to culture. Traditional ways of growing, harvesting, and preserving foods were often rooted in climate resilience using synergies from nature. Indigenous nations have food systems that can not only be preserved through innovation, but can also be enhanced and used to promote livelihood development. Immigration brings another dimension to culturally-based innovation as new creative product ideas and new ways of thinking emerge from our diverse population.

Another key feature of successful innovation includes looking outside one's discipline to discover new ways of doing business, and sourcing solutions to problems. A whole range of stakeholders needs to work together across disciplines, including the classic sectors: farmers, food processors, retailers, food service organizations—and more broadly, to encompass environmental sustainability, waste management, water resources mapping, use of artificial intelligence and robotics, and technological breakthroughs from the hard sciences.

Skills for food systems innovation must be democratized through non-formal pathways with emphasis on youth, recent immigrants, and Indigenous nations. Our resilience, our health and well-being, and our economic prosperity are all anchored in Canada's status as an agri-food nation, and we need to build innovation skills to keep this sector strong in a changing world.

Amy Proulx, PhD, CCHP, is professor of Food Innovation at Niagara College, and global research and innovation systems leader within the college's Institute for Global Education and Training. She is research leader at the Niagara College Food and Beverage Innovation Centr, where she and her colleagues provide technical, regulatory and product development support to the Canadian food and beverage manufacturing sector.

The Hill Times

Regulatory reform: unlocking Canada's agricultural potential in a changing world

Trevor Heck

Opinion

Canada's agri-food sector is a pillar of our economy, providing one in nine jobs, and contributing 7.4 percent to our GDP. Our farmers and agri-businesses have long been recognized for their ability to produce premium quality, sustainable products.

While this industry has consistently demonstrated resilience and adaptability in the face of challenges such as fluctuating interest rates, extreme weather events, and supply chain disruptions, it continues to grapple with a persistent obstacle: a burdensome regulatory framework. Once designed to protect and nurture Canada's competitive position in the global agri-food landscape by enabling safe access to innovative pest management tools, it is now paradoxically hindering both innovation and competitiveness.

This situation underscores the need to both uphold high quality and safety standards, and to cultivate an environment conducive to growth and technological advancement.

The 2017 Barton Report highlighted agriculture as one of six sectors capable of sustained, long-term economic growth in this country. Yet, seven years later, regulatory delays are still preventing our agricultural sector from reaching its full potential.

Consider, for instance, the development of biologicals—an area where we should be at the forefront. Our current regulations restrict research to just one hectare for biostimulants across the entire country. This limitation is impeding our ability to make greater strides in this crucial field. Similarly, amendments to the Competition Act regarding greenwashing, while well-intentioned, risk disincentivizing the communication of environmental goals and progress, leading to missed opportunities for collaboration and investment in sustainable programs.

The World Economic Forum ranks Canada 35th out of 38 OECD countries in terms of regulatory burden. Particularly concerning are delays in regulatory decisions on new technologies. Predictability in our regulatory system is critical to attract investment in innovation. The fact of the matter is that global firms, like Syngenta, first seek product registrations outside of Canada in countries with predictable regulatory systems. As a result, our farmers here at home are delayed in accessing these innovations. Without predictability it's also impossible to plan resourcing needs, from manufacturing through to supplying retailers. Canadian farmers are already dealing with unpredictable weather, commodity prices, and transport challenges. We need to get them the tools they need to fight pests and climate change in a timely manner.

Recent industry data further highlights the impact of regulatory complexities on agricultural innovation. Between 2010-14 and 2014-19, the cost of chemistry research for new agrochemicals rose by 31.6 per cent to US$64-million. More alarmingly, registration costs have more than tripled since 1995, according to a study by CropLife International. With the average lead time from synthesis to commercial introduction now exceeding 12 years, these escalating costs and extended timelines pose significant challenges to innovation in the agricultural sector.

It's critically important to foster an agile regulatory system that enhances competitiveness and encourages innovation. Modernizing regulations is the fastest, most cost-effective, and impactful way the government can boost growth in the agricultural sector. We need efficient regulations that use scientific evidence to drive decision making—not regulations grounded in precautionary principles that hinder development and creative innovation.

As CSG Senator Colin Deacon astutely observed, "Canada desperately needs a major, whole-of-government strategy to meaningfully address our OECD-leading legacy of regulatory burden and stagnation." I concur with his view that we must create the regulatory agility necessary to protect Canadians, drive the Canadian economy, spur innovation, and increase productivity.

Regulatory reform goes beyond reducing red tape; it's about facilitating the adoption of new technologies and practices that will help our farmers better manage risk, optimize their operations, and secure our food supply. With numerous challenges facing the industry—both currently and on the horizon—it is crucial that the government acts swiftly to stem the loss of opportunity and return Canada to its rightful position as a leader in the adoption of agriculture technology.

By streamlining our regulatory processes, we can unlock the full potential of Canadian agriculture, driving ingenuity, environmental stewardship, and economic growth. It's time for our government to recognize the vital importance of this sector and take decisive action to ensure its prosperity for future generations.

Trevor Heck is president of Syngenta Canada.

The Hill Times

To fix Canada's innovation gap, why not fix Canada's biggest innovation program?

We could be on the verge of a tax credit that prioritizes intellectual property generation and commercialization as real drivers of future economic success.

Nick Schiavo

Opinion

Among policy leaders, we're finally arriving at a broad consensus that Canada has a major economic problem. Our labour productivity rates have been stagnant for a decade, and the Bank of Canada's deputy governor has declared the situation to be a national emergency.

And in some sense, we know the solution: the only sure-fire way to boost productivity and create sustainable prosperity for Canadians is through innovation and technology adoption.

As a country, we need to work smarter.

But as we grapple with this challenge, we should also acknowledge an important fact: the federal government has tried a lot of different things to address this problem, albeit unsuccessfully.

We had the Innovation Superclusters, which failed to meet their lofty ambitions, and were eventually downgraded to just clusters. We had the Canadian Innovation Corporation which failed to launch at all. We had the Canada Infrastructure Bank, and the Canada Growth Fund. Just this year we had $2-billion just for artificial intelligence computing infrastructure in spite of the fact that AI leaders say that compute is not their main barrier to global growth.

But amid all the failed schemes, the government has been awfully slow to take action on the country's most efficient and important innovation funding program by far: the Scientific Research & Experimental Development tax credit (SR&ED).

In a nutshell, SR&ED is a partially refundable tax credit that allows firms to claim expenses related to research and development, and at around $4-billion annually, it is 10-times bigger than any other innovation funding program in Canada.

In theory, SR&ED is the perfect mechanism for incentivizing domestic innovation and research commercialization. Unlike so many failed programs with huge administrative overhead and complex program design, SR&ED is a tax credit. In theory, companies just file for it, and if they qualify, they get the money back.

Unfortunately, if you ask a tech CEO in this country about the reality of SR&ED, you're likely to get an earful. Everyone uses SR&ED, the all see how it needs to be improved. Ambiguous criteria and misaligned incentives mean that this critical program is often a source of frustration and uncertainty for high-growth technology companies that can't afford to be bogged down in bureaucracy.

The system is currently so broken that Huawei managed to receive $103-million in SR&ED tax credits over a 10-year period—hardly an obvious economic benefit for the Canadian innovation economy.

The good news is that the government is looking to fix SR&ED. The bad news is that they're taking forever to do it.

Consultations to reform the tax credit were first announced in budget 2022, but didn't actually launch until January 2024. And then after this year's budget, the government launched a second round of consultations to clarify a few points.

So now here we are 29 months after the process started, keeping the hope alive.

We could be close to reforming SR&ED to prioritize Canadian companies over foreign multinationals, and ensuring that eligibility criteria supports high-growth firms that are in the best position to deliver meaningful economic benefits.

We could be on the verge of a tax credit that prioritizes intellectual property generation and commercialization as real drivers of future economic success.

At a time when our economic productivity is in a crisis, finalizing SR&ED reform could be the single most impactful thing that the federal government can do in the fall economic statement. It could be the most impactful thing that Prime Minister Justin Trudeau's government has done for innovation in its entire time in office.

Nick Schiavo is director of federal affairs at the Council of Canadian Innovators, which represents more than 150 homegrown Canadian technology firms, dedicated to reshaping how governments think about innovation policy, and support scale-ups to drive prosperity.

The Hill Times

Will innovation support or undermine rural and Northern Canada?

Ken Coates & Carin Holroyd

Opinion

In the 1970s, Canada had an impressive network of highway lodges, gas stations, and motels positioned strategically along the long and winding roads that connected southern and urban areas to rural and small-town Canada. Today, most of these way-stations are gone, and the gaps between the surviving highway stops area are growing. These small settlements are, in many ways, victims of innovation.

The innovations in these instances are less exciting than AI, biotechnology, machine learning, or space travel, and include the development of radial tires and improved automobile gas mileage, combined with the expansion of paved highways and improved road surfaces. These innovations—all rooted in scientific discovery and commercial development—have allowed people to drive further, faster, and more cheaply, with rare tire blowouts, and in greater comfort.

Innovation disrupts. The advent of the automobile destroyed much of the market for horses, carriages, and buggy whips while creating new economic sectors. Electrification has ended some businesses, and sparked different industries. The rapid improvement in airplane technologies opened vast expanses of Canada—particularly in the North—improving access to remote communities, and expanding economic activity.

And so it continues to the present. The internet and better cellphone service have enhanced many aspects of Canadian life—entertainment, banking, health care, shopping, and even education—but much less effectively in rural, northern, and small-town areas. New technologies come faster—AI looms, monster-like, on the horizon—all the time, with substantial disruptions and—to be clear—significant improvements.

Canada has made a modest and only partially successful transition to an innovation economy. There are several bright spots, including AI, the Waterloo Region eco-system, and some elements of government-funded scientific research. But the nation's overall performance lags well behind competitor nations. Toronto, Vancouver, Calgary, and Montreal play in the big global leagues, attracting much of the country's government innovation funding, and with ready access to private investment capital.

Beyond the achievements of this country's major city-state economies, however, achievement is uneven. There are important research and practical commercial applications in prairie agriculture. Our oil and gas sector is one of the most innovative in the world. Science-based management of the lobster fishery in the Maritimes is an important example of research-founded natural resource management, and commercial adaptation. The mining industry's extractive and processing activities—undertaken in Canada and internationally—are among the best in the world. And far from being a declining remnant of the "old economy," the resource sector is scientifically advanced, commercially engaged, and globally important.

A fundamental dissonance has emerged in our innovation economy. The research and commercialization activities are focused larger cities, with only small reverberations in rural areas. The country's top universities—almost all located in major urban areas—attract faculty, research funding, students and start-up firms. The associated financial, legal, marketing and other professional work is overwhelmingly city-based. Innovation generates opportunity, jobs, and prosperity, producing in the best cases recurring invention, investment, and renewal. It is this cycle that has sustained the long-term prosperity and creativity of Ontario's Waterloo Region, and that has made the Greater Toronto Area one of the world's top innovation eco-systems.

In contrast, rural areas and small towns have been largely passive recipients of the commercialization of science and technology, and only rarely significant beneficiaries in terms of general economic growth. Innovations have reduced dramatically the number of jobs in forestry, mining, and agriculture, all the while maintaining or expanding Canadian production of vital resources. The country may be wealthier, but many areas are coping with declining populations and stagnant local economies.

Canada has not yet learned how to diversify its innovation economy in the way Norway, Sweden, and Finland are doing. Manufacturing and much of this country's processing is shifting to urban and near-urban areas. Northern and rural areas are losing stores to e-commerce, movie theatres to video-streaming, and professional jobs to e-health and e-education, experiencing only a small return in the way of reduced costs of living and limited work opportunities. Scientific and technological innovation is bringing only incremental benefits to small towns and rural areas and major transformations to the nation's cities. The rural-urban divide in Canada is only going to accelerate with social and political consequences that will bedevil the country in the decades ahead.

Ken Coates is a professor emeritus at the University of Saskatchewan, and a distinguished senior fellow at the Macdonald-Laurier Institute. Carin Holroyd is a professor of political studies at the University of Saskatchewan.

The Hill Times

This country's challenges are vast, but so is our capacity for innovation. We have the talent, ideas, and passion to make meaningful change. What we need now is the infrastructure and financial models to turn those ideas into lasting solutions that benefit everyone, write Andrea Nemtin and Diane Rousin. *Image courtesy of Pixabay*

Canada needs solutions-focused innovation to tackle social and environmental challenges

An independent social innovation agency could help make this happen.

Andrea Nemtin & Diane Rousin

Opinion

The traditional view of innovation focused on technology must now be leveraged to address the critical social and environmental problems confronting Canada and the rest of the world. Whether tackling the housing crisis, mental health, or climate change, these issues require solutions-based innovation that directly benefits communities, and the country's long-term prosperity.

Canada has a history of finding practical solutions to tough problems. Now, we need to bring that spirit to today's complex challenges.

Across the country, communities are finding solutions for housing, poverty, food security, and more. But sustaining and scaling these efforts requires more than good ideas—it demands new financial models, cross-sector collaboration, and approaches that bring new voices to the table.

To drive this forward, this country needs a national solutions-based innovation strategy, one that applies innovation to social and environmental goals just as it does for economic growth. Our current ways of working are not enough.

At the heart of this strategy should be a national solutions-based innovation agency. This agency would serve as a central hub, acting as a bridge to communities, co-ordinating the best ideas from across sectors, and ensuring the financial tools are in place to scale successful solutions.

Operating independently from governments, it would have the flexibility to experiment, iterate, and adapt to society's evolving needs.

An innovation agency would use innovative financing models that blend public, private, and philanthropic investments to address critical issues like affordable housing, economic reconciliation, and climate solutions. It would bring together the strengths of philanthropy, academia, social sector groups, purpose-driven businesses, and governments to collaborate on shared missions, and support local solutions.

This model has been successful elsewhere: the United Kingdom's Nesta, Finland's SITRA, and Sweden's Vinnova are all examples of independent agencies that foster cross-sector collaboration to tackle large-scale societal challenges.

Such an agency would be a catalyst for Canada's social innovation ecosystem, which is rich in ideas, but fragmented, underfunded, and disconnected from national strategies. It would provide funding, knowledge-sharing, and collaboration opportunities, enabling local solutions to scale and drive systemic change.

This approach would increase the capacity of existing social innovation labs, and create a networked infrastructure that could drive systemic change. Our ecosystem is rich with potential, but without the right mechanisms to support it, we risk losing the solutions already being developed.

For example, a social innovation agency could help address challenges like transit-oriented affordable housing, when needed investment in transit unintentionally worsens affordable housing shortages. The agency could bridge this gap by ensuring investments in transit don't create affordability problems, but instead integrate housing solutions.

Aligned with this agency's work, Canada's national innovation strategy must also recognize the unique role of Indigenous innovation, and the importance of economic reconciliation.

Indigenous-led initiatives and organizations—such as the Winnipeg Boldness Project and Raven Indigenous Capital Partners—are driving forward new models of innovation that are deeply rooted in community and cultural values. These efforts are critical to addressing both social and economic inequalities within Indigenous communities while contributing to broader national prosperity.

The agency would work in partnership with Indigenous-led groups to ensure that Indigenous innovation labs receive the resources and support they need to scale their impact.

Through outcomes-based financing and innovative investment models, we can create pathways for economic sovereignty, wealth creation, and sustainable development in Indigenous communities.

By fostering collaboration between Indigenous and non-Indigenous innovators, we ensure that economic reconciliation becomes a core component of our national innovation efforts. The agency would serve as a bridge, helping to integrate Indigenous innovation into the broader ecosystem and supporting Indigenous leaders in co-designing solutions that reflect their communities' unique needs and aspirations.

We need mechanisms that ensure innovation and research dollars are driving clear social and environmental outcomes. This agency would help distribute funding across portfolios of mission-driven projects and ensure alignment with government priorities.

Working with higher education, the agency could also provide the evidence base needed to inform policymaking, ensuring government investments are both efficient and effective in achieving long-term goals.

This country's challenges are vast, but so is our capacity for innovation. We have the talent, ideas, and passion to make meaningful change. What we need now is the infrastructure and financial models to turn those ideas into lasting solutions that benefit everyone.

Andrea Nemtin is the CEO of Social Innovation Canada, a leader in social finance and innovation, dedicated to driving systemic change through mission-based strategies, and collaboration across sectors. Diane Rousin is a community leader and social innovator known for her work as the director of the Winnipeg Boldness Project, focusing on creating systems-level change to support Indigenous families and children in Winnipeg's North End.

The Hill Times

Supporting Canadian entrepreneurs is critical

The main driver of economic growth and rising productivity is technological progress, much of which comes from ambitious entrepreneurs. Supporting them should be a priority.

David Crane

Canada & the 21st Century

TORONTO—Shopify president Harley Finkelstein got it only half right in contending that innovation and growth in Canada were being held back by a lack of ambition, with too many promising homegrown companies selling out to foreign—mainly American—multinationals rather than hustling for growth.

But the lack of ambition is not in Canada's entrepreneurial firms. It exists instead in our financial system, in the managers of our pools of capital focused on short-term and safety, and among our politicians who would sooner cosy up with Silicon Valley than with domestic start-ups. And it exists with our risk-averse procurement officials in government departments and agencies where Canadian technology is overlooked and imported technologies purchased instead.

As the Council of Canadian Innovators—representing some 150 Canadian-owned and growth-focused tech companies—said in response to Finkelstein, "the problem isn't Canadian ambition—it's that our polices, strategies, and institutions aren't built to harness and support it."

Our branch-plant Industry Minister François-Philippe Champagne—who spends much of his time paying foreign multinationals to locate here, and too little to build domestic successes—was quick to embrace Finkelstein's comments. But as the council said, "it's easier for governments to blame the innovators instead of taking responsibility for the role they should be playing to create the marketplace frameworks for innovative Canadian companies to succeed." In other words, "the real issue is that government isn't providing the modern policy frameworks for them to succeed."

Canada needs economic growth to deliver good jobs, and the wealth to support health care, education, national defence, and other priorities. This is why supporting entrepreneurs is critical. The principal driver of economic growth and rising productivity is technological progress, much of which comes from ambitious entrepreneurs. Supporting them should be a top priority.

In today's turbulent world where our competitors are trying even harder to gain advantage, it's even more critical that we capitalize on our entrepreneurs' ambitions. By using the massive purchasing power of government procurement—the goods and services government buys—first, to allocate a targeted share of overall public procurement to small and midsize Canadian-owned firms and, second, to advance new technologies and build new businesses with government playing the critical role of first or lead customer to commercialize new ideas, government could play a big role.

As the Canadian Council of Innovators contends, one of the most important ways to invigorate our economy is by "working with homegrown companies and ensuring that Canada remains home to the very companies that will fuel Canada's long-term prosperity."

This year the council has issued two reports on using procurement to support Canadian-led innovation. The first, *Buying Ideas: Procuring Public Sector Innovation in Canada*, addresses the barriers faced by high-growth Canadian tech firms in selling to government. They include a lack of in-house government capacity and expertise to assess technology and deep-rooted risk aversion in the Canadian public service in choosing a homegrown company over a global multinational. "This means that significant taxpayer funds are being channelled to global firms, sidelining local innovators who have a deep-rooted stake in Canada's progress." It calls for new steps to enable government to identify technology needs, and seek out domestic technology firms to advance them, and help the best ones advance to the point where they can eventually become active in export markets.

The second report, *Building Winners: Strategic Procurement in the Age of Innovation*, notes that the feds alone spend $4.6-billion annually on goods and services. It proposes a procurement target for SMEs, the development of an in-house body to help the public service with innovation procurement expertise, and use the power of flexible standards to get around bureaucratic red tape in procurement. The goal would be to use this country's private sector to develop "new and better

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Canada's entrepreneurial mindset starts with its students

As each new cohort of students interested in exploring entrepreneurship is ever-more sophisticated, our programs and services must evolve to meet their ambitions.

Guy Levesque

Opinion

Last year, the Business Development Bank of Canada reported that this country had less than half the entrepreneurs than we used to. Meanwhile, the Global Entrepreneurship Monitor points to a major increase in entrepreneurial activity here in the last 10 years. *Image courtesy of Jimmy Chan/ Pexels*

Canada needs more entrepreneurial thinking, and we need more entrepreneurs. What if we turbo-charged today's students with a toolbox full of entrepreneurial skills and possibilities?

Not just for them to start their own ventures. Not just to bring their inventions or ideas to market. Not just to generate more homegrown intellectual property assets. Not just to learn to work together in diverse teams to study, tackle, and solve problems. Not just to develop a vast network of like-minded changemakers. Not just because trying and failing might be one of their most important life lessons. Not just for any one reason, but *all* of these reasons.

These days, entrepreneurial mythos is everywhere—from Shopify to Fullscript, the allure is as varied as it is abundant for our current generation of university students. More than ever, post-secondary institutions have an opportunity to help shape a new wave of young leaders, setting them up to be the most entrepreneurial generation in a century. To do so, Canada needs meaningful entrepreneurship strategies to lay the groundwork for life-long entrepreneurial thinking and doing.

That is certainly what our team at the University of Ottawa—uOttawa—is trying to do. While we are a decade deep into #MissionEntrepreneurship, the last five years have brought transformative results and impact. By far the most satisfying part of my role as associate vice-president of innovation, partnerships, and entrepreneurship is spending time with highly motivated, engaged, and trailblazing students in hackathons, pitch competitions, Idea/ Solutions Labs, and particularly in our flagship Startup Garage and its "circuits architecture."

Growing our reach from 400 students to nearly 4,000 over these five years, we are poised for much more. To start, we must do a better job at reaching and engaging the "missing entrepreneur," the group of young leaders who have been historically underserved, underrepresented, and overlooked by traditional entrepreneurship initiatives. That's why we brought all four of Ottawa's post-secondary institutions together earlier this year to intentionally stand up our own regional entrepreneurial network, launching the Capital Entrepreneurship Connection, along with support from 28 partners in the National Capital Region.

uOttawa's eHub team has graduated more than 150 new ventures through Startup Garage over the past 15 years, many going on to thrive locally and globally. Whether being recognized on North Americas' Fast50 list (Noibu), graduating from international accelerator programs (Sugar Coated Technologies), being a world leader in sustainable vertical farming (Growcer), or improved diagnostic imaging (Yellowbird Diagnostics Inc.) our student-founded startups are having a major impact.

Yet just a year ago, the Business Development Bank of Canada reported that this country had less than half the entrepreneurs than it used to. At the same time, the Global Entrepreneurship Monitor—the largest study of entrepreneurship in the world—points to a significant increase in entrepreneurial activity in Canada in the last 10 years. So what gives? On campus, our students clearly have a growing interest and passion for entrepreneurship, and are eager to leverage these skills in a variety of contexts. We are ready to accompany them on their journey no matter how they wish to exemplify what it means to be entrepreneurial.

While we regularly bemoan Canada's dismal record of productivity, and have tried—with best intentions— to apply waves of strategies and programs over the past three decades, maybe we should start by building up future generations of leaders with a sharpened entrepreneurial mindset. Who want to be difference-makers. Who see problem-solving from a much different perspective. Who want to build Canada.

As each new cohort of students interested in exploring entrepreneurship is ever-more sophisticated, our programs and services must evolve to meet their ambitions. Strategies, programs, and incentives are needed. But sometimes, the smallest and simplest contributions have the biggest impact. It also requires long-term thinking, stable investments that outlive political cycles … and patience. Seems that is a big part of the problem today.

Our #MissionEntrepreneurship aims to give every student who wants a taste of entrepreneurship to have the opportunity to do so in their time with us at uOttawa. Let's help inspire and equip the next generation of changemakers to help build a more entrepreneurial, ambitious Canada. uOttawa is hard at work doing just that.

As associate vice-president, Guy Levesque leads the University of Ottawa's #MissionInnovation, which focuses on the creation of transformative partnerships for the institution, drawing on the strengths of partners from all sectors, both local and global.

The Hill Times

Cultivating growth: Canada's bio-economy opportunity

The bio-economy offers a path to more productivity by leveraging our domestic resources, adopting innovative technologies and advanced manufacturing capabilities, and building strong, integrated supply and value chains here at home.

Meaghan Seagrave

Opinion

We must be more than fishers, farmers, and foresters; increasingly, these roles need to be low-carbon feedstock suppliers into other industries. Only then will we begin to see a shift in our productivity, writes Meaghan Seagrave. *Image courtesy of Pixabay*

Canada stands at a crossroads. We can choose to remain a nation of raw material exporters, allowing other nations to benefit from our vast natural resources, or we can embrace the bio-economy and unlock its full potential. We must be more than fishers, farmers, and foresters; increasingly, these roles need to be low-carbon feedstock suppliers into other industries. Only then will we begin to see a shift in our productivity. This focus on aligning supply-chain and value-chains with our manufacturers will also increase their global competitiveness and reduce additional costs and tariffs related to compliance on sustainability, carbon emissions, and transparency in supply chains—all new requirements of our largest trading partners.

This idea of a thriving bio-economy in this country is more than just a sprout, it is a very real possibility and would address the nation's productivity crisis head-on. This is about doing more with what we already have while increasing rural and urban prosperity. Canada's productivity woes are well-documented. Compared to other developed nations, our GDP per hour worked falls short. The good news is we have the tools to turn this around. Our abundant natural resources, renewable energy sources, and established circular economy practices position us perfectly to capitalize on the bioeconomy, and pursue evolving domestic and export markets. This includes housing and construction at home, and growing global markets for lower carbon intensity goods like renewable fuels, greener chemicals, and lightweight aerospace manufacturing.

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Innovation Minister François-Philippe Champagne, pictured on the Hill last May, spends much of his time paying foreign multinationals to locate here and too little time helping to build Canadian successes, writes David Crane, based on Shopify president Harley Finkelstein's recent comments. *The Hill Times photograph by Andrew Meade*

Supporting Canadian entrepreneurs is critical

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solutions" to meet public sector needs.

One of Canada's great challenges is to successfully commercialize new knowledge, yet despite major investments in government seed funding and financing of incubators—along with other incentives for start-ups—we are still struggling to find the right formula. Government procurement is one way.

The United States' Small Business Innovation Research (SBIR) initiative is a helpful model. Since 1982, it has been allocating a set share of external R&D budgets of American government departments and agencies to stimulate commercialization and innovation through contracts to SMEs to develop new technologies to fill currently unmet government needs. Government identifies its new technology needs and entrepreneurs—in return for contracts with upfront cash—attempt to fulfill those needs. In the SBIR process, government ends up being the lead or first customer for promising young businesses.

As a Cambridge University study—*Creating Markets For Things That Don't Exist*—declared a decade ago, "helping entrepreneurs without significant experience or capital to develop and test out their ideas with real customers is vital if we are to create businesses with a commitment to continuing growth in the U.K., rather than temporary R&D subsidiaries for companies headquartered overseas."This applies to Canada, as well.

Policies to increase the supply of R&D are important, from funding for universities to favourable R&D tax incentives for small businesses. But in the early stages of efforts to create and commercialize innovative technologies where no market exists, these policies are not effective. Policies that create customer demand for innovation, such as the SBIR program, offer a better prospect: demand-pull instead of technology-push.

Moreover, heavy reliance on venture capital funding can be counter-productive. While "the best entrepreneurs" want to retain their independence and grow a substantial business, under the typical venture capital model, a profitable sale is the ultimate goal, and this usually means sale to a foreign corporation, with future growth—including wealth creation, exports and jobs—taking place elsewhere.

Any policy that helps put young companies with good ideas on the path to growth deserves priority. The next Canada must be a much more innovative and entrepreneurial nation. An SBIR-type initiative and more creative use of government procurement would be major first steps.

David Crane can be reached at crane@interlog.com.

The Hill Times

Cultivating growth: Canada's bio-economy opportunity

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Challenging foreign policies and increasing regulations offer opportunities that align well with a robust bioeconomy, ensuring Canada's economic stability. Supporting home-grown companies through innovation and leveraging our resource advantage will result in an enviable competitive edge in a global market which is increasingly driven by carbon and sustainability.

The bio-economy also offers a path to increased productivity through a combination of leveraging the foundation of our domestic resources, adopting innovative technologies and advanced manufacturing capabilities, and building strong, integrated supply and value chains here at home.

A focus on technology development, validation, and scaling in sectors like energy, sustainable chemistry, and biotechnology will increase the economic output of our exports, and ensure this country's manufacturing remains in-step with global trends while ensuring market access for our exports.

The automotive sector presents one of many tangible and exciting opportunities for the bioeconomy. By linking the forestry sector's wood residues with the agricultural sector's soy oil, flax and hemp fibres—and even Canada's greener lithium mining—we can create a robust domestic supply chain to support the light-weighted, lower carbon intensity components and needed batteries for the growing electric vehicle manufacturing sector. This approach keeps both the supply and value chains domestic, maximizing economic benefits, while strengthening Canada's position in the global automotive market.

The choice is clear. It's time for all levels of government and private industry to work together to:

• Develop a national bioeconomy strategy with clear goals and timelines;

• Invest in technologies to unlock the full potential of biobased products and processes that transform our manufacturing to unlock greater value;

• Streamline regulations, and create incentives to encourage investment in the bioeconomy and its supply chains; and

• Foster collaboration between industry players across different sectors to build strong, sustainable, and integrated value chains that benefit rural and urban economies.

By taking these steps, we can transform our country into a global leader, creating jobs, boosting productivity, and securing a sustainable economic future while ensuring profits are kept within Canada.

The time to act is now. Let's leverage our strengths, embrace innovation, and work together on cross-industry opportunities to unlock the immense potential of the bioeconomy in increasing Canada's productivity and competitiveness. A brighter, more prosperous nation awaits.

Meaghan Seagrave is executive director of Bioindustrial Innovation Canada.

The Hill Times

UNIVERSITY AND COLLEGE RESEARCH

Vigilance required to bolster 'first steps' in national security measures for university research, says Montreal prof

On Jan. 16, Innovation Minister François-Philippe Champagne announced a set of national security measures intended to protect Canadian research from falling into the hands of foreign entities that represent a security risk. *The Hill Times photograph by Andrew Meade*

McGill University professor Benjamin Fung says 'if the Chinese government really wants to collaborate with a Canadian professor, they can just find another university that is not on that list to initiate the collaboration.' *Photograph courtesy of LinkedIn*

NDP MP Richard Cannings argues Canada doesn't fund research to the same extent as some other countries, and this increases the risk of Canadian researchers being attracted to foreign sources for funding.

BY JESSE CNOCKAERT

Measures implemented by the federal government to help protect Canadian research have helped raise awareness about potential security risks, but researchers must still be on guard against foreign entities trying to circumvent these safeguards, according to a Canada research chair in data mining for cybersecurity.

Benjamin Fung, a Hong Kong-born Canadian professor in the School of Information Studies at McGill University in Montreal, Que., told *The Hill Times* that a set of national security measures announced by Ottawa earlier this year intended to protect Canadian research and technology from falling into the hands of foreign entities that pose potential security risks—such as institutions for China, Russia, and Iran—is a good first step.

On Jan. 16, Innovation Minister François-Philippe Champagne (Saint-Maurice–Champlain, Que.) announced the Policy on Sensitive Technology Research and Affiliations of Concern (STRAC), which lists 11 sensitive technology research areas—such as artificial intelligence (AI), quantum computing, and genetic engineering—as well as a list of more than 100 foreign research organizations and institutions deemed to pose a high risk to Canada's national security because of direct or indirect connections with military, national defence, or state security entities.

As of May 1, all named researchers on a grant application related to research in sensitive technology areas must provide an individual attestation indicating they are not affiliated with or in receipt of funding or in-kind support from any of the named research organizations.

Fung said this list of organizations that pose the highest security risks has been effective at raising awareness among Canadian professors about foreign interference, but it's not sufficient on its own.

"When you talk about whether this is actually effective or not, if the Chinese government really wants to collaborate with a Canadian professor, they can just find another university that is not on that list to initiate the collaboration," he said. "Any sensitive projects related to specific countries like China, Iran, or Russia should be evaluated by the research security office at the university."

> "A top priority has to be for the federal government and the provincial governments to try and work together to avoid duplication, and align the rules they're introducing.
>
> —*Universities Canada president and CEO Gabriel Miller*

In terms of next steps, Fung suggested the federal government could consider preparing a list to inform Canadian researchers about the risk level of companies located within Canada, but which are operated by foreign governments.

"As a professor, we always look for industry collaborations. When we look for that collaboration, we cannot differentiate whether this company is a real Canadian company, or if it is actually indirectly controlled by the Chinese companies or government. This is what we actually need," he said. "Company X approach[es] us. You can give me a very rough category—let's say red, yellow, green in terms of national security risk—this company belongs to. Then, the professor will make a decision at the beginning before we actually formally submit an application."

Along with the STRAC, Champagne also announced in January the creation of the Research Security Centre, which provides guidance and advice to the research community about how to protect research.

Fung is familiar with the recruitment attempts used by the Chinese government from his own personal experience. He said that in 2018, he was approached by a Chinese 5G company about the possibility of him providing consultant services, with an offer to triple his professor's salary if he would only reply to their emails. He said a typical strategy employed by China is called "feed, trap, kill."

"I understand how it works, but usually they will not ask for anything at the beginning, but maybe one or two years later, they will start asking for IP rights or asking the professor to provide some information from other projects," he said. "It's basically using financial benefits or other benefits to attract the target … so one or two years later, the professor will rely on that company to provide the financial support. That's the trapping stage. That's the stage they can make requests."

NDP MP Richard Cannings (South Okanagan–West Kootenay, B.C.), his party's deputy innovation, science, and technology critic and a member of the House Science and Research Committee, told *The Hill Times* that the lists announced by Champagne help to

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Sensitive technology research areas

First announced back in January, the federal government says these 11 "advanced and emerging technologies … are important to Canadian research and development, but may also be of interest to foreign state, state-sponsored, and non-state actors, seeking to misappropriate Canada's technological advantages to our detriment."

1. Advanced digital infrastructure technology
2. Advanced energy technology
3. Advanced materials and manufacturing
4. Advanced sensing and surveillance
5. Advanced weapons
6. Aerospace, space, and satellite technology
7. Artificial intelligence and big data technology
8. Human-machine integration
9. Life science technology
10. Quantum science and technology
11. Robotics and autonomous systems

—Source: Innovation, Science, and Economic Development Canada

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University and College Research Policy Briefing

Vigilance required to bolster 'first steps' in national security measures for university research, says Montreal prof

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clarify for Canadian researchers funded by the federal government "where they can and can't go."

He argued Canada doesn't fund research to the same extent as some other countries, in terms of a percentage of gross domestic product (GDP), and this increases the possibility of Canadian researchers being attracted to foreign sources for more cash.

"It makes it easier for foreign agencies to step in and say, 'hey, we'd like you to do some research on this topic,' and sometimes those researchers aren't even aware of it, or they have a grad student or someone working with them that—unbeknownst to them—is working for a foreign agency," he said. "That's when Canada's security agencies have to step in, and step up to be more actively monitoring these situations. And they are."

According to the Canadian Association of University Teachers, between 2001 and 2020, Canada slipped from a rank of 13th out of 36 Organisation for Economic Co-operation and Development countries to 21st in terms of gross domestic expenditures on research and development.

In 2021, Canada invested just 1.7 per cent of GDP on R&D, compared to the United States at 3.5 per cent, Japan at 3.3 per cent, Germany at 3.1 per cent, and the United Kingdom at 2.9 per cent, according to Research Canada.

"The real risk is when Canada is not funding [research], but let's say, a Chinese government agency is funding it, and that's where the—I think—the real concern is. That issue takes just vigilance on the part of Canadian institutions and Canadian agencies such as [the Canadian Security Intelligence Service] to monitor that," said Cannings.

NDP MP Richard Cannings, right, says a shortage of research funding in Canada 'makes it easier for foreign agencies to step in.' *The Hill Times photograph by Andrew Meade*

To help support research in Canada, the 2024 federal budget, released on April 16, included more than $4.6-billion intended to strengthen research and innovation, including $1.8-billion in new funding for Canada's three core federal granting agencies: the Social Sciences and Humanities Research Council, the Natural Sciences and Engineering Research Council of Canada, and the Canadian Institutes of Health Research.

In 2021-22, the higher education sector in Canada spent $16.6-billion on research and development—an increase of 4.5 per cent from the previous year—and marked the 12th consecutive annual increase in research and development spending by the sector, according to Statistics Canada.

Gabriel Miller, president and CEO of Universities Canada, told *The Hill Times* that the security measures announced by the federal government in January provided "a framework to have a conversation and to take steps in a more co-ordinated way."

"Universities had already been taking many steps to ensure the security of their research, but this helps put the entire country on the same page," he said. "But I think it's really important to acknowledge [that] the risk with any framework is people feel like it's a box that's been checked. It's critically important that we recognize security is much more than just rules. It's the funding to resource the implementation of those rules, but it's also an ongoing engagement and evaluation of these risks, which universities are doing, and dialog about how the framework needs to evolve."

In terms of next steps, Miller said that there is a need for a "coherent, nimble framework" across levels of government within the country, and between Canada and its closest allies.

"A top priority has to be for the federal government and the provincial governments to try and work together to avoid duplication, and align the rules they're introducing. Similarly, with a partner like the United States, we don't want to have duplicate policies buried in bureaucracy. What we want are efficient, targeted, smart frameworks that don't prevent opportunity, but do target the biggest risks," he said. "No. 2 is expanded resources to do the work on the ground in our universities to ensure security … and to meet the federal government security requirements."

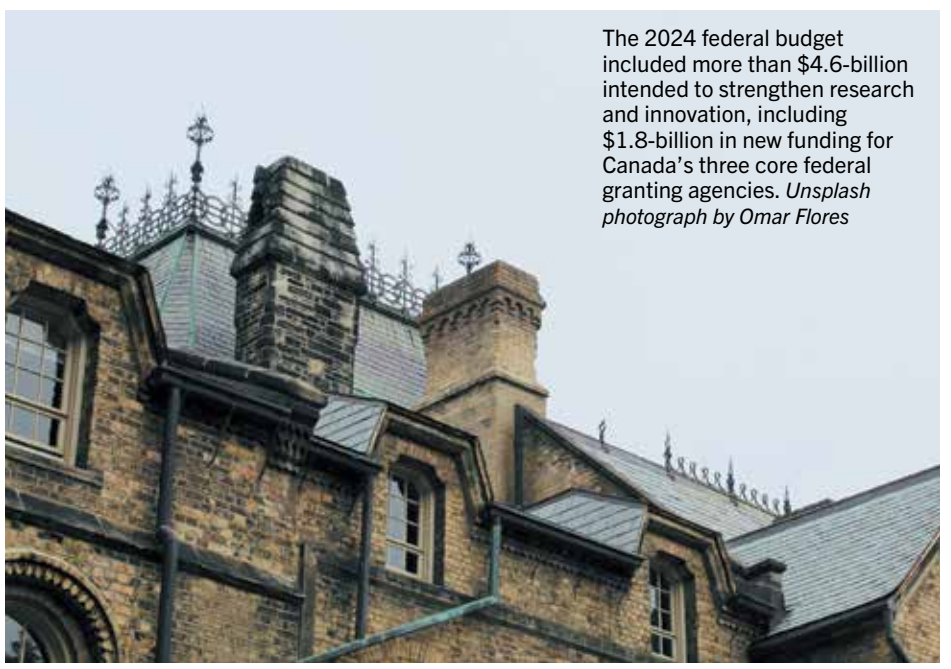
James Hammond, director of public affairs for U15 Canada, told *The Hill Times* that the 2024 federal budget included really significant investments into the research system, but much of that funding is "backdated," which leaves an open question about whether Canadian research is being funded sufficiently in comparison to some of our peer nations.

He said that while the federal government's list helps researchers to navigate where the highest-risk partnerships may lie, it is still important to see further funding flow into those sectors, such as for AI, quantum computing, and biomanufacturing.

"You look at that list, [and] it's really interesting because a lot of those areas are also strategically significant for Canada," he said. "We want to support that, and encourage folks to do research that is as secure as possible, but continues to be well funded and world leading."

U15 Canada's partnership with the federal government on matters of research security have included establishing the Government of Canada–Universities Working Group in 2018, and also informing the STRAC.

jcnockaert@hilltimes.com
The Hill Times



The 2024 federal budget included more than $4.6-billion intended to strengthen research and innovation, including $1.8-billion in new funding for Canada's three core federal granting agencies. *Unsplash photograph by Omar Flores*

Spending on research and development in higher education (2021–22)

- In 2021-22, the higher education sector in Canada spent $16.6-billion on R&D, an increase of 4.5 per cent from the previous year.
- In 2021-22, both the natural sciences and engineering field of research, and the social sciences, humanities, and arts field reached their highest level of R&D spending. Spending in the natural sciences and engineering field rose 5.3 per cent to $12.5-billion, while spending in the social sciences, humanities, and arts field increased 2.1 per cent to $4.1-billion.
- In 2021-22, the growth in R&D expenditures was driven mainly by funding from the higher education sector itself (+$459-million to $8.4-billion), followed by funding from the private non-profit sector (+$227-million to $1.7-billion). Offsetting this growth was a decrease in funding by the federal government, which declined $129 million (-3.1 per cent) to $4-billion. This represents the first decrease in federal funding since 2014-15.
- The largest increases in R&D spending in 2021-22 were observed in Quebec (+$354-million to $4.4 billion), followed by British Columbia (+$133-million to $1.9-billion), and Ontario (+$120-million to $6.6-billion).
- Canada's higher education R&D intensity, measured as R&D expenditures by the higher education sector per nominal GDP, decreased from 0.72 in 2020-21 to 0.66 in 2021-22. Despite this decline, Canada ranked alongside the U.K. as having the highest R&D intensity in the higher education sector among G7 countries.

Source: Spending on research and development in the higher education sector, 2021/2022, released by Statistics Canada on Dec. 1, 2023

Preserving Canada's competitive edge: the need for balanced international student policy

Recent policy changes are damaging our ability to attract the talent we need for the future, pushing universities deeper into deficit, and hurting Canada's ability to compete.

Gabriel Miller

Opinion

Canada has long been a top destination for highly talented international students seeking education and training. Our universities offer high-quality instruction, world-class research, and a welcoming environment. These students go on to contribute to Canada's economy and quality of life.

The federal government's haphazard moves over the last year to cut the number of international student permits threaten this vital part of the Canadian economy. International students enrich classrooms, and help fund Canadian education. Recent policy changes are damaging our ability to attract the talent we need for the future, pushing universities deeper into deficit, and hurting Canada's ability to compete.

The federal government's goal of better managing the number of international student permits is understandable given the need to balance economic and social factors like housing availability, and immigration system capacity. However, achieving this balance does not have to come at the expense of the international talent we need.

Among other benefits, international students help strengthen our research and innovation. Universities play a key role in giving students and researchers the skills to solve big problems like improving agriculture or advancing artificial intelligence. The work done at Canadian universities not only boosts our economy but also makes a difference globally.

In Manitoba, for example, Dr. Mark Belmonte's research on white mould—a major threat to canola crops—is crucial to safeguarding a Canadian agricultural export that is in demand the world over. In Quebec, Dr. Monia Rekik's team at Laval University is developing artificial intelligence algorithms that could endow the 300,000 Canadians who live with Type 1 diabetes with new freedom to live their lives safely and securely.

Beyond their immediate impact, Canada's university research labs also serve as critical training grounds for the next generation of innovators, renewing the pool of highly skilled workforce critical to well-paying jobs, and the increased investment that is essential to Canada's standard and quality of life.

The loss of interest among international students is already evident. Factors like lengthy processing times for study permits, increased financial thresholds, high costs of living in major cities, and the clear message that international students are less welcome in Canada are all driving prospective students to seek alternatives.

These changes and ongoing uncertainty are damaging institutions in Canada and our reputation abroad. The international education system needs time to assess the long-term impact, and adapt to these policies.

Without a correction, the government must get to work repairing Canada's well-earned reputation as a magnet for the world's best and brightest. End the uncertainty, and protect universities from any additional changes that will damage international recruitment.

Immigration Minister Marc Miller. The federal government's haphazard moves over the last year to cut the number of international student permits threaten a vital part of the Canadian economy, writes Gabriel Miller. *The Hill Times photograph by Andrew Meade*

The global competition for talent is fierce, and Canada can't afford to fall behind. We can't afford to turn away global talent, or risk losing out on cutting-edge research and our ability to attract investment.

It's taken decades for Canada to forge its well-deserved reputation as a preferred destination for the best education, training, and opportunity. Let's not squander that with short-sighted "ripped from the headlines" policymaking. We are ready to work with the federal government.

We hope they will start working with us.

Gabriel Miller is the president and CEO of Universities Canada. He is an experienced not-for-profit leader who has built an extensive track record in member relations, advocacy, stakeholder engagement, and public policy development over his 22-year career.

The Hill Times

New capstone agency promises to improve Canada's research enterprise

An overarching agency will improve the current funding system, and help to develop it as a true meritocracy where the best ideas are funded.

Andy Knights

Opinion

Among the welcome news about new university research funding in April's federal budget was a particularly important non-monetary announcement that will improve the way future research is funded.

The federal government is planning to create a new body—a capstone organization—to support Canada's research community in addressing emerging global challenges. It will see our primary funders—the Social Sciences and Humanities Research Council, the Natural Sciences and Engineering Research Council, and the Canadian Institutes of Health Research—operate within the new organization and in co-ordination with the Canada Foundation for Innovation (CFI), which funds public research infrastructure, such as labs and major equipment.

While the granting councils have made significant strides in co-ordinating their advocacy efforts, a more focused viewpoint—particularly when it comes to supporting national priorities—is both necessary and welcome. Details of how the new capstone agency will work are expected with the Fall Economic Statement, but the idea promises to improve Canada's research enterprise.

An overarching agency will improve the current funding system, and help to develop it as a true meritocracy where the best ideas are funded—the ideas that will generate the greatest possible benefit for the greatest number of people. In addition, it will provide clear direction in alignment with governmental priorities, with the potential to serve as a single window for collaborating with international partners.

The plan is for the agency to organize streams of research more efficiently—reducing redundancy while simultaneously improving outcomes—and to employ a deliberate, coherent strategy to address pressing global issues such as the health of our planet, our aging population, and both chronic and infectious diseases.

This approach to research operations can also apply to infrastructure investment. While research proposals already require some consideration for the possibility of duplication, an oversight body will help to minimize those chances.

A central organization can ensure co-ordination across local, regional, and national levels, reducing duplication while facilitating shared access to funded assets beyond the institutions that house them. The CFI's promotion of the concept of Core Research Platforms has already made significant impact along these lines, and the capstone agency can reinforce that strategy.

The overall effect of such enhanced infrastructure management will be to maximize uptime and utilization, ensuring those assets are used as efficiently as possible. Such an approach could enhance the global competitiveness of Canadian industries by providing them greater access to state-of-the-art public infrastructure.

Canada has a new chance to maximize returns on the billions of dollars that CFI invests while helping drive our national socio-economic priorities, uniting us around a "Team Canada" approach to generating research knowledge and boosting its impact.

Ensuring a strong return on public investment is vital. The capstone agency can help improve accountability for research funding. By developing a new approach to the way funding is allocated for key priorities, it can demonstrate that instead of competing with one another for resources, institutions can collaborate to advance Canada's interests.

Without necessarily adopting its centralized model for overseeing research, Canada can take valuable lessons from the United Kingdom's Research Excellence Framework, a comprehensive evaluation system through which funding is predicated on the impact, quality, and significance of research outputs across all academic disciplines.

Canada's umbrella organization can provide valuable, evidence-based feedback on how best to use research dollars to achieve maximum impact.

Ultimately, Canada needs a research funding pipeline that fosters a considered balance between critical, open-ended discovery research and strategic, mission-driven research, efficiently creating a direct, positive impact for Canada.

Creating this capstone organization is a crucial step in the right direction.

Andy Knights is the vice-president, research (acting) at McMaster University where he is responsible for research activities within the university and the aggressive pursuit of partnerships—nationally and internationally—designed to capitalize on McMaster's significant research strengths. A professor of engineering physics and respected entrepreneur, Knights has built a robust research program, and is the founder of a successful McMaster spin-off company.

The Hill Times

Setting Canada's research priorities

As the gathering storm of global challenges intensifies, we will need to improve the performance of our science, technology, and innovation ecosystem to adapt to and manage these risks.

David Watters

Opinion

This past June, Canada's research-intensive universities signed a remarkable document with their counterpart organizations in the United States, the United Kingdom, Germany, Australia, Europe, and Japan called the Berlin Statement.

This joint statement articulates the role of this network of 166 universities "to mobilize knowledge to the benefit of all." It calls upon governments "to work with us and our partners to ensure we can realize the full potential of the distinctive research, innovation and partnerships our universities offer."

Why is this commitment important?

First, because research-intensive universities are at the forefront of developing the talent and new knowledge from research that are needed to anticipate and respond to the cluster of interrelated and interdependent economic, social, environmental, security, and technological risks that are impacting our societies. As the Berlin Statement notes: "Research in all its forms is front and centre in solving local and global problems and achieving human progress. It serves as the foundation for pioneering technologies and solutions and is laying the groundwork for the social and economic well-being of our global community."

Second, Canada's universities continue to play a central institutional role in our national science, technology, and innovation ecosystem, along with governments and the private sector. However, it is becoming increasingly clear, that as the gathering storm of global challenges intensifies—recently characterized as a "polycrisis"—we will need to improve the performance of our national asset—the science, technology, and innovation ecosystem—in order to adapt to and manage these risks. For example, as the Berlin Statement acknowledges: "Recent years have seen rising geopolitical tensions, a global pandemic, mass migrations, clear evidence of climate change, and greater polarization as both opinion and rhetoric pushes more towards extremes. All of this is occurring in a context of rising technologies such as automation and AI, that may replace and reshape many current industries and societies in ways we don't yet fully understand."

In this regard, as the Berlin document notes, "As the world confronts increasing challenges, our universities are working relentlessly to develop solutions."

But how might this commitment be implemented in Canada?

One important way to achieve this is for the Canadian signatory schools (the U15) to establish a process through this network of 166 research intensive universities to conduct an annual assessment of the global trends in research and technology development.

Then, on the basis of this global assessment, the U15 should partner with Innovation, Science and Economic Development Canada to establish an annual domestic process that examines the implications of these research and technology trends on our institutions and the public, culminating in an annual briefing of the federal cabinet. The annual process could be structured in four phases:

1. Academic institutions: an assessment by the U15, Universities Canada, and our colleges to summarize the domestic implications of these global research and technology trends.

2. Business: an examination of the implications of these global trends by the country's private sector, particularly through major associations like the Business Council of Canada, the Chamber of Commerce, the Canadian Manufacturers and Exporters Association, and the Canadian Federation of Independent Business, etc.

3. Federal government: a review by the 13 federal science-based departments and agencies of these global trends, the academic and business assessments noted above, and a determination of the implications for the roles of governments.

4. Cabinet: building on these three previous steps, present an annual briefing to the federal cabinet on the state of global research and technology development, and the implications for Canada to help identify research and technology priorities, investment opportunities, and new national policy priorities in the context of federal budgets.

In summary, this important initiative—to be led by the U15—offers a rare and valuable opportunity for Canadians to not only anticipate their future, but also to help shape it. In a world where research and technology are the drivers of economic, social, and environmental progress, we cannot afford to sit on the sidelines. Canadians must take an active role in assessing global developments, understanding their implications for our country, and making the strategic decisions needed to improve our prosperity and security through the mobilization of new knowledge, talent, and technology.

The future will not wait, and neither should Canada.

David Watters is a former assistant deputy minister for economic development and corporate finance in the Department of Finance, the founder and former CEO of the Global Advantage Consulting Group, and the founder and current president of the not-for-profit Institute for Collaborative Innovation.

The Hill Times

Canada's research ecosystem must drive impact

Pari Johnston

Opinion

Canada's research and innovation landscape is ready for an overhaul. For years, our public research and development spending has trailed behind other G7 and Organisation for Economic Co-operation and Development countries, and our track record in business innovation is sub-par. That means we're missing out on realizing the full benefits of our research right here at home.

But here's the good news: change is on the horizon. Last year's report on the federal research support system—the Bouchard Report—made it clear that many of us in Canada's research ecosystem need to reflect with purpose on what we're trying to achieve. More recently, federal investments and the ongoing work to set up a new capstone research funding organization indicate a promising shift to a more strategic, multi- and interdisciplinary approach that mobilizes our research and innovation ecosystem to address the country's—and the world's—most-pressing challenges.

It's more important than ever that we reimagine our approach to meeting policy challenges and driving impact via our research ecosystem—and Canada's colleges and institutes are uniquely placed to do so.

In 2021-2022, our sector worked on more than 8,000 applied research projects resulting in 6,500 new processes, products, and prototypes in areas like housing construction and advanced manufacturing, climate-smart agriculture and food production, and social innovation. That means things like developing a new prototype that can help a local business reduce waste, or testing the efficiency of a new insulated panel that can be used in modular housing construction. These are the real results that make Canadian businesses more efficient, competitive, and productive.

College and institute applied research is partner- and problem-driven innovation. Our cues come from the communities we serve, leading to on-the-ground impact, and improved technology adoption, adaptation, and integration.

With 80 per cent of projects completed in less than a year, it's also innovation at the "speed of business." And—importantly—with college-led research, 98 per cent of industry partners are in Canada and keep their intellectual property

The numbers tell us half the story. The other half is about how the impact, relevance, and reach of college and institute research translate into real benefits for Canadians, and for the long-term sustainability of our domestic industry.

I am glad the Bouchard Report, the development of a new the capstone research organization, and new partnership opportunities with Horizon Europe have brought mission-driven research back into focus, and—looking forward—I'm optimistic about the effect we can achieve.

Still, the college and institute sector currently only receives 2.9 per cent of federal research funding from Tri-Council agencies. And many federal research programs—either in terms of institutional eligibility, funding restrictions, or the process by which successful applicants are determined—are not adequately attuned to the college and institute reality. That needs to be changed if we want to leverage the full potential of college applied research and maximize the impact of federal research dollars.

Innovation policy thinkers have advocated for a challenge-driven industrial strategy for Canada, and I think we need to also embrace a challenge-driven research approach to support this agenda. That means a fresh look at the role, value-add, capacities, and connections of all research ecosystem partners to focus our efforts and resources on solving practical challenges facing communities, regions, and our country. This is precisely what colleges and institutes do best.

The future of Canada's research ecosystem must also support historically excluded groups in conducting impact-oriented research. Challenge-driven research that capitalizes on college and institute applied research expertise, their networks of partners across sectors, and state-of-the-art facilities can—*and should*—be positioned as one of Canada's strongest motors for innovation by thinking purposefully about funding.

With a demand-driven approach, an ethos of collaboration, and expertise in knowledge translation and technology uptake by local industry partners, we can drive greater downstream impact of a challenge-driven research agenda in areas like housing, economic diversification in traditional sectors, and innovative manufacturing.

The country's research ecosystem must be reimagined and redesigned in a way that drives impact for Canadians and their businesses. The way to get there is through colleges and institutes.

Pari Johnston is president and CEO of Colleges and Institutes Canada. A dynamic senior executive with 25 years of experience driving the transformative impact of Canada's skills, research, and innovation ecosystem for the benefit of Canadians, she is a recognized national post-secondary leader who builds strong and healthy organizational cultures while delivering results.

The Hill Times

Ontario's health-care system is putting Métis lives at risk—it's time governments invest in research to influence meaningful change

If Canada is serious about its path towards reconciliation, Métis people and our unique perspectives must be acknowledged and recognized so that colonization is not perpetuated in our communities via life-threatening health outcomes, writes Sabastian Koprich. *Pexels photograph by Thirdman*

Public policymakers and researchers need timely information that reflects the health-care needs of the Métis population.

Sabastian Koprich

Opinion

What does it mean to be Indigenous today? As a young Métis person, I've learned it is vastly different than the experiences of my Métis ancestors who—despite living notably long lives—faced discrimination, displacement, and dispossession from the lands they called home. Canada is now waking up to these experiences, and their unique legacy within Métis communities. Today, I carry the responsibility to learn and connect to the teachings of my ancestors, and how their ways of knowing support my research in public health as I work to undo the harms of the past.

That does not mean that marginalization towards Métis people no longer exists. It means there is greater opportunity to act and build on years of social progress by examining the ways in which colonization remains entrenched in some of this country's major institutions. Recent research published in the *Canadian Journal of Cardiology Open*, for example, shows how incidents of heart failure have increased steadily amongst Métis populations from 2012 to 2020. This is especially true for Métis men, among whom rates of heart failure increased by 47 per cent. Cases of chronically high blood pressure—a risk factor for heart failure—also increased by nine per cent generally. For Métis seniors over the age of 65 years, the increase was 107 per cent. The data also tells us that, as of 2020, three in 10 Métis Nation of Ontario citizens are diagnosed with hypertension.

If Canada is serious about its path towards reconciliation, Métis people and our unique perspectives must be acknowledged and recognized so that colonization is not perpetuated in our communities via life-threatening health outcomes. Heart disease, as a primary example, remains the second leading cause of death in Canada. Other studies tell us that depression and anxiety, diabetes, osteoarthritis, and poor vision often emerge in tandem with cardiovascular illness. And for Métis patients with heart disease who do not have reliable and equitable access to health care—a reality that is statistically more prevalent for Indigenous populations—it is not reasonable to expect they will be able to live a full, healthy life the way our ancestors did before us.

The way to move forward begins with evaluating the current system and its shortcomings. To do that, federal and provincial governments must invest in distinction-based—including Métis-specific—research. Public policymakers and researchers need timely information that reflects the health-care needs of the Métis population, the current barriers we face, and the larger implications of rising incidents to help guide changes for care and treatment. The fact the second-most recent study on cardiovascular health of Métis citizens in Ontario was conducted more than a decade ago demonstrates how underprioritized and underfunded research is on Métis health. More studies will close knowledge gaps, and allow policymakers to understand what is required to improve health care and how it can be better aligned with Métis teachings, way of life, and holistic values around health and wellness.

To make these investments worthwhile, and ensure there is a solid foundation of data for public policy, there must be genuine collaboration between academia, Indigenous communities, and governments throughout every research stage. When study findings are available, it will be critical that they are actioned by our elected officials—Canadian and Indigenous.

The work required to make progress will not be easy, but I believe it is possible. It was not too long ago when Métis people and culture were stigmatized, and efforts were so forcefully aimed to displace the Métis communities and erode our way of life. At the same time, historic records state many of my ancestors—removed from Drummond Island in the 1800s—lived well into their 80s and 90s, and remained grounded in their way of life. I carry both of these realities, and see the potential for a future where our Métis communities can access the health services they deserve to live full, healthy lives as our ancestors before us.

Sabastian Koprich lives in Toronto on the Williams Treaties and Treaty 13 territories. He is currently pursuing a master's in public health with a specialization in Indigenous health at the University of Toronto, and plays an active role advising the Health and Wellness Department and Métis Languages Advisory team at the Métis Nation of Ontario.

The Hill Times

Digital research infrastructure is the key to the future success of Canada's research ecosystem

We must build a truly pan-Canadian digital research infrastructure that enables revolutionary artificial intelligence developments.

Chad Gaffield

Opinion

Canada is facing a turbulent, uncertain, and competitive world in which leading countries are increasingly relying on knowledge, understanding, and innovation.

In the context of shifting geopolitics and increased economic tensions, questions about how to ensure Canada's security, political sovereignty, and quality of life are centre stage in policy debates. These questions are focusing attention on the emerging and redefined collaboration of "machines and minds." In leading countries, communities increasingly depend on highly qualified talent with advanced digital literacies.

Jobs involving routine operations that can be automated are at greater risk than ever. However, new emerging occupations will increasingly call for high-level competencies to perform work that requires sound judgment, awareness of alternative approaches, and critical abilities to deal with complexity and non-standard requirements.

In this context, the role of research-intensive universities in responding to secure a more prosperous and resilient future has never been more important.

Fortunately for Canada, Budget 2024 included notable investments into Canada's research ecosystem. This will support our best minds with funding and infrastructure to advance their ideas and develop solutions for today and tomorrow. Funding will primarily flow to the next-generation of talent, not only through long-overdue increases

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Canada needs a roadmap for research

We will only be able to weigh the risks of action or inaction when we have sufficient knowledge, writes Roseann O'Reilly Runte. *Unsplash photograph by Annie Spratt*

Let's agree on our priorities, and invest in research to develop the talent pool we will need in the years ahead.

Roseann O'Reilly Runte

Opinion

Two of the world's top experts in physics, computational, and geoengineering returned to Canada this week to discuss the question of the environment. They agreed that progress in decreasing emissions has been made by reducing emissions, capturing carbon, and by using wind, water, and solar power. They also concluded that this is not sufficient to remediate previous damage accumulated over time.

A major challenge remains and requires a bold solution: perhaps nuclear fusion, perhaps solar geoengineering. We need to research these fields with seriousness of purpose. We will only be able to weigh the risks of action or inaction when we have sufficient knowledge. Both experts—Ross Koningstein, a climate and energy researcher with Google, and David Keith, the founding faculty director of the Climate Systems Engineering initiative at the University of Chicago—are certain that we owe it to ourselves and to future generations to pursue research on these topics. It is a question of life and death.

Today, the environment is one of many grand challenges we face. We know that solutions can be found through research, but we cannot possibly do everything. How do we set priorities?

As I was completing my term as president and CEO of the Canada Foundation for Innovation, I sought the advice of more than 60 experts to help identify areas of excellence, our resources and needs, areas where we can shine internationally, and the contributions we can make to the health and well-being of Canadians, the economy, and the environment.

They agreed on the importance of engaging in a national conversation about the future of research and its benefits to Canadians. This included the idea that our best resource is our people. First and foremost, we must respect the rights, needs, and contributions of the First Nations, Inuit, and Métis people. Then—knowing that an educated population will attract industry, create jobs, and support communities—we need to continue investing in the development of a critical mass of talent.

We need sustenance, and Canada has been known as the world's bread basket. Yet with climate change, fields are subject to floods and droughts. As the growing period changes, we may look at northern agriculture, vertical farming, and the development of plants that are resistant to disease. Agricultural research will enable the innovative farmers of Canada to support both our health and the economy.

Our forests and oceans and the precious minerals beneath our land are potential sources of wealth, but require research to develop sustainable processes of extraction and development. Canada continues to be a leader here. However, when it comes to our natural resources, we must also concentrate our efforts on developing the means to make positive contributions to our environment and the economy.

We must protect and develop Canada's North. At a time when other nations

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As the global demand for AI computing power soars, Canada's lack of sovereign compute capacity is having a real impact on researchers who are unable to access sufficient resources to perform their work, writes Chad Gaffield. *Unsplash photograph by BoliviaInteligente*

Digital research infrastructure is the key to the future success of Canada's research ecosystem

Continued from page 22

to graduate scholarships and post-doctoral fellowships, but also through core research grants which indirectly provide financial support to more than 75,000 graduate students each year.

U15 Canada welcomed these investments. Budget 2024 will help reverse a troubling stagnation in federal support for science, which saw a decline in spending by more than 15 per cent in real terms from 2020 to 2022. Delivering on the five-year roadmap for research and talent development outlined in Budget 2024 must be a continued priority for future governments as Canada navigates an increasingly turbulent and competitive world.

To enable and optimize these investments, we must build a truly pan-Canadian digital research infrastructure that enables artificial intelligence developments which are revolutionizing the potential to realize new breakthroughs, and undertake complex new research. Despite intense global competitive pressure, Canada has major advantages. We are home to three per cent of the world's top-tier AI researchers, and rank first in the G7 per capita for scholarly output.

Canada is also globally well-positioned to lead in the appropriate application of this technology. As stated in the *Montreal Declaration on Responsible AI* in 2018, the application and use of artificial intelligence systems should respect seven core values: well-being, autonomy, justice, privacy, knowledge, democracy, and responsibility. More recently, U15 Canada published *Navigating AI in Teaching and Learning* that similarly highlights principles and values for appropriate use.

The federal government has increasingly recognized the possibilities of digitally enabled research. Budget 2024 included more than $2-billion towards a new AI Compute Access Fund to respond to demands for more compute capacity. It also reinvested in CANARIE, which will allow researchers to remain connected on ultra high-speed networks. This builds on the existing pan-Canadian AI Strategy, and the work of the three national AI institutes and the Canadian Institute for Advanced Research.

These investments are crucial because Canada lags significantly behind the computing capabilities of our peers; even when adjusting for population and economic size, our country ranks last in the G7 for compute performance.

As demand across the globe for AI computing power soars, this lack of sovereign compute capacity is having a real impact on researchers who are unable to access sufficient resources to perform their work. Moreover, AI is resulting in increasing demand for robust data management, storage, and advanced computing capacity.

There are also justified concerns about access, data storage, and privacy as we seek to protect Canadian sovereignty. At present, only 15 per cent of Canada's academic researchers have access to one of the country's national host sites. To complement current capacity and access, the need for renewed and enhanced funding for the Digital Research Alliance of Canada during 2025-30 is top of the agenda for Budget 2025.

The key is to implement these investments—including the AI Compute Access Fund—in ways that make the whole greater than the sum of the parts. We have a unique opportunity to build a robust pan-Canadian digital research infrastructure that can accelerate leading developments while also ensuring data management, access, sovereignty, and continuous improvement.

Seizing this opportunity for truly digitally enabled research will help in expected and unexpected ways for the benefit of all.

Dr. Chad Gaffield has served as chief executive officer of U15 Canada since April 2022. He has previously served in many leadership positions including as president of the Canadian Historical Association, and president of the Humanities and Social Sciences Federation of Canada. Appointed by Order in Council, he served as president and CEO of the Social Sciences and Humanities Research Council of Canada (2006-2014), and was elected president of the Royal Society of Canada (2017-2019). He was appointed an officer of the Order of Canada in 2017.

The Hill Times

Canada needs a roadmap for research

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are looking at our waters as new routes for transportation, the wealth of minerals beneath the ocean floor, and the fragile stocks of fish and wildlife, Canada must step up and strongly develop—in partnership with people of the North—research programs that will protect the people and their culture, the land and its riches, and our fragile coastline.

As we tackle all these challenges, it opens new opportunities for Canada to excel. For example, we need more data storage, classification, and means of access and treatment. We know that Canada is third in the world for data storage, and we might accommodate more. If we invest in the development our data expertise and the training of technical staff, we will create employment in a promising field. If data is fundamental to the acquisition of knowledge, and data storage is the new library, Canada could be one of the world's most important libraries and have a resource that will grow, not diminish.

We must support brilliant research in emerging fields like artificial intelligence and quantum, precision medicine, physics, and photonics, and be open to the next big idea that will inspire hope for the future.

Determining our priorities and investing in research will not only enable us to develop the talent pool we will need in the years ahead, but will also assure the health and wealth of future generations and immediately bolster the economic outlook and our chances of success.

Roseann O'Reilly Runte is completing her term as president and CEO of the Canada Foundation for Innovation at the end of September, and is author of Canadians Who Innovate: the Trailblazers and Ideas that are Changing the World.

The Hill Times

Policy Briefing
University and College Research

Research partnerships are key to Canada's net-zero economic future

When you bring together the right people, you push the boundaries of innovation.

Bill Flanagan

Opinion

Canada and 140 other countries have committed to achieving net-zero emissions by 2050. Research and collaboration are critical to achieving these targets while meeting the global need for affordable and reliable energy. It's an ambitious goal, but at the University of Alberta, we understand energy, and we understand innovation. After more than a century of energy breakthroughs, we have learned the key to success: when you bring together the right people, you push the boundaries of innovation.

The University of Alberta has launched a major research project to develop and scale the technologies Canada will need to meet its net-zero target: Canadian Net-Zero Energy Solutions (CANZES). This Alberta-based project brings together academia, industry, and government to advance the solutions that will reduce carbon dioxide emissions and diversify the economy. Rather than tackling these challenges through isolated projects, CANZES prioritizes partnerships and seeks comprehensive, integrated solutions in complementary areas.

This initiative advances research in five key areas: 1) hydrogen; 2) carbon capture, utilization and storage; 3) critical minerals; 4) resilient electrical grids for sustainable energy and zero-emissions vehicles; and, 5) land and water reclamation. These collective efforts foster the innovations that will address environmental, technological, economic, and social challenges while meeting Canada's net-zero emissions goals.

Every advance can move us closer to a net-zero future, but success requires a sustained and co-ordinated effort from all levels of government, industry partners, and academic leaders.

Alberta's long record of energy research and innovation makes it the ideal setting to move forward emerging energy opportunities. Dr. Amit Kumar is opening Canada up to the global hydrogen market—predicted to be at $1.9-trillion by 2050—by blending hydrogen with natural gas without any costly changes to existing infrastructure. At the same time, Dr. Dan Alessi is addressing the lithium supply gap by extracting the valuable metal from oilfield brines, and Dr. Ryan Li's work will strengthen Canada's grid against the effects of climate change such as blackouts caused by floods or wildfires.

With more than $100-million in initial partner commitments and growing, CANZES is responding to industry demands for affordable, scalable, and practical solutions to speed up the shift to net-zero energy solutions and processes.

The U of A has a strong history of turning research into real-world solutions, helping to launch more than 125 companies in the past five years. Combined with strong industry partnerships and close ties with Alberta Innovates, PrairiesCan, and Mitacs, the university is uniquely positioned to apply the innovations emerging from CANZES to real-world challenges. Our industry partners—including Capital Power, TOTALEnergies, and EPCOR—have already made significant financial commitments to CANZES. With their support—and the support of federal and provincial funding—we can pursue collaborative research, workshops, professional development, student internships, and technology initiatives.

However, achieving the ambitious goals of CANZES requires continued financial support from federal and provincial governments, alongside industry and nonprofit partners. With this backing, CANZES can continue to build on Canada's existing innovation ecosystem, train new talent, and scale technologies from lab prototypes to fully realized solutions. This includes the development of hydrogen fuel cells, materials for CO2 and direct air capture, lithium-ion batteries, remote electric power microgrids, renewable energy and battery storage, clean fuels, and nature-based solutions for land and water remediation and reclamation.

CANZES helps make these net-zero solutions accessible to companies and communities that might otherwise hesitate to invest due to high upfront costs.

Securing a sustainable future demands collaboration, expertise, and sustained funding. By backing these projects, Canada can move faster to become a world leader in the race to net zero, ensuring that our economic growth, environmetal stewardship, and innovation will together create lasting benefits for generations.

Bill Flanagan became the 14th president and vice-chancellor of the University of Alberta in July 2020. Born and raised in Alberta, he has been recognized for his transformative and entrepreneurial leadership. As soon as he was appointed, Flanagan launched the largest and most ambitious program of academic and administrative restructuring ever undertaken by a Canadian university. With a vision for the University of Alberta for Tomorrow, he set the goal of turning the university's acute financial pressures into a strategic transformation, repositioning the U of A for long-term success.

The Hill Times

The Hill Times Policy Briefing | February 14, 2024

HEALTH

And much more...

Fixing health system flaws requires better data sharing and workforce strategies, say health-care experts

Improving data accessibility and ways to facilitate co-ordinated care, and reducing the administrative labour for health practitioners are among the recommendations in a new C.D. Howe Institute and HealthCareCAN report.

BY JESSE CNOCKAERT

Health Minister Mark Holland says 'without a sustained and efficient workforce, Canadians cannot access the care they need, when they need it.' *The Hill Times photograph by Andrew Meade*

Canada's health-care system is in "crisis," with reforms needed that go beyond additional funding, such as addressing human resource difficulties and improving data accessibility, according to health-care experts.

"One of the big pieces that's missing is both quality metrics about the health-care system that are comparable and meaningful to patients, as well as health-outcomes information that can really empower policymakers and researchers to see what the effects of a policy change are," said Rosalie Wyonch, a senior policy analyst who leads the C.D. Howe Institute's Health Policy Council and Research Initiative. "If we don't know what the results of a change are with certainty, then you're kind of trying to innovate in the dark. You have to be able to see the results of your experiment to know if it was a success … or whether you need to adjust."

Challenges facing the health-care system include a lack of access to primary care for many Canadians, strained resources, and health-care professionals experiencing burnout following the COVID-19 pandemic, according to a report released on Feb.7 by the C.D. Howe Institute and HealthCareCAN. The report details the input provided by health-care experts from the private and public sectors during a conference to discuss the factors holding back health outcomes in Canada, held on Nov. 2, 2023, in Toronto.

"Leftover from the pandemic, we are still in the process of addressing the shortcomings in seniors care, and the population does continue to age. It's difficult to find an area that you would call not a priority for health care," said Wyonch in an interview with *The Hill Times*. "I'll say that there was broad consensus among the attendees and presenters that simple infusions of funding is not likely to solve … many of our problems, and much more fundamental reform of the health-care system is going to be needed."

Finding ways to improve data accessibility and facilitate more co-ordinated care and reduce the administrative labour for health practitioners were among the recommendations put forward during the event.

Health data sharing was also identified as a challenge in Canada in a report sponsored by the Public Health Agency of Canada and released by the Council of Canadian Academies (CCA) on Oct. 19, 2023. Health data sharing in Canada is less about overcoming technical hurdles, and more of a cultural challenge, according to the CCA report. It said that concerns about potential breaches of privacy and cybersecurity, as well as stigmatization of data-sharing technologies, are holding back its implementation.

"Depending on the province, [a health-care provider] may have no information about different specialists' waitlists, for example. There might be someone with a two-month wait or a 12-month wait, but your primary care physician doesn't have that information when referring you. Similarly, if your primary care physician ordered tests, those results won't necessarily be available to the specialists," said Wyonch. "All of this wastes time and resources where they need to communicate this information or reorder the tests."

Health-care professionals predominantly rely on resources such as Canada Health Infoway or the Canadian Institute for Health Information (CIHI) to collect statistical information, according to Wyonch.

"We don't have abundant sources of information regarding patient outcomes, quality metrics, even population health data can be difficult to get," she said. "The federal government can potentially, through the bilateral agreements, get more data inflows from the provinces. I think these agencies have a role to play in standardizing certain data across the country so that we can actually do meaningful comparisons and understand the impacts of policy."

During the December conference, speakers also discussed staffing shortage issues, and offered recommendations such as implementing pan-Canadian medical licensure to allow health-care professionals to practice across provincial and territorial borders, and finding ways to reduce administrative burdens.

To help address these problems, Health Minister Mark Holland (Ajax, Ont.) announced the launch of Health Workforce Canada on Dec. 6. The organization's mandate includes working with CIHI and other health-care system stakeholders to improve the collection and sharing of health workforce data.

"Without a sustained and efficient workforce, Canadians cannot access the care they need, when they need it. Health Workforce Canada will help us better understand the root causes of health workforce issues by understanding data gaps and supporting planning efforts for the future. A pan-Canadian approach to these challenges will support all levels of government, partners and stakeholders, which will improve health outcomes for Canadians," said Holland in a Health Canada press release.

Michael Gardam, board chair of HealthCareCAN and CEO at Health PEI, told *The Hill Times* that Canadians' pride in the health-care system has been shattered over the last 20 years.

"I think Canadians feel they can't have access to health care anymore, and the data bears that out. It's very hard for people to access primary care. The emergency departments are overwhelmed partially because of not being able to access primary care. Our hospitals are overwhelmed," he said. "We're in this perfect storm of health human resource shortages. The ones that are left are burned out, the population is aging, [and] our infrastructure hasn't kept up."

Gardam said that improving Canada's health sector is a challenge in part because of how health-care responsibilities are divided across different regions. Instead of having a national plan, Canada has 13 provincial and territorial health-care insurance plans.

"It's one of the great handicaps that the Canadian health-care system has. Because it's a provincial responsibility, provinces want to do their own thing, [and] the territories do their own thing," he said.

In regard to Holland, Gardam said he's been impressed with how the health minister acknowledged that reforms to health care will be about more than money.

"What it's going to require is somebody who can pull different opinions together, and be a leader

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Rosalie Wyonch, a senior policy analyst at the C.D. Howe Institute, says 'it's difficult to find an area that you would call not a priority for health care.' *Photograph courtesy of Rosalie Wyonch*

HealthCareCAN board chair Michael Gardam says 'we're in this perfect storm of health human resource shortages.' *Photograph courtesy of Michael Gardam*

Prof. Samira Abbasgholizadeh-Rahimi says AI tools can be useful in health-care systems. *Photograph courtesy of Samira Abbasgholizadeh-Rahimi*

UofT professor Rahul Krishnan says one of the key challenges to overcome is how to create incentives for hospitals to bring health-care data back into 'a unified view.' *Photograph courtesy of Rahul Krishnan*

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to lead them through what needs to be a serious health transformation. I don't know [Holland] well enough to know if he's able or willing to do that. I also think there's a huge political risk in doing that," said Gardam. "Ministers aren't always free to do what they think is necessarily the best thing to do, because in the end, in Canada, it comes down to politics when we talk about health care."

Gardam said it's time to get serious about health-care reform, and Canada has fallen behind in terms of health research.

"If you go wander the street and you ask your average Canadian, 'is health research the most important thing in your life?' The answer is going to be 'no,' right? Yet, that's our investment in the future," said Gardam. "The Canada of yesteryear, where we discovered insulin, and we discovered stem cells … all those things are at risk now because the funding has not kept up to any other developed country, and so we're starting to lose people to the United States."

Samira Abbasgholizadeh-Rahimi, an assistant professor in the department of family medicine and Canada Research Chair in Advanced Digital Primary Health Care at McGill University, told *The Hill Times* the federal government could play a role in implementing regulations aimed at ensuring artificial intelligence (AI) systems are properly developed and integrated into the health-care system.

"I can say we are in the area that our health-care system is still using fax machines. In order to shift into a smartphone area, and in order to shift to an AI area, we have to think about modernizing this health-care system," she said. "Its uses could be very impactful if we can properly integrate AI in our health-care systems for data management, for diagnosis and prediction of different disease, for personalizing medicine, [and] for personalizing treatment plans."

Rahimi said there are a lot of regulatory barriers from governments and ministries in terms of data collection or algorithm development.

"The first step [towards] the implementation of these AI systems, or even advanced digital health technologies in real practice, is to conduct research on that, pilot test it, and then conduct research on the implementation side of it, and then implement it," she said. "There needs to be investment … from the government side for AI health research, and regulations with regard to responsible use of AI for sure."

Rahul Krishnan, an assistant professor in the department of computer science and medicine at the University of Toronto, told *The Hill Times* that one of the big challenges facing researchers is that health data is "siloed," in part because of how medicine has bifurcated into specialized disciplines, such as radiology, oncology, and pathology.

"The department of pathology is where the pathology data is, [and] the department of laboratory medicine is where the clinical values and the lab measurements are housed, and so this bifurcation was useful up until we decided that we could actually make use of the clinical data to start making predictions about a patient," he said. "I think one of the key challenges that we have to overcome is: how do we create incentives for hospitals to really bring back this data into a unified view?"

Krishnan said that all parties involved in health care—including the federal government, the provincial and territorial governments, and the hospital system—need to create "a unified system of data where we now have a patient-centric view." The federal government could partly facilitate that through investment in research and development, he said.

"Continuing to push for investment in that space so that we can better support grad students and postdocs—who are pretty much the lifeblood of research and innovation here—is, in my opinion, one of the key ways to support it," he said. "There's this question of how we make sure that data is being used to drive better outcomes, and I think … to start with a provincial strategy, and perhaps in the future move towards a national health-care data strategy will be a really critical way by which, I think, the federal government could improve the ability for researchers such as myself to think about building and deploying models, as well as testing the utility out for all Canadians."

jcnockaert@hilltimes.com
The Hill Times

Health-care provider access statistics

- While 85.5 per cent of Canadians living in the provinces had a regular health-care provider in 2021, a total of 14.4 per cent of Canadians (4.7 million people) did not.
- Lower proportions of bisexual or pansexual Canadians (77.4 per cent) reported having a regular health-care provider, compared with heterosexual Canadians (85.6 per cent).
- Lower proportions of First Nations people living off reserve (81.2 per cent) reported having a regular health-care provider, compared with non-Indigenous Canadians (85.7 per cent).
- Having a regular provider also varied across racialized groups, from 71.7 per cent among Latin American people, to 89.8 per cent among Filipino people.
- In 2021, almost 2.5 million Canadians had unmet health-care needs, meaning they felt that they needed health care in the past 12 months, but did not receive it. Unmet health-care needs were more prevalent in the Atlantic provinces (10.7 per cent), compared with the rest of Canada. More females (8.9 per cent) than males (6.9 per cent) reported unmet health-care needs.
- Population aging and the increasing prevalence of some chronic conditions mean that the need for home-care services is growing. In 2021, a total of 3.2 per cent of Canadians used home-care services, and 1.6 per cent had unmet home-care needs. Canadians with the lowest household incomes used home-care services more (6.2 per cent), and had more unmet home-care needs (3.3 per cent), compared with Canadians with the highest household incomes (2.2 per cent used home care services; 0.5 per cent had unmet home-care needs).

—Source: Health of Canadians report, released on Sept. 13, 2023, by Statistics Canada

Federal budget health measures (2023)

- In the 2023 federal budget, the Liberal government announced an additional $195.8-billion in health transfers over the next 10 years, including $46.2-billion through new Canada Health Transfer (CHT) measures.
- The funding envelope included an immediate and unconditional $2-billion top-up to the CHT to all provinces and territories to address immediate pressures on the health-care system.
- The federal government promised $25-billion over 10 years through a new set of bilateral agreements to address individual provincial and territorial health system needs, such as expanding access to family health services, supporting health workers and reducing backlogs, increasing mental health and substance use support, and modernizing health systems.
- The federal government also promised $505-million over five years, starting in 2023-24, to the Canadian Institute for Health Information, Canada Health Infoway, and other federal data partners, so they may work with provinces and territories to develop new health data indicators, support the creation of a Centre of Excellence on health worker data, advance digital health tools and an interoperability roadmap, and support provincial and territorial efforts to use data to improve the safety and quality of health care.

—Source: A Made-in-Canada Plan, released on March 8, 2023

Solutions exist, but only if leaders are willing to listen to health-care professionals

Experts have offered a range of explanations for the current crises with actionable solutions, and if we listened to them, we could have been on our front foot, proactively planning and properly resourcing.

Liberal MP
Jenica Atwin

Opinion

Health care is the dominant issue constituents raise in every conversation with me, and it is referenced in some form or another in nearly every meeting I take.

When the problems with our system are so pervasive, where do I even begin to address them? Do I start with a jurisdictional discussion? With funding models? Do I highlight the glaring gaps in Indigenous health? Or the crisis in mental health and addictions? Do I focus on the long-fought battle for reproductive rights in my home community? Or how about lack of access and expertise in trans and gender-affirming health, especially considering recent attacks on these elements of care?

How about the serious shortage of family doctors, bottlenecks, wait lists, and hallway medicine, with ERs—like the one in my city—at 360 per cent capacity? The issues with foreign credential accreditation, staff burnout, recruitment, and retention? Thinking about the compounding crises in our current system of health care has become overwhelming and, frankly, distressing. Canada is a nation that prides itself on our universal public health-care system, and its distinct advantages over the system of our neighbours to the south, so how did we find ourselves in such a time of crisis?

In my many conversations with health-care providers, unions, and medical societies with administrators, physicians, nurses, pharmacists, and beyond, the experts offer a range of explanations with actionable solutions. The vast majority have pointed to a serious lack of data collection, and an unwillingness to listen to the people on the front lines. Perhaps we could have seen this cliff approaching if we were properly tracking services, if we were mapping policy impacts, population growth, distinctions-based information, and other trends. Even with the vast differences across provinces and territories, we could have been better prepared for the tsunami that characterizes our current reality. We could have been on our front foot, proactively planning and properly resourcing. We may have also been able to protect our health-care workers who have been left to float adrift.

The solutions exist, but only if leaders are willing to listen to our health-care professionals. They are urging us to reduce barriers to accreditation and transferring foreign credentials, modernize record-keeping, improve our data collection and analysis, invest in more infrastructure and expand models of group practices and telehealth. Indigenous health-care professionals and patients alike are calling for mandatory cultural competency training and the inclusion of traditional healing and Indigenous knowledge. Those who deliver care in smaller cities and in rural areas are asking governments to invest in the services and amenities needed for them to build their lives and raise their families. Investments in rural communities for education, infrastructure, housing, and recreation will not only attract more health-care providers, but will also encourage them to remain and serve those communities throughout their careers.

I think we have lost sight of the most basic elements of health, as well as the individual agency we each possess, and it's no wonder that we have as we stare down the hopelessness caused by the current experience. To find solace, I continue to turn to the experts, such as the Canadian Medical Association, who have called for practical solutions and initiatives such as a national school food program as one of the most effective tools in preventative care available to us. There is light at the end of this tunnel with the recent historic investments, buy-in from provinces and territories, and a national dialogue around standards and expectations of care.

One thing is for sure, we can no longer take health care in Canada for granted. The time for action was long before the COVID-19 pandemic, but sadly it took a national trauma to expose our vulnerabilities, and those most at risk among us are paying the highest price. There have been a multitude of proposals put on the table, it's time to implement them. Let's be creative, let's be bold and forward thinking, let's roll up our sleeves and plug the holes in the sieve. All of our lives depend on it.

Jenica Atwin was first elected as the Member of Parliament for Fredericton, N.B., in 2019, and became the first woman to hold this title. Atwin is passionate about addressing the climate and affordability crisis, improving the quality of our health system and fighting for social justice.

The Hill Times

Why are the Liberals abandoning hungry children across Canada?

The feds have failed to create or allocate funding to a national school food program in recent budgets, despite the urgent and growing need across Canada.

NDP MP
Don Davies

Opinion

Childhood hunger in Canada has become dramatically worse in recent years, with skyrocketing food prices and record food bank use across the country.

Every day, millions of Canadian children struggle through the school day without the benefit of a healthy breakfast or lunch. Deprived of access to nutritious food, their health, learning, and future are jeopardized.

This is a preventable problem with a well-established solution: a national school food program. Yet Canada remains the only G7 country without one in place. As a result, we rank 37th out of 41 wealthy countries in child food security, according to UNICEF.

The adage, "you are what you eat," holds true. If we aspire for our children to be healthy, happy, and successful, we must ensure they are well-nourished. Implementing a national school food program is not just a moral imperative, it is also a prudent investment in our country's future.

Such a program would guarantee that every Canadian child has access to healthy, affordable, and culturally appropriate food at school. It would also serve as a platform for children to learn about nutrition and food preparation, support local farmers and producers, and reduce food waste.

Indeed, the benefits of a national school food program are well documented and widely acknowledged.

School food programs play a pivotal role in enhancing student health. They encourage the intake of nutritious whole foods, while curbing the consumption of items high in fat, sugar, and sodium. This balanced dietary approach helps mitigate the risk of obesity, heart disease, diabetes, and other chronic conditions.

Moreover, the availability of healthy food at school has proven to bolster academic performance, graduation rates, and regularity in attendance. School food programs can also help alleviate anxiety and depression, and reduce bullying and aggressive behaviour, thereby fostering a more conducive learning environment.

In addition to their health benefits, school food programs provide a significant long-term boost to the economy. A recent Canadian study found that a national school food program would save families up to $2,268 per child every year on grocery bills, contribute $4.8-billion to local economies through domestic food purchases over a decade, increase students' lifetime earnings by up to 5.8 per cent, and boost mothers' labour-market participation by five per cent.

In 2019, both the NDP and the Liberal Party committed to invest $1-billion to create a national school food program, in partnership with provinces, territories, Indigenous communities, and civil society. This historic commitment marked a rare moment of cross-party consensus.

However, the Liberal government has since quietly abandoned its 2024 deadline to implement this program without any explanation or consultation. It has also failed to allocate any funding for this program in its recent budgets, despite the urgent and growing need across Canada.

This is a betrayal of the millions of Canadian children who face hunger daily. It also shows a stunning disregard for the evidence and the experts who have advocated for a national school food program for decades.

The Liberal government professes to care about the health and well-being of Canadians, and to champion human rights globally. Yet, it is neglecting one of the most effective ways to improve the health and well-being of Canadian children and to respect their rights to equality and development.

With food prices soaring and food insecurity worsening across the country, this is an ideal time to act. We can make an immediate difference in many families' lives, and plant the seeds for a much healthier future for our children.

The NDP will continue to hold the Liberal government to account for its broken promise, and to advocate for a national school food program that meets the needs and aspirations of Canadian children and families.

We believe that no child in Canada should go to school hungry, and that every child deserves a healthy start in life.

It's rare to find a policy that makes economic, health, and social sense. Establishing a national school nutrition program is such a policy, and should be started at once.

Don Davies is the NDP MP for Vancouver Kingsway, B.C., and is his party's health critic and deputy critic for foreign affairs. He previously served as official opposition critic for international trade, citizenship and immigration and multiculturalism, and as public safety and national security.

The Hill Times

Stop patching holes in our health-care system and rebuild the ship

We continue to work within and build upon a framework that does not serve Canadians, and the costs of this on both individual and societal levels are immense.

Shauna Cronin

Opinion

According to Statistics Canada, more than five million Canadians met the diagnostic criteria for a mental health disorder in 2022, and only half spoke to a health professional about it, highlighting at a high-level that something beneath the surface of our mental health system is not working.

The problem we're facing is a deep systemic inertia: an entrenchment in existing systems driven by the status quo and the cost or risk associated with change. We continue to work within and build upon a framework that does not serve Canadians, and the costs of this on both individual and societal levels are immense. Our health sector is oversaturated with short-term models and projects that continue to take priority over improving current services to match need, or even de-implementing projects to create space for ideas that work.

If we're going to fix this problem, we're going to need to think outside this existing framework.

Consider the very real impact that outdated evidence paired with systemic inertia has on people across the country. We can see this most evidently in health disparities affecting Indigenous communities. Our health-care system is built upon evidence rooted in colonialist ideals that are often at odds with Indigenous beliefs. Not to mention that accessing these resources from remote communities—many without reliable internet access—presents its own challenges. Then reports state that suicide rates for Indigenous Peoples are three times the national, and we ask why?

The lack of evidence-based care for Indigenous populations drives individuals to crisis before they seek support, if they do at all. Upon reaching crisis, they face long wait times in the ER, staff who lack training in cultural sensitivity and colonial trauma, among other barriers. Long-term, sustainable funding for research opens opportunities to explore and implement services that decolonize traditional beliefs, are built upon Indigenous knowledge, and are further shaped to meet the needs of different communities. In other words, we can implement services based on the right evidence to find solutions that work.

Crisis response and care is another area where this impact rises to the surface. Today, a Canadian experiencing or nearing a mental health crisis is told to call 911 or visit their nearest emergency department. While emergency departments are vital resources, they are not the right place for someone at that time. A visit can be a traumatizing experience, with bright lights, security guards, and claustrophobic spaces. However, it's important to note that the ER is often the only option when we consider that some young people wait 67 days on average for access to counselling, and 92 days for intensive treatment. If we could reimagine an approach to crisis support, what would it look like?

Fortunately, our partners in the United Kingdom are doing just that. They've developed a model called the Recovery Café, an inviting space where people in crisis can go to access support, decompress, and connect with peers. They are open when other supports are closed, and require no referral. Many Cafés see 20-25 people per evening, and up to 9,100 annually. In just the first six months these Cafés were operating, there was a reported 33 per cent reduction in psychiatric admissions, showing great potential for reducing systemic burden on hospitals.

The Recovery Café is a powerful example of what mental health interventions can look like—and the profoundly positive impacts they can have—when we consider and respond to the expressed needs of those relying on these services.

We have an opportunity to reflect on the past and use what we've learned to change the future. Our sector is not short on solutions, but those solutions are met with barriers that inhibit innovation. As we work together towards system reform, we must recognize the harm that's been done by patching holes in a broken system, rather than creating space for new, more holistic approaches to care. The evidence is clear, we just need to use it.

Shauna Cronin is the executive director of Frayme, a national youth mental health and substance use intermediary working to create a more equitable and accessible health-care system.

The Hill Times

Health Minister Mark Holland speaks to reporters in Ottawa on Jan 30. The growth in demand for health care is expected to outpace taxation's ability to finance the labour-driven supply of services, writes Zayna Khayat. *The Hill Times photograph by Andrew Meade*

Harness the current momentum to shift the health workforce from a position of crisis to one of strength

The government can reframe the issue by focusing on the demand side of work instead of on the domestic supply of labour.

Zayna Khayat

Opinion

The Canadian government has little authority over levers that affect the health workforce: education, recruiting, training, deployment, compensation, retention. Despite this, it has rightly prioritized this matter, enacting federal policies to increase supply of health workers, such as by expediting the licensing of foreign-trained health professionals and the cross-province mobility of workers, as well as by creating an agency to obtain data that can make planning and decision-making processes more transparent.

The federal government is also helping to address worker attrition with a pan-Canadian challenge under way to support retention and engagement, as well as with plans to release a tool kit to improve the nursing work environment.

However, simply adding more people is not likely to solve access challenges. Despite this, the present supply-strategy projections are assumed to be sufficient, both in terms of services that will be required and how health care is designed, paid for, and delivered by the current mix of professionals. That is, the projections speculate that more workers doing the same work, having an easier path to obtaining the necessary credentials, being more easily transferred to areas that require their services, and being incentivized to remain in their roles are sufficient conditions to tackle this important challenge.

Yet, the growth in demand for health care is expected to outpace taxation's ability to finance the labour-driven supply of services. As such, we are overdue for a reframing of the health-care challenge.

Some considerations: does spending more than 60 per cent of our health investments for staff match the labour intensity needed? Is the anticipated workforce growth expected to come from training and recruiting health professionals using long-standing means, methods, and talent pools? Is our current mix of licensed health professionals fit for purpose? Have we augmented our talent with the necessary technologies to allow them to focus on what humans can do best?

Our suggestion: Canada is in a strong position to bring needed policy and investment to a new stage, beginning with rethinking the demand side of the work of health care.

To clarify, "demand side" does not presume a focus on reducing the demand for health services alone (i.e., via prevention strategies). Rather, it is meant to highlight the untapped opportunity that exists to reimagine the way our health system currently deploys workers. We see three levers currently at the federal government's disposal that could make use of existing infrastructure:

1. Removing lesser-value work: According to sources including the national Choosing Wisely campaign, roughly 30 to 40 per cent of health workers' tasks are unnecessary, duplicative, and even unsafe. Could the federal government inject new life into Choosing Wisely, and set expectations for engaging in higher-value work to care organizations funded through the Canada Health Transfer program?

2. Deploying technology to improve health work: To help the health-care system and restore joy and humanity in the work of caring, it's essential to accept that many tasks undertaken by health workers can be done equally well or better by partnering humans with simple technology such as automation, analytics, logistics, and AI cognition. Similar to England's review of their national health service, could the Government of Canada conduct an analysis of the opportunity afforded by technology to free up our healthforce capacity? A national plan that lays out concrete strategies and a role for federal agencies such as the Canadian Institute for Health Information, Canada Health Infoway, and the Canadian Institutes of Health Research might help jurisdictions realize the promise of—and the means to invest in—a digitally enabled health workforce.

3. Redesigning and redefining work itself: The global workforce is emerging from an industrial-era construct wherein "work" was defined as a fixed, static job tied to a specific professional and strict credentials, to one in which it's a dynamic landscape of skills that can be accessed and utilized as the nature of work evolves. This evolution requires separating jobs into their component skills, and then accessing a wider complement of talent that have or can readily acquire the needed expertise. We estimate that up to 60 per cent of work currently tied to a given credentialed professional could be performed by an alternate, such as a civilian who can be easily upskilled/reskilled (e.g., a retiree, student, volunteer), an extender (e.g., someone getting directive from and/or teaming with higher-licensed clinicians), or a second professional (e.g., a nurse practitioner, pharmacist, or nurse prescribing for routine ailments). What if the federal government provided the working capital for provinces to fundamentally redesign care models and to redefine work, from jobs to skills? This would mean changing the current work paradigm: assessing how we can educate, develop, upskill, and reskill a much wider and more varied mix of talent.

Zayna Khayat, PhD, is a health futurist with Deloitte Canada, and co-chair of the firm's Future of the Health Workforce signature issue.

The Hill Times

Working together for a healthy workforce

While the federal government can provide leadership and support, collaboration with provincial and territorial governments is crucial.

Liberal MP
Sean Casey

Opinion

Canada's health-care system is in crisis. An elevated demand for care and numerous vacancies have dramatically increased the workload of health professionals. They are working longer hours, burning out, and many are leaving these jobs, with effects that we are feeling across the country.

My home province of Prince Edward Island is no exception. One of the island's two main hospitals, Prince County Hospital, does not currently have an intensive care unit due to staffing shortages. Residents have vociferously expressed their dissatisfaction with the provincial government on this urgent issue, including at the ballot box where a Green Party candidate won a byelection recently in a long-held Progressive Conservative riding.

A pan-Canadian problem demands a pan-Canadian solution. This is why, in 2022, the federal government established the Coalition for Action for Health Workers with key stakeholders in health workforce management. This coalition's first priority is addressing staffing challenges across the country.

Federal action is, however, only one piece of the puzzle. As chair of the House of Commons Standing Committee on Health, I oversaw the group's study of this crisis. After hearing from expert witnesses, we submitted a report to the House in March 2023 underlining the federal government's role in addressing the health workforce shortage.

In Canada, provinces and territories manage health-care service delivery and workforce within their jurisdiction. It is then no surprise that the key takeaway from the study was this: while the federal government can provide leadership and support, collaboration with these governments is crucial.

Our government led this necessary collaborative approach by rolling out a 10-year $200-billion "Working Together to Improve Health Care for Canadians" plan in 2023, signing bilateral agreements with provinces and territories.

This plan centres four priority areas essential to a healthy care workforce: recruiting and training more workers, retaining professionals, planning for long-term sustainability, and modernizing the system.

First, let's talk recruitment.

Through programs like the Sectoral Workforce Solutions Program and Future Skills Initiative, the federal government can continue to support training and innovation. These directly build capacity by training new workers and supporting them as they enter the field.

Another important pool of workers is international-educated health-care professionals (IEHP). In 2021, only 58 per cent of these 259,695 qualified individuals aged 18 to 64 in Canada worked in this field. This is a huge amount of talent that remains available to bolster health-care capacity. The federal government must make it easier for IEHPs to practice in Canada, via programs such as the Foreign Credential Recognition Program, which reduces barriers to recognize their credentials and supports them as they enter their field of work.

This leads me to retention. To retain health workers, we must understand why they leave.

Our government is developing a Pan-Canadian Health Data Strategy as informed by an expert advisory group. The data collected in this plan will not only address the health needs of Canadians, but also that of the workforce. This is a unique opportunity to understand the major stressors contributing to burnout for the sector while sharing best practices to mitigate them.

Meanwhile, we must work with provincial and territorial governments to optimize the scope of practice of professionals such as nurses and pharmacists. By doing so, not only would we make it easier for Canadians to find the care they need, but also alleviate the burden on pressure points of the health-care system. The federal government can also provide a platform to share best practices and tools in managing administrative duties, which can take up to 30 per cent of a physician's time.

The actions above also address the last two priorities: planning and modernizing.

The federal government is perfectly situated to oversee the long-term sustainability of the health-care system by anticipating future health needs. Good planning, including investments in long-term and palliative care as well as preventative health strategies, would decrease the demand on acute care and avoid overwhelming the system.

Innovation is essential to keep up with a rapidly changing digital and social landscape. The federal government can explore alternate forms of care delivery, such as virtual and team-based care, which would provide a holistic approach to health-care delivery, helping those who need it most.

Health care is a complex issue that cannot be resolved by something as simplistic as a "blue seal standard." Canadians deserve better. A comprehensive, collaborative, thoughtful approach is the right one. And that's what we will deliver.

Sean Casey is the Liberal Member of Parliament representing the riding of Charlottetown, P.E.I. He currently sits on the Standing Committee on Veterans Affairs and is the chair of the Standing Committee on Health.

The Hill Times

How to achieve accountability in long-term care

It is impossible for provincial/territorial residents to hold their governments accountable for their responsibilities in LTC if the data available are biased, and the most important kinds of data are completely absent.

Michael Wolfson

Opinion

Canadian Armed Forces members help with meals and provide care to residents at the Grace Dart Extended Care Centre in Montreal, as part of Operation Laser on May 8, 2020. *DND photograph by Cpl. Genevieve Beaulieu*

Memories of the tragedy in Canada's long-term care (LTC) homes from the pandemic are fading all too fast. However, this tragedy was not an accident; it was the result of a series of deeper problems with the ways LTC is funded, managed, and understood. Without concerted action, these problems will continue to fester, and indeed grow with Canada's aging population.

Addressing these problems requires actions on a number of fronts, from operating standards to staffing, to assuring the human rights of LTC home residents. The most important actions form the core recommendations of a just-released report from the Royal Society of Canada (RSC).

One reason for the failures in Canada's LTC homes is their general invisibility. It has only been the unnecessary spike in residents' deaths from the pandemic that brought these to light. With this tragic visibility, there has been a flurry of government actions. But as myriad experiences have taught us, as soon as the light fades, actions weaken.

One of the core recommendations of the recent RSC report is the creation of a robust "accountability framework" based on strong data reporting. This is not a new idea; the 2003 First Ministers Health Accord also spoke repeatedly about accountability. However, governments' support for the underlying data waned over only two or three years, as did support for the short-lived Health Council of Canada a few years later.

In order to avoid yet another failure, we must understand what an accountability framework involves, and why it has failed in the past.

One fundamental reason for failures is the constitutional division of powers. The provinces and territories, with primary jurisdiction for health care, do not want to be "accountable" to the federal government, even though the federal government channels billions of Canadian taxpayer dollars to them. However, they should be accountable to their own populations.

The only way Canadians can learn what works and what doesn't from each region, no matter their differences, is if the data are comparable—this is a legitimate role for the federal government.

Here we come to the reason for past failures: no provincial/territorial government wants to be shown to have poor performance in any area of its jurisdiction, certainly including health care. In a phrase, "why shoot the messenger if instead you can prevent there ever being a messenger?"

In the face of such self-interested resistance, an obvious response is for the federal government to incent the needed standardized data generation across jurisdictions, and then assure these data flow in ways that can populate a well-designed accountability framework.

Such a framework should include key indicators, such as the levels of direct care staffing per resident on LTC homes, and the frequencies of falls leading to fractures and hospitalizations. But the data flows must be much more than a handful of indicators. Analysts need to be able to drill down in the data to see, for example, what kinds of staffing levels and mixes are associated with the lowest rates of hospitalizations for falls, and other factors, including language and broader social determinants of health.

The federal government has ample constitutional powers to give effect to the needed data, not least from its spending powers and its power for "peace, order, and good government."

The federal government does appear to be going through the right motions here. The major cash transfers announced in 2023 to the provinces and territories include $500-million for data, and assign the Canadian Institute for Health Information (CIHI) a central role.

Yet, in the 2017 First Ministers Health Accord, through which billions of dollars were transferred from the federal government focusing on LTC and mental health and addiction, all governments agreed that CIHI should be given the mandate to develop relevant indicators. Three years after the Accord, CIHI had published only one indicator relating to LTC, and it was based on hospital rather than LTC data.

CIHI does the best it can, but it is seriously limited by the data provided to it by the provinces and territories. For example, data about LTC residents are not connected to staffing levels, hospitalizations, and other kinds of health-care utilization, nor to surveys of all those waiting to access homecare or LTC homes.

It is impossible for provincial/territorial residents to hold their governments accountable for their responsibilities in LTC if the data available are biased, and the most important kinds of data are completely absent.

We take for granted in other areas—such as GDP, unemployment, and inflation—that there are ample underlying data enabling a dissection of the observed trends. We deserve the same for LTC.

It's long past time the federal government used all its constitutional powers.

Michael Wolfson, PhD, is a former assistant chief statistician at Statistics Canada and co-author of the Royal Society of Canada report, Repair and Recovery in Long-term Care.

The Hill Times

The federal government is failing Canadian health research

Canada risks losing out by inadequately investing in health researchers working to unlock new discoveries.

Paul-Émile Cloutier

Opinion

As the world embraces and pursues a far-reaching revolution in the life sciences, will Canada be there as a serious player?

With artificial intelligence and other new tools, Canada has the potential to cure long-standing diseases, address future pandemics, improve medical diagnostics, and develop innovations to ease pressure on the health system. The contributions of our health researchers in the global fight against COVID-19 showed we could make important science breakthroughs and achieve commercial success from these discoveries.

Yet by failing to invest in health researchers working to unlock new discoveries, Canada risks losing out. Rather than supporting and encouraging talent, governments are squeezing researchers financially, implicitly telling them there may be no careers in science in Canada, and that they are better off leaving for other countries where their talent is treated far better. Researchers who have often looked to Canada as a great place to pursue their careers may decide they can no longer afford to come here. Canada will be the loser.

Most graduate and postdoctoral researchers are funded through the federal grants received by their supervisors from the three federal research agencies: the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council of Canada, and the Social Sciences and Humanities Research Council of Canada. This funding has also stagnated and been hit hard by inflation. That is why, along with strengthening graduate scholarship and post-doctoral fellowship programs, it is imperative that the federal government also increase investments in the federal granting agencies. Both the Advisory Panel on the Federal Research Support System convened by the government and the House of Commons Standing Committee on Science and Research recommended last year that the federal government do so by at least 10 per cent a year for the next five years.

Ensuring Canada has the talent pipeline needed for a thriving, globally competitive knowledge-based economy goes beyond investing in researchers when they are training. Governments must ensure people see a future for themselves in Canada if they want to keep the talent we have invested in and supported, so they go on to work in hospitals, health authorities, health research institutes, government, and the private sector for the benefit of Canadians. This is another reason why the federal government must urgently increase investments in research through the three federal agencies.

In addition to the danger of losing our best and brightest research minds, the failure of the federal government to adequately invest in health research also undermines our ability as a nation to efficiently and effectively apply new research findings to improve access to care and outcomes. Building a better health system requires applying best practices.

It would be a tragedy if Canada opted out of the life sciences revolution and the opportunities it brings to improve human health, and enhance Canada's success as an innovation nation.

There is investor interest in the life sciences. Some $10-billion has been invested by venture capital groups in Canadian life science startups over the past decade. Investors in recent years have been putting more than $1-billion annually into initial public offerings by life science companies on the Toronto Stock Exchange.

That is why HealthCareCAN recommends the federal government immediately invest $3.8-billion to double current funding to the three federal granting agencies and commit to an annual increase that keeps pace with inflation and global benchmarks to ensure competitive and sustainable research funding.

HealthCareCAN also calls on the government to increase federal funding available through the three agencies for graduate scholarships and postdoctoral fellowships to a minimum of $25,000 and $35,000, respectively, tying funding levels to increases in inflation, and increase the overall number of scholarships and fellowships available by 50 per cent, adjusting annually to reflect the level of enrolment in graduate and postdoctoral programs.

Budget 2024 is a critical test of the federal government's commitment to the future and whether it wants to build on past success in life sciences, or let the global life sciences revolution pass Canada by.

Paul-Émile Cloutier is the president and CEO of HealthCareCAN, the national voice of hospitals, health authorities, health research, and health-care organizations.

The Hill Times

Iiyika'kimaat in Indigenous health: a call for change and empowerment

A physician who witnesses the realities of an often-inadequate health system for Indigenous communities urges the federal government to implement Truth and Reconciliation Calls to Action 18–24.

Lana Potts

Opinion

Indigenous Services Minister Patty Hajdu speaks with reporters in the House of Commons foyer on Dec. 13, 2023. Indigenous communities should have the power and resources to design and implement their health-care strategies and control their health systems in alignment with their cultural values, writes Lana Potts. *The Hill Times photograph by Andrew Meade*

The Truth and Reconciliation Commission (TRC) of Canada launched 94 Calls to Action in 2015, emphasizing the urgent need for systemic changes to recognize historical trauma and help establish a more fair and just society for all. To date, fewer than half of these 94 calls have been fulfilled, and none of the TRC's seven recommended health-care actions (Nos. 18-24) have been enacted.

The state of health care in many Indigenous communities is deeply troubling, as exemplified by the tragic circumstances seen in my First Nation community in Alberta. Over the past 10 months, we have had more than 50 funerals—primarily deaths from addiction, and mostly involving people aged 35-46. This devastating loss has yielded a large number of orphaned children who are now relying on child-welfare services.

Current health-funding models are focused on "sick care," and do not effectively allocate resources to address health inequities. Many First Nations lack access to primary health care, leaving them without essential preventative health services. The situation is exacerbated by high levels of poverty, geographical challenges, prevalence of chronic disease, and overcrowded living conditions. Compounded, this has resulted in a significantly reduced life expectancy: many of us don't reach the age of 50.

According to the Canadian Medical Association report, *Indigenous Health*, Indigenous Peoples in Canada can face racism in health systems. The general lack of acceptance of Indigenous healing models further deepens these disparities, as traditional and holistic approaches to wellness are for the most part not embraced by western medicine. Despite Indigenous Peoples making up more than 4.5 per cent of Canada's population, fewer than one per cent of the country's physicians identify as Indigenous. This under-representation further serves to hamper the development of culturally attuned health-care services.

A way forward: *Iiyika'kimaat*

In my Blackfoot language, we say *Iiyika'kimaat*—leading with purpose and determination. There is a crucial need for the Canadian government to adopt an *Iiyika'kimaat* approach to realizing a more equitable health-care system that will serve the needs of Indigenous populations.

A good starting point is to adopt funding models focused on upstream health and primary care, while elevating the importance of self-determination, resilience, and community support. These models can help break the cycle of disparity between Indigenous and non-Indigenous health outcomes. In parallel, Indigenous communities should have the power and resources to design and implement their health-care strategies, and control their health systems in alignment with their cultural values. Recognizing the rights of Indigenous Peoples in such a way also acknowledges that they possess valuable learnings and insights about their health and are best suited to act on behalf of their communities. This approach is in line with TRC Call to Action 21: prioritizing the creation of Indigenous healing centres that address the mental, emotional, physical, and spiritual needs of Indigenous people.

A precedent for the power and value of preserving Indigenous ways of knowing and healing is in the repatriation of a Thunder medicine bundle in my Blackfoot community. Prior to contact, our community enjoyed traditional ceremonies and bundles, benefiting from long, healthy lives free from chronic disease, poverty, and addiction. The leadership, dedication, and efforts of people including Jerry Potts Jr. and the late Allan Pard to bring our bundles home help ensure the preservation of our long-standing health-care systems.

One repatriation principle in action was the 2022 opening of Aisokinaki, a Blackfoot-led health-care clinic. The centre embodies the values of evidence-based practices seamlessly intermingled with *Iiyika'kimaat*. Aisokinaki offers a range of services, including land-based healing, connections with ceremony, and elder involvement to support each person in achieving health. This unique clinic takes a holistic approach by incorporating tools such as traditional medicine, rattles, and drums to aid in addiction recovery. Aisokinaki is the successful result of more than 20 years of convincing decision-makers that Indigenous communities are well-equipped to care for and heal themselves.

Transformative change in Indigenous health begins with a profound sense of enlightenment, as expressed in Blackfoot teachings. It emphasizes the importance of being aware of our surroundings, actively listening to the voices of and within Indigenous communities, and observing the interconnectedness of humans and the land. True enlightenment prompts us to recognize the injustices and disparities faced by Indigenous Peoples and compels us to act.

By working with the Canadian government to lead with purpose and determination—that is, to embrace *Iiyika'kimaat*—Indigenous communities and Canada at large may one day finally, fully help ensure our health-care systems benefit each of us equally.

Dr. Lana Potts is the national Indigenous health lead for Deloitte Canada.

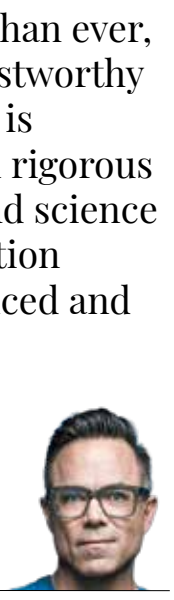
The Hill Times

Needed: less science hype!

Now, more than ever, we need trustworthy science that is grounded in rigorous methods, and science communication that is balanced and accurate.

Timothy Caulfield

Opinion



Yes, science is exciting, but how we talk about science matters, especially in this era of health misinformation, writes Timothy Caulfield. *Unsplash photograph by Ambreen Hasan*

Science hype has become a serious problem. There is more and more hype in the peer-reviewed scientific literature. There is hype in the institutional press releases about that literature. There is hype in the news reports about the research—especially in those hype-y headlines. There is hype on social media. And, perhaps most worrisome, the hype exists in the marketing of the health products associated with the science.

Throughout the knowledge-production process, exaggeration and overly optimistic language is injected into the public representations of research. It has become a hype pipeline, one that starts when researchers search for research funds.

In a study involving anonymous interviews with senior academics from the United Kingdom, the participants admitted that the hyper-competitive funding environment led them to routinely lie and exaggerate in research grants about the potential impact of their work. As one of the researchers was quoted as saying, "If you can find me a single academic who hasn't had to bullshit or bluff or lie or embellish in order to get grants, then I will find you an academic who is in trouble with [their] head of department."

This kind of data is depressing, but it shouldn't be surprising. The pressure to hype, hype, and hype is baked into the current pub-

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It's time health-care workers learned how to work in teams

We need to reorganize the work of health-care workers to better use their expertise, reduce duplication, and enhance the co-ordination of care experienced outside of hospitals.

Ivy Oandasan &
Ivy Bourgeault

Opinion

Canada is in the midst of a primary care crisis. Primary care is the first point of contact Canadians have with the health-care system outside of hospitals, often via a family physician or nurse practitioner. Unfortunately, an estimated 6.5 million Canadians do not have a family physician or a nurse practitioner.

Provincial government plans to address the crisis have largely focused on increasing the number of health workers. But increasing numbers alone—by making more spots available in medical and nursing schools, and recruiting health workers from out of country—will not be enough to solve the crisis.

We need to reorganize the work of health-care workers to better use their expertise, reduce duplication, and enhance the co-ordination of care experienced outside of hospitals to improve health-care access.

No one practitioner can do it all because this no longer fits the reality of the kind of health issues people face today. Patients—especially those with chronic or complex health needs—are better served by a team of health-care workers whose skills complement each other.

A team-based approach can better balance the workload among team members, and enable each to better use their skills and training. Not only can this help to reduce burnout, it can also improve job satisfaction.

Some provincial governments have been creating more practice opportunities for primary care teams working collaboratively. Many provinces are implementing new practice approaches like the Patient's Medical Home, with family physicians working in teams with other health-care professionals providing accessible, high-quality care for their patients.

But effective teamwork doesn't just happen magically without dedicated training and support.

Training health-care workers to practice in primary care teams is a necessary part of any strategy to address the crisis. Teamwork among health-care workers must be fostered through knowledge about what each other can do and opportunities to practice working together.

It may come as a surprise to many Canadians that few health-care workers learn explicitly about the roles each plays, or could play, in the care of patients. For example, various health professionals, including physicians, may not be aware that registered nurses can conduct annual wellness exams, including pap smears; that midwives have the authority to prescribe drugs; of the role that occupational therapists have in providing mental health services; that audiologists can help older adults with hearing problems develop new listening and communication skills; and that pharmacists have prescribing authority to collaboratively manage chronic diseases and minor ailments.

Team-based care operates on the premise that enabling these primary care providers to complement rather than substitute each other in co-ordinated ways offers better access to care.

Without this critical knowledge, health workers don't know how to work together most effectively. Lack of knowledge can lead to a lack of trust and duplications of services without co-ordination that can be costly and time consuming to both patients and the health system.

Like any team, successful primary care teams require training and practice together to learn how to leverage their strengths.

This idea is not new. More than 20 years ago, the Commission on the Future of Health Care in Canada argued that: "If health-care providers are expected to work together and share expertise in a team environment, it makes sense that their education and training should prepare them for this type of working arrangement."

A unique federally funded pilot project called Team Primary Care: Training for Transformation is working to address this foundational and outstanding gap. It brings together more than 20 practitioner groups representing all aspects of primary care to create training content, tools, and approaches that enable each team member to learn about, from, and with each other, and enhance their ability to work better together delivering more and better primary care.

The project focuses on enhancing the training of specific primary care practitioner groups as well as practice-based training of existing primary care teams, bringing on new providers to accomplish transformational change at many levels. Spreading and scaling the tools and approaches of this project is paramount and will begin with the support of more than 100 health professional and educational organizational partners across the country.

It's time health-care workers learned how to work in teams.

Now, all governments need to work with health provider educators to support necessary education reform as part of the transformation to primary care teams. Patients, health providers, and the health system alike will benefit.

Dr. Ivy Bourgeault is a professor in the school of sociological and anthropological studies at the University of Ottawa, and leads the Canadian Health Workforce Network. Dr. Ivy Oandasan, a professor with the department of family and community medicine at the University of Toronto, is director of education at the College of Family Physicians of Canada. They are co-leads of Team Primary Care.

The Hill Times

No one practitioner can do it all because this no longer fits the reality of the kind of health issues people face today, write Ivy Bourgeault and Ivy Oandasan. *Unsplash photograph by Luis Melendez*

The partnership approach works because the provinces, territories, and people from across Canada jointly contribute to our national cancer strategy, write Jeff Zweig and Craig Earle. *Unsplash photograph by the National Cancer Institute*

Cancer will strike almost half of all Canadians in their lifetime

A challenge of this magnitude requires a national response, and the Canadian Partnership Against Cancer is a unique model of collaboration that is working to make a meaningful difference in cancer outcomes across the country.

Jeff Zweig & Craig Earle

Opinion

The reality is that we will all likely be affected by cancer in our lifetime, either directly or through someone we love. More than 200 Canadians die from cancer every single day. It is the leading cause of death in the country.

In the positive column, cancer survival rates are improving, and Canada ranks highly compared to other countries in cancer outcomes. But, with a growing and aging population, more Canadians are getting diagnosed with cancer than ever before.

A challenge of this magnitude requires a national response. In 2006, Canada was one of the first countries in the world to create a national cancer strategy. There are 14 different health-care systems across Canada between federal, provincial, and territorial governments. Who you are and where you live determines which system provides your care. Less-resourced jurisdictions and communities often do not have access to the same quality of health care. Remote and Indigenous communities are often seriously disadvantaged, and cancer outcomes are worse as a result.

It was against this context that the Canadian Partnership Against Cancer was created in 2007 as the steward of the Canadian Strategy for Cancer Control. An arm's-length agency funded by the federal government, the Partnership's model is based on identifying shared cancer priorities across those 14 health systems, identifying leading practices, and accelerating their implementation to improve cancer outcomes. It has enabled unprecedented collaboration, knowledge sharing, and co-ordination across the country. The Partnership's board of directors is composed of representatives from federal, provincial, and territorial governments, cancer organizations, Indigenous communities, and other people affected by cancer from across the country.

The Partnership is a pan-Canadian approach to addressing one of the biggest challenges of our time.

With federal support over the last 15 years, the Partnership has collaborated with more than 700 partners in cancer care-related initiatives. We track cancer outcomes across the country and benchmarks around the world to help inform opportunities and promising approaches. We convene a diverse range of cancer leaders on specific topics to exchange information, prioritize actions and develop plans to improve outcomes.

For example, last November, the Partnership organized a national summit in Halifax bringing together 150 decision-makers from across the country to drive action on the elimination of cervical cancer. Representatives from every province and territory, including First Nations, Inuit, and Métis leaders, health-care professionals, patients, community and equity partners attended this event. They left with actionable next steps to advance the elimination of cervical cancer in their communities and support Canada's commitment to eliminating cervical cancer by 2040. Every year, 1,300 people in Canada are diagnosed with cervical cancer and more than 400 die. Through the human papillomavirus (HPV) vaccine and HPV test, we now have the means to prevent cervical cancer and eliminate this disease altogether.

Another example relates to screening for lung cancer, which often goes undetected until it reaches an advanced stage. At current rates, one in 14 Canadians will be diagnosed with lung cancer. Unfortunately, the mortality rate is high because it is not caught early enough. Five years ago, working with partners across the country, we identified lung cancer screening as a priority. Today, planning and implementation of lung cancer screening programs is underway in all 10 provinces.

This partnership approach works because the provinces, territories, and people from across Canada jointly contribute to our national cancer strategy, setting the common priorities, and committing to work together to improve. There are four clear goals in the Strategy:

- People in Canada have equitable access to quality cancer care;
- Fewer people develop cancer;
- More people survive cancer; and
- People in Canada affected by cancer have a better quality of life.

These are supported by eight agreed-upon priorities with clear actions, which are measured quantitatively and reported on the Partnership's website.

Cancer care is complex, compounded by the nature of Canada's health-care landscape. The Canadian Partnership Against Cancer is a unique model of collaboration that is working to make a meaningful difference in cancer outcomes across provinces, territories, and Indigenous communities, and helping to close the gap for disadvantaged regions and groups. It is a successful pan-Canadian response to a national priority.

Jeff Zweig is the board chair of the Canadian Partnership Against Cancer, and partner, vice-chair, and head of Natural Capital (Agriculture & Timberland). Dr. Craig Earle is the CEO of the Canadian Partnership Against Cancer.

The Hill Times

Needed: less science hype!

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lish-or-perish research ecosystem. For example, to attract the needed investment to an area—especially for large, expensive, and time-consuming interdisciplinary projects—the research needs to be framed as revolutionary, cutting-edge, and paradigm shifting, even though science is very rarely any of those things. Doing science is hard, messy, and slow. It rarely unfolds exactly as promised. And the results are almost always more modest than initially promised. No revolutions, but lots of iterative—but, it should be emphasized, *still* important—advances.

I've seen this cycle unfold again and again. Over the past three decades I've been fortunate to work closely with the biomedical research community on many of the hottest "Big Science" topics, including stem cells, genomics, nanotechnology, neuroscience, and the microbiome. There has been lots of very interesting science and exciting niche (and tremendously expensive) applications, such as gene therapies for sickle cell disease and a few (a *very* few) new stem cell treatments for diseases like multiple sclerosis. But despite decades of research and the global investment of billions of dollars, I have yet to see a single "revolutionary" advance—that is, a broadly relevant technology that altered our health-care system or that had a drastic impact on population health—play out in the manner originally promised.

Not only is this kind of hype disingenuous, but it can also do significant harm. It can, for example, misinform and skew research priorities and resources away from less exciting but more impactful population health strategies (exercise, diet, smoking cessation, etc.). It can create false expectations, and misinform the public and desperate patients about the actual state of the science. And the hype can be leveraged to market unproven and potentially harmful therapies and products, a process I've called scienceploitation.

Perhaps the biggest concern, however, it that science hype has the potential to further erode how the public views biomedical research. Trust in science and scientific institutions is declining. A recent Pew Research Center survey, for example, found that only 57 per cent of Americans think science has had a "mostly positive effect on society," down from 73 per cent in 2019.

Now, more than ever, we need trustworthy science that is grounded in rigorous methods, and science communication that is balanced and accurate. Yes, science *is* exciting. New discoveries *are* often worthy of enthusiastic declarations. And all of us in the research community *must* do more to engage with the public to help foster critical thinking and heighten science literacy. But how we talk about science matters, especially in this era of health misinformation.

So, to be clear, I'm *not* arguing against the funding of big and well-justified science projects. Indeed, funding rigorous biomedical research is more important now than ever. And advances like the mRNA vaccines—which saved millions of lives—and the rise of artificial intelligence demonstrate that world changing science does happen.

We need more good science. But we also need good science communication.

Timothy Caulfield is an author and professor at the University of Alberta's faculty of law and school of public health.

The Hill Times

Health

Canada is on track to cure Type 1 diabetes, and we can get there with the right support

Research innovation is becoming increasingly competitive in the post-pandemic world, and Canada is at risk of losing its foothold.

Sarah Linklater

Opinion

An estimated 300,000 Canadians (growing at a rate of 4.4 per cent a year) live with Type 1 diabetes (T1D), an autoimmune disease resulting in the pancreas not producing enough insulin for the body, causing blood sugars to rise. Until cures are found, people with T1D must monitor their blood glucose throughout the day and take multiple daily insulin injections to survive. But insulin is only a treatment, and Canadians with T1D have a high risk of life-threatening complications, lower quality of life, and life expectancy that is 10 years less than that of the general population.

When it comes to diabetes research, Canada has historically punched well above its weight on the world stage. Since the discovery of insulin in Toronto in 1921, Canada has continued to make significant breakthroughs towards curing T1D: from the discovery of stem cells in 1961, to the development of the Edmonton Protocol—a method of transplanting pancreatic cells—in 1999.

In 2022, the federal government published the Framework for Diabetes in Canada, highlighting a need to better recognize, collaborate with, and support those affected by diabetes. The framework provides a common policy direction to help align national efforts to address diabetes. Like previous reports, however, it recognizes that Canada continues to lack the necessary funding for diabetes research and for translating discoveries into practice. The federal government has an opportunity to make meaningful investments into research, and demonstrate its leadership and commitment for better treatment and support for people living with diabetes.

Canada has the talent and capacity to continue its legacy of success, and can be the place where the next major breakthroughs in T1D cures are discovered, driven to commercialization, and delivered to improve lives. But to maintain our leading research position and to reduce the immense pressure on our health-care system caused by T1D and its complications, there needs to be sustained investment in research and innovation throughout the entire pipeline. That is why the Juvenile Diabetes Research Foundation (JDRF) is recommending the federal government invest $50-million over five years in the JDRF-CIHR Partnership to Defeat Diabetes to support new and ongoing translational T1D research—from discovery to clinical trials—to improve health outcomes, drive commercialization, create good jobs, and bolster Canada's life sciences sector.

Investments in this space not only create jobs for highly qualified personnel and research trainees, but also allow for the potential of discoveries to spin-off into businesses. Without the right incentives, Canadian projects—and the research talent behind them—may choose to relocate to other countries with better opportunities. This leaves Canada in a position of starting research projects with heavy initial investment, but then losing out on the economic benefits that would flow from its discoveries, as well as the benefits of early access to new treatments that Canadians need. By effectively moving research projects through the full pipeline into commercialization, Canada can demonstrate that it values innovation and that we can be a destination for new talent and investments.

Funding translational research is essential for bringing innovations to market. Along with improving the lives of Canadians with T1D, bringing innovative solutions to market will also realize long-term benefits for governments looking to reduce health-care costs (which in Canada are $30-billion annually due to all diabetes). Innovations in T1D research will reduce hospitalizations caused by diabetes complications (including diabetic ketoacidosis, hypoglycemia, kidney and cardiovascular disease, and mental health disorders), as well as improve quality of life and health outcomes, thereby reducing absenteeism and presenteeism related to T1D in working-age Canadians.

As research around the world brings us closer to cures for T1D, we cannot afford to abandon the progress we have made in Canada. It is crucial for our government to provide consistent and stable funding for Canadian researchers to launch the next moonshots that will transform T1D therapy, and lead to cures. Canada discovered insulin. Canada discovered stem cells and pioneered the Edmonton Protocol. Canada can lead the world in the discovery of a cure.

Sarah Linklater is chief scientific officer of JDRF Canada, a non-profit organization focused on Type 1 diabetes research funding and advocacy. Linklater holds a PhD in experimental medicine from the University of British Columbia.

The Hill Times

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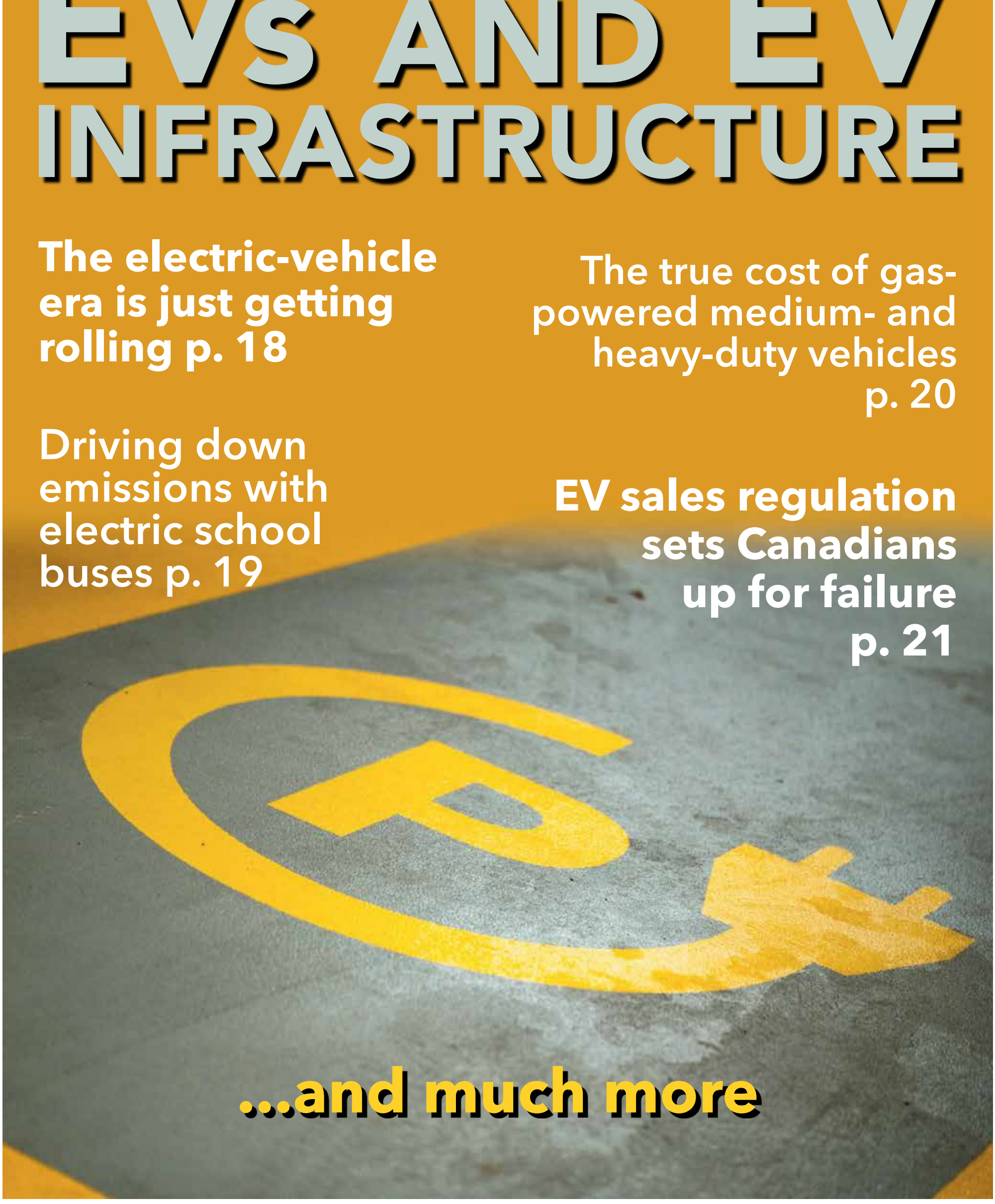
EVs and EV infrastructure



...and much more

Expanded electric capacity to handle EVs must be taken seriously, say experts

Annual increases in electricity demand from expanded use of EVs could require the equivalent of 10 new mega hydro dams or 13 large natural gas plants, according a recent Fraser Institute study.

BY JESSE CNOCKAERT

Measures by the federal government intended to electrify transportation will come with more pressure on the electric grid, leaving some experts questioning how well Canada will handle the increased energy demand.

"We certainly know that [electric vehicles], especially alongside other electrification … they're all going to add to electricity demand," said Daniel Posen, an associate professor in the department of civil and mineral engineering at the University of Toronto. "I think one of the big challenges, of course, is that we don't know exactly yet … what the charging behaviour is going to look like."

On Dec. 19, 2023, Environment Minister Steven Guilbeault (Laurier–Sainte-Marie, Que.) unveiled Canada's Electric Vehicle Availability Standard, intended to increase the supply of zero-emission vehicles (ZEVs) available across the country. The standard sets a national target of 100 per cent zero-emission vehicle sales by 2035, with interim targets of at least 20 per cent of all sales by 2026, and at least 60 per cent by 2030.

UofT professor Daniel Posen says 'there are all sorts of regional demands to make sure that we don't have too much congestion on our transmission lines,' when it comes to the electrification of mobility. *Photograph courtesy of Daniel Posen*

Posen, who is also a Canada Research Chair in System-Scale Environmental Impacts of Energy and Transport Technologies, told *The Hill Times* that he regards the electric vehicle (EV) sales mandate as "generally positive," but added that the transition will be a big challenge because of the many different dimensions related to electric transportation.

Challenges include building enough charging stations, as well as ensuring "sufficient generation, but also sufficient capacity" to meet peak energy loads, according to Posen.

"[There is] winter versus summer demand. There are all sorts of regional demands to make sure that we don't have too much congestion on our transmission lines. There are just a lot of pieces to juggle," he said. "I think probably the bigger challenge is going to be peak capacity, rather than total energy needs."

Posen said that, for example, the increased electricity demand in Ontario for the transition to EVs could be between 50 to 100 per cent of current levels.

"I think that is manageable. It sounds like a lot, but it's probably a few per cent per year, which is not unheard of in the past. We just have to take it seriously," he said.

Posen added that EVs are better than using vehicles with internal-combustion engines when it comes to greenhouse gas emissions, but reducing overall driving, such as through public transit, is even better.

"We do have a pretty clean grid throughout most of the country. Your electric vehicle is going to do better; it's going to be better for climate change. It's going to be better for air quality, and so it's generally pushing us in the right direction," he said. "If we can do things like investing in more transit, walkable cities, and these kinds of things to reduce the amount of … vehicle demand needed, that's always going to be better than driving more electrics."

In a follow-up email on March 12, Posen said the "flip-side misconception" is to think the widespread use of EVs would be sufficient on its own to address climate change, which it will not.

"EVs are a big help, especially for greenhouse gas emissions and air quality, but we shouldn't rely on them alone, because they are certainly not free from emissions or environmental harms; they're just better than most fossil-powered vehicles," he said in the emailed statement.

The requirement for all vehicle sales in Canada to be electric within 11 years could put a strain on the country's electricity grids, according to a study released on March 14 by the Fraser Institute, a Canadian public policy think tank.

The annual increases in electricity demand could range from 46.8 terawatt hours (or 7.5 per cent of total generation) to 95.1 terawatt hours (15.3 per cent), which would require the equivalent of 10 new mega hydro dams or 13 large natural gas plants, according to the study.

"Canadians need to know just how much additional electricity is going to be required in order to meet Ottawa's electric vehicle mandate, because its impact on the provinces—and taxpayers and ratepayers—will be significant," Cornelis van Kooten—the report's author, a Fraser Institute senior fellow, and professor of economics at the University of Victoria in British Columbia—said in a press release.

Vehicle owners are likely to get into the habit of recharging their EVs in the evening when they arrive home from work and keeping them plugged in overnight, similar to how they recharge their phones, and recharging batteries in the late afternoon or evening will lead to an increase in peak load, according to the study. Nuclear energy is cited by the study as among the most feasible and reliable clean energy options to handle the demand because "nuclear technology has constantly been improving and nuclear reactors are now safer than ever before."

Environment Minister Steven Guilbeault says 'getting more electric vehicles on the road is another example of how we are taking climate action while helping make life more affordable.' *The Hill Times photograph by Andrew Meade*

Wind and solar power cannot serve as a baseload power source because of the intermittent availability of those sources, and stored hydroelectric capacity is determined by the capacity of the generating units and the height of the water in the reservoir behind the dam, which can fluctuate from year to year or season to season, according to the study.

"Unless society begins almost immediately to develop the required generating infrastructure, it will not be possible to meet the expected demand that EVs might pose for electricity grids in Canada," reads the Fraser Institute study. "That is, if governments continue to push for an all-electric vehicle fleet by continuing to subsidize EV purchases directly, and through policies that raise gasoline prices and requiring all vehicles sold beyond 2030 or 2035 to be electric, it would be necessary to start construction of power plants to meet the anticipated increase in demand."

When the federal Electric Vehicle Availability Standard was announced, Environment Canada said in a press release that the government is "confident that the country's evolving electricity grid will be able to support the large increase in electric vehicles," adding that ZEVs are projected to account for about five per cent of total electricity demand in Canada in 2035, and 9.5 per cent in 2050.

A Tesla EV is plugged into a CAFU En-Charge mobile electric vehicle charging station on Sparks Street as part of a showcase of the Canadian Zero-Emissions Vehicle supply chain on Sept. 27, 2023. *The Hill Times photograph by Andrew Meade*

A 2020 report commissioned by Natural Resources Canada said that the total annual load growth due to EV charging has the potential to be 20.4 terawatt hours (TWh) in Canada by 2030, 104 TWh by 2040, and 156.5 TWh in 2050. That forecasted ZEV load is equivalent to adding Ontario's 2019 annual electrical load to the national grid, according to the report.

Meena Bibra, senior policy adviser for Clean Energy Canada, told *The Hill Times* that the 2050 deadline provides about 25 years to start planning for the increased demand.

"When we look at whose responsibility it is to really help with meeting some of these climate ambitions, EV sales targets, [and] charging infrastructure targets as well, everybody has to have hands on deck. It's not just the federal government," said Bibra. "The federal government has set these targets and is supporting them. They have spent nearly a billion-and-a-half dollars on charging infrastructure, but other public and private sector players also play a pretty important role, and that includes car companies. Provincial governments can also offer their own financial rebates, whether it's EV rebates or public charging program rebates. This is really going to be a mixture of different actors that will make sure that we are reaching those sales targets and emissions targets that we need to get to."

Meena Bibra, senior policy adviser for Clean Energy Canada, says 'when we look at whose responsibility it is to really help with meeting some of these climate ambitions, EV sales targets, [and] charging infrastructure targets as well, everybody has to have hands on deck.' *Photograph courtesy of Meena Bibra*

Brian Kingston, president and CEO of the Canadian Vehicle Manufacturers' Association, says 'what we need to do is build out the ecosystem to support the transition to electric, and that's where we're falling short.' *Photograph courtesy of Brian Kingston*

Bibra argued that the EV sales mandate represents Canada "joining the pack," and referred to the United Kingdom, South Korea, and the European Union which all have similar emissions standards. The EU has set a standard that requires zero carbon dioxide emissions for all new cars and vans from 2035 onwards.

The EV sales mandate in Canada will offer predictability, according to Bibra.

"One of the best things—and this is why the EV availability standard really is that last piece of the puzzle that will help ramp up adoption across Canada—it'll also help electric utilities and other charging infrastructure stakeholders make sure that they're prepared for EVs," she said. "When you know that 20 per cent of sales will have to be EVs in 2026, and that's going to go up to 100 per cent by 2035, that … gives that market certainty and that investment certainty."

The two biggest challenges in achieving Ottawa's regulated EV sales targets are affordability, and building the needed charging infrastructure, according to Brian Kingston, president and CEO of the Canadian Vehicle Manufacturers' Association.

Kingston argued that using a sales mandate as a regulatory tool to get to 100 per cent EVs by 2035 is the wrong approach, and that the mandate "sets Canadians up for failure."

"We should not be dictating what vehicles Canadians can and can't buy. What we need to do is build out the ecosystem to support the transition to electric, and that's where we're falling short," he said.

To help Canadians purchase ZEVs, Ottawa has introduced programs, including an Incentives for Zero-Emission Vehicles program (iZEV) for light-duty vehicles that offers up to $5,000 to individuals and businesses for the purchase or lease of light-duty ZEVs.

Kingston told *The Hill Times* that the iZEV program has been extremely popular, but said it is not a long-term help because it is set to expire on March 31, 2025, or end sooner if available funding is fully exhausted.

"We need to see a long-term commitment to this incentive program until the price gap between an electric vehicle and a gas-powered vehicle closes, and that's not going to happen overnight," said Kingston. "The industry's creating a North American EV battery supply chain as we speak, but that takes time, and that is costly. We need government to step up and do more at a federal level on incentives to address the affordability challenge."

Kingston also raised concerns that the needed charging infrastructure could be developed in time to accommodate the expanded number of EVs on the road.

"There are about 27,000 operational public chargers today, and according to the federal government we need 442,000 in 11 years," he said. "That requires building over 100 chargers every single day for the next decade. I don't see any path to that at the current pace of build out. I need to see a more clear, comprehensive plan with some urgency behind it to close that gap and make sure that we've got the charging network available to support a fully electric fleet, and as it stands today, I'm not convinced that that plan exists."

The EV availability standard is intended to include benefits such as channeling supply to Canadian markets instead of going abroad, and reducing customer wait times, according to an Environment Canada press release.

"Many Canadians are increasingly eager to make the switch to cleaner transportation, since it's a win-win-win in savings, their heath, and the environment. Putting in place an Electric Vehicle Availability Standard fulfills a major climate commitment from our climate plan. Getting more electric vehicles on the road is another example of how we are taking climate action while helping make life more affordable. And our investments to position Canada as a significant player in the global electric vehicle manufacturing and battery supply chain shows how we are taking advantage of the economic opportunities provided by the emerging low-carbon economy," said Guilbeault in the press release.

Greig Mordue, a professor of engineering at McMaster University in Hamilton, Ont., and former general manager of Toyota Motor Manufacturing Canada, told *The Hill Times* that Ottawa has "completely overspent for the electrification of mobility," in terms of the automotive manufacturing industry.

"We're prepared too early. That seems counterintuitive, but the reality is we are prepared and spending for an electric vehicle transition that is going to happen several years from now," he said.

The American Inflation Reduction Act (IRA) was introduced in August 2022, and included hundreds of billions of dollars in new spending and tax breaks to encourage clean energy industries in the United States.

Mordue argued that investments intended to attract EV manufacturing plants to Canada could have been significantly lower if Ottawa had waited until closer to 2032, when the IRA tax credits are set to phase out.

"Remember, about 10 per cent of the North American market is electric vehicles right now, which means 90 per cent of the market is internal-combustion-engine vehicles," he said. "We don't want to have 90 per cent of our plants scrambling around for 10 per cent of the market. We should have waited, and if we would have waited, we would have got closer to the end of the Inflation Reduction Act and the plants that we paid $50-billion for … we probably could have got for a fraction of that, and we would have been more aligned with what's happening in the market."

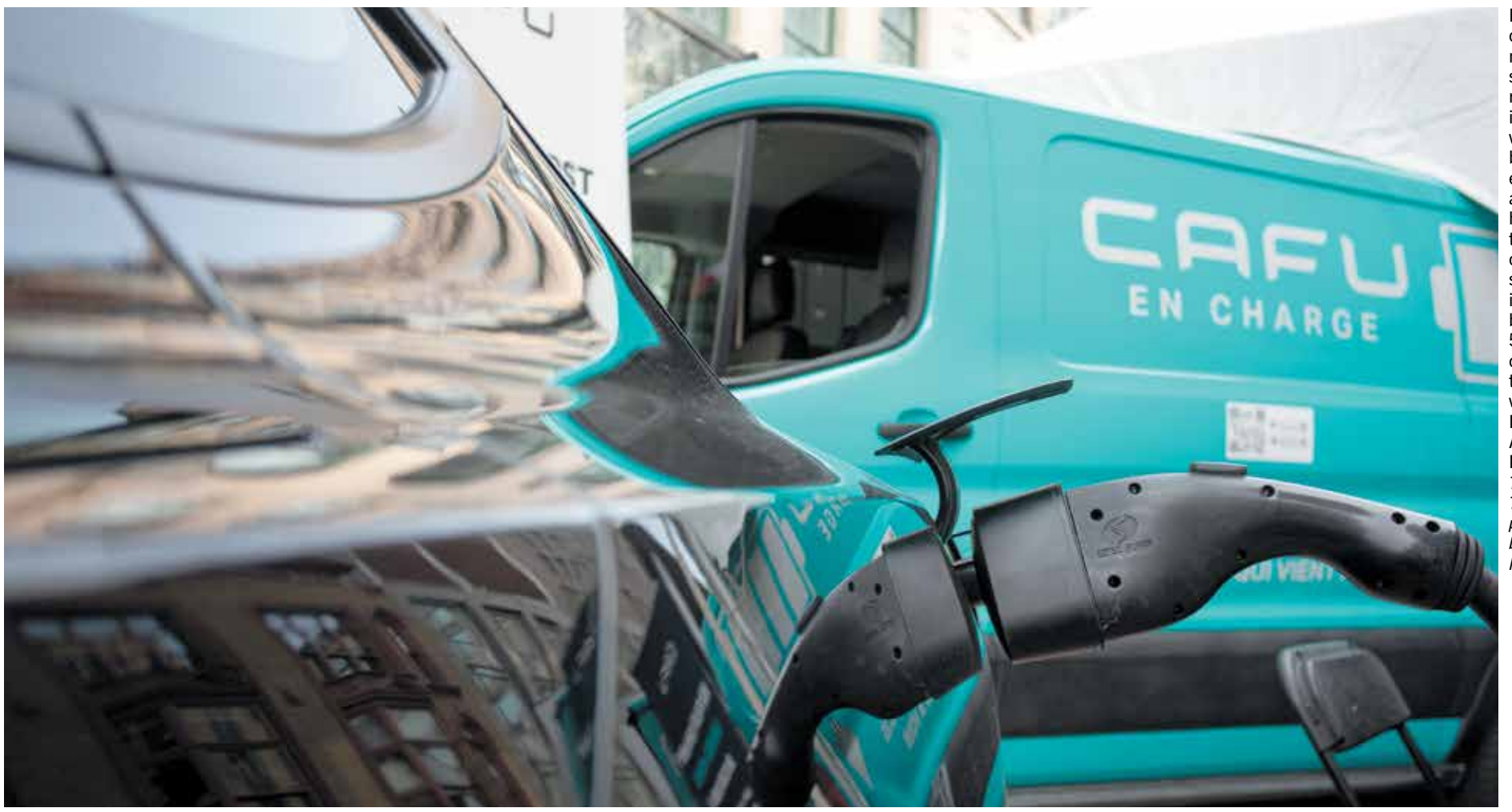
jcnockaert@hilltimes.com
The Hill Times

Electric vehicle (EV) statistics

- In 2022, global EV sales represented 14 per cent of all vehicles sold, marking a substantial increase from the nine per cent market share in 2021.
- This rise, led by China and Europe, contributed to a total of more than 26 million EVs on roads, with battery electric vehicles (BEVs) driving about 70 per cent of this growth.
- Quebec, Ontario, British Columbia, and the territories have led in ZEV representation in recent years, accounting for 92.2 per cent of new ZEV registrations in Canada from 2018-2022.
- In 2017, zero-emission vehicles represented one per cent of new Canadian vehicle registrations, growing by more than tenfold to 10.3 per cent through the first three quarters of 2023.
- While some provinces are plateauing in residential energy demand, B.C. experienced consistent growth from 69,962 terajoules in 2018, to 78,082 terajoules in 2022. In 2018, ZEVs represented 0.5 per cent (14,773 vehicles) of registered light-duty vehicles on B.C. roads, growing to 2.8 per cent (91,528 vehicles) in 2022.
- However, Alberta—which demonstrated the second-largest percentage increase from 2018-2022 in residential energy demand—appeared in the lower end provincially, with ZEVs representing 0.3 per cent of total light-duty vehicle registrations.

—Source: Watt's up? Electric Vehicles and future electricity generation needs, released by Statistics Canada on Jan. 30, 2024

EVs and EV Infrastructure Policy Briefing



In Canada, one-in-nine new car sales registered in 2023 were either battery electric or a plug-in hybrid, and the number of ZEVs sold increased by almost 50 per cent compared to 2022, writes Liberal MP Adam van Koeverden. *The Hill Times photograph by Andrew Meade*

The electric-vehicle era is just getting rolling

Canada is going electric by producing critical minerals and cutting-edge batteries, re-tooling passenger vehicle plants, manufacturing electric vehicles, and much more.

Liberal MP Adam van Koeverden

Opinion

More well-paying jobs for Canadians. Lower fuel and maintenance costs. More options and availability, increasing charging stations, falling sticker prices, better air quality. A major win in the fight against climate change.

The shift to electric vehicles (EVs) will benefit all of Canada: our economy, environment, health, and well-being.

My EV has more than 50,000 km on it, and there is definitely no turning back for me. It's a better car, an enhanced driving experience, cleaner, greener, and more efficient. It's also way more convenient—I spend less time fuelling up since I charge overnight at home, and it doesn't require oil changes as the only liquid it uses is windshield washer fluid.

My commutes to Ottawa include a civilized 40-minute breakfast and email stop around a Kingston, Ont., fast charger. Overall, zero-emission vehicles are a big upgrade to the way we get around.

By producing critical minerals and cutting-edge batteries here in Canada; re-tooling passenger vehicle plants; manufacturing electric buses, vans, and trucks; developing hydrogen technology; and rapidly expanding our national network of electric charging stations, this country is going electric.

Canadian household finances, our workers, and the health of our downtown communities and heavy traffic corridors all stand to benefit.

More and more Canadians, including my neighbours in Milton, Ont., are discovering the many benefits of zero-emission vehicle (ZEV) ownership. Down in Oakville, Ont., the Ford Motor Company is preparing and retooling to become a "high-volume" EV manufacturing hub.

More than 50 models of ZEVs were available in Canada last year, with many more expected in 2024. Perhaps the best news is that prices have started to fall, there are more used EVs available, battery costs are decreasing, and automakers are bringing more compact vehicles to market. Chargers are popping up everywhere due to government programs, private sector efforts, and consumer demand.

In 2023, global sales of electric cars reached around 14 million, meaning almost one-in-five cars sold was electric. In Canada, one-in-nine new car sales registered in 2023 were either battery electric or a plug-in hybrid, and the number of ZEVs sold increased by almost 50 per cent compared to 2022. Meanwhile in Norway, which is a few years ahead of us, more than 82 per cent of new car sales in 2023 were ZEVs.

Recently a United States study found that the switch to zero-emission vehicles will have a dramatic reduction in the amount of childhood asthma in neighbourhoods near heavy traffic corridors.

But I still hear concerns about long wait times to get a new zero-emission vehicle, and the need for more charging stations.

As an Olympic kayaker, I know the importance of everyone paddling in the same direction. That's why our government is building more charging stations, supporting made-in-Canada manufacturing of vehicles and batteries, and ensuring Canadians have market access to the new vehicles they want and need. But every level of government needs to get on board; British Columbia and Quebec outpace the rest of the country in terms of sales and infrastructure thanks to provincial government support. Towns and cities with more charging infrastructure have better uptake as well.

Our government's Electric Vehicle Availability Standard is driving Canada towards our goal of all new light-duty vehicle sales in Canada being electric or plug-in hybrids by 2035. The first interim goal of 20 per cent by 2026 is essential to grow the sector, satisfy consumer demand, and meet our emissions reduction targets.

Canada's total GHG emissions have already declined by seven per cent since 2015, but meeting our 2030 targets depends on ramping up the sale and use of zero-emission vehicles. The Electric Vehicle Availability Standard will help drive that momentum.

All of these ambitions include plug-in hybrids that allow drivers to make short trips running on electricity and only use fossil fuels when towing or on a longer road trip in the winter. These are perfect for Canadians still hesitant about making the switch to an all-electric model, and the technology is perfect for trucks and delivery vehicles. Having an electric-only driving option for shorter trips is like diversifying your fuel-option portfolio.

Combined with federal investments in public transit systems, clean fuel regulations, and federal support for cycling and walking paths, Canada is lowering emissions from its transportation sector.

That's a big win for Canada. We've always been global leaders, punching well above our weight with respect to our innovation, economy, and environmental stewardship. That will continue as we electrify our transportation sector—gold medals for our planet, people, and pocketbooks.

Adam van Koeverden is the Liberal Member of Parliament for Milton, Ont., and is the parliamentary secretary to the minister of sport, and the parliamentary secretary to the minister of the environment and climate change. He is known for his dedication to public service and sports excellence. Van Koeverden is a celebrated Olympic kayaker who has represented Canada at four Olympics winning one gold medal, two silver, and a bronze. He is a first-generation Canadian, and grew up at Chautauqua Co-op in North Oakville, Ont.

The Hill Times

Driving down emissions with electric school buses

Transitioning to cleaner alternatives such as electric school buses would mean cutting out more than four million tons of carbon dioxide from our emissions every year.

NDP MP
Laurel Collins

Opinion

Every day, more than two million children in Canada take the bus to go to school—that's 51,000 school buses. These buses emit unnecessary, yet dangerous, amounts of carbon into the atmosphere, affecting our children's health and well-being, as well as our environment.

Solutions exist, but we need a government that's willing to take bold steps to drive down emissions. An electric school bus program would go a long way in achieving this. The switch from diesel-run school buses to electric would not only reduce carbon emissions, but it would also keep our kids and our environment healthy.

Toxic emissions from diesel and gas-powered vehicles greatly affect the air quality that we're breathing in our cities. Health experts warn us that exhaust from school-bus engines can lead to negative health impacts. In fact, children are much more likely than adults to be affected by breathing in polluted air, and are at higher risk of developing asthma and other lung complications if they are often exposed to traffic exhaust.

Every day, diesel-powered school buses are releasing significant amounts of particulate matter into the air, and our government isn't doing enough to address the issue.

The reality is that transportation currently makes up nearly a quarter of all greenhouse gas emissions in Canada. When it comes to decreasing those emissions, we need to tackle the problem from multiple angles. Transitioning to cleaner alternatives such as electric school buses would mean cutting out more than four million tons of carbon dioxide from our emissions every year. If the Liberal government wants an easy solution to tackle carbon emissions, then an electric school bus program is a major first step to take.

Canada's 2030 Emissions Reduction Plan has set a goal to reduce greenhouse gas emissions by 40 to 45 per cent below 2005 levels by 2030. To achieve this, it aims for 35 per cent of medium- and heavy-duty vehicle sales to be zero-emission vehicles by 2030. This should include school buses, but the Liberals have shown no signs of including them in any of their emission-reduction strategies.

The upfront cost of transitioning to an electric school bus fleet across the country is worthwhile when considering the long-term impacts. While we would undeniably be reducing our emissions, which is already worth the cost, electric vehicles have a lower maintenance and operating cost than traditional diesel engines. Furthermore, school districts would be able to save money on the gas to run the buses. And, most importantly, replacing one diesel school bus with an electric school bus can save $11,800 in health costs related to diesel pollution. When you think about the 51,000 buses being used every day, that number is substantial.

Our world is changing so quickly. But that's a good thing. To fulfill our international commitments, Canada must rapidly reduce our emissions, but under the Liberals, Canada isn't on track to meet emission targets and we have the worst climate track record in the G7. And with the Conservatives, there's no talk of solutions because they're still debating if climate change is real or not.

Our children deserve a healthier and cleaner future, and that starts with electrifying school buses—an achievable policy if the federal government stepped up and committed funding. Solutions like electrifying school buses mean that our cities can be cleaner, our environment healthier, and our quality of life better.

In an era in which technological advancements are rapid and constantly changing, the transition to electric school buses shouldn't be a difficult switch. The integration of cutting-edge battery technology and improvements in charging infrastructure is making electric buses more efficient and accessible. By investing in this transition, Canada would not only address the immediate environmental concerns, but also position itself at the forefront of innovation in sustainable transportation.

The urgency to fulfill our environmental commitments is increasing every day. The rapid pace of change demands bold solutions, not more Liberal broken promises and delays, or Conservative denialism of the problem.

Electrifying school buses stands out as a tangible and impactful step. It's an investment not just in transportation, but also in the well-being of our communities and the future of our children. By embracing this shift, we pave the way for a cleaner, greener, and more sustainable Canada.

NDP MP Laurel Collins, who represents Victoria, B.C., is her party's environment and climate change critic, as well as the deputy critic for families, children and social development.

The Hill Times

Canada has all the resources and tools we need to benefit from a clean and green economy

To be competitive, we need to be able to use our grid like a battery, and all Canadians should be encouraged to install renewable energy systems, writes Elizabeth May. *Pexels photograph by Gustavo Fring*

We only lack the political will to remove jurisdictional obstacles that hold us back from ensuring that Canada's electricity grid is smart and integrated.

Green Party Leader
Elizabeth May

Opinion

In seeking transformational climate solutions, Saul Griffith's 2022 book title says it all: *Electrify: An Optimist's Playbook for Our Clean Energy Future*.

We have known this for decades. Back in October 2002, when I was executive director of the Sierra Club of Canada, we teamed up with the David Suzuki Foundation and Climate Action Network for a groundbreaking report, *Kyoto and Beyond*. Our legally binding target was to reduce greenhouse gas emissions six per cent below 1990 levels, and to have achieved it between 2008 and 2012. Then-prime minister Stephen Harper cancelled that commitment without regard to our international reputation for honouring a legally binding treaty. As soon as permitted under Kyoto, he legally withdrew us from the protocol—the only nation to have done so.

Kyoto and Beyond showed in detail how we could deliver on those emissions cuts. The research by energy analysts Torrie Smith Associates demonstrated that over the previous two decades, without really trying, Canada had delivered enormous gains in energy productivity. In other words, our economy benefited from doing more with less. Looking to deliver on Kyoto, it was all within reach. The bottom line was that without building a single new mega dam or nuclear power plant, our existing electrical system could be more efficient and deliver on climate commitments while boosting the economy. The only needed investments were in modernizing and ensuring the connectivity of our national grid.

Here we are two decades later, and not yet near our 2012 target. But the world is moving toward those 2002 recommendations. The COP28 global stocktake calls on all governments to double domestic energy efficiency and to triple renewable energy installations—and do both by 2030.

Where in these goals does the Liberal target for electric vehicles (EVs) fit? They are totally consistent, but insufficient, primarily from an equity standpoint. All Canadians deserve to have access to affordable, sustainable, and secure ground transit systems. It is a key call for justice from the Inquiry into Missing and Murdered Indigenous Women and Girls and 2S+ peoples. Canadians, no matter where we live—whether in urban centres or in rural and remote areas—should be within walking distance of safe public transit. Ideally, we need a multi-modal and interconnected system of buses and trains. Those systems should be electric. But they should not be modelled on the car culture of the privately owned car.

It is increasingly clear that the overarching status of the personal automobile in urban planning for roads and parking lots is a prime occupier of valuable surface area that could support emergency housing. We need not replicate car culture as we move to EVs and self-driving vehicles.

As for needed infrastructure for EVs, we need not overbuild. For most homeown-

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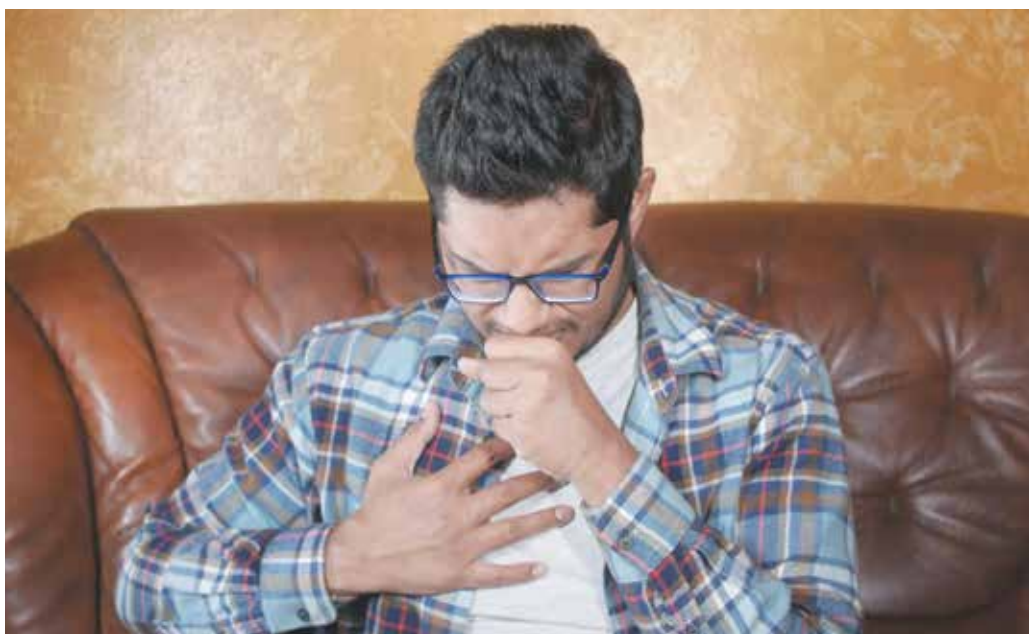
The true cost of gas-powered medium- and heavy-duty vehicles

Diesel-powered MHDVs are a disproportionately large contributor to traffic-related air pollution, which contributes to 1,200 premature deaths annually.

Adam Thorn & Sarah Butson

Opinion



According to a 2023 poll conducted by Abacus Data for the Canadian Lung Association, 79 per cent of respondents are concerned about the effect of traffic emissions on air quality, write Adam Thorn and Sarah Butson. *Pexels photograph by Towfiqu Barbhuiya*

Operators of medium- and heavy-duty vehicle (MHDV) fleets frequently cite cost as one of the single biggest impediments to purchasing battery-electric trucks to replace gas- or diesel-powered ones. But the sticker price of a fossil-fuelled vehicle doesn't reflect its true cost. We urge the Government of Canada to consider the embedded costs to our health-care system, our environment, and the well-being of Canadians, and to implement policies that will accelerate the transition to low-carbon road freight.

Diesel-powered MHDVs are a disproportionately large contributor to traffic-related air pollution (TRAP). According to Health Canada, TRAP contributes to 1,200 premature deaths, 210,000 asthma symptom days, and 2.7 million acute respiratory symptom days every year. The four-in-10 Canadians who live within 250 metres of a high-traffic roadway are especially vulnerable. And children whose lungs and brains are still developing are at even greater risk. Forty-eight per cent of schools are located within 200 metres of areas that experience high traffic volumes, and approximately 2.2 million children in Canada travel on school buses every day, 70 per cent of which are diesel-fuelled. A known carcinogen, diesel exhaust contains a mixture of toxic particles that are small enough to be inhaled deep into the lungs. Health risks range from throat and lung irritation, wheezing, and coughing, to impaired cardiac function, and lung, breast, and bladder cancer. Exposure to diesel exhaust has been linked to the development and worsening of asthma symptoms, behavioural and neurological problems, and even childhood leukemia.

The Government of Canada has already begun a push towards the electrification of MHDVs. Since July 2022, the federal government has offered purchase incentives to encourage uptake. In December of 2022, Transport Canada unveiled Canada's Action Plan for Clean On-Road Transportation to boost the number of zero-emission MHDVs available for sale. Last August, the government invested $3-million in the Zero-Emission Trucking Program to encourage sector-wide readiness for transitioning to clean transportation.

But it's time for more action, and the Canadian public agrees.

According to a 2023 poll conducted by Abacus Data for the Canadian Lung Association, 79 per cent of respondents are concerned about the effect of traffic emissions on air quality, and 83 per cent support the electrification of school buses. Eighty-two per cent support regulations that require auto makers and importers to sell zero-emission MHDVs as an increasing percentage of their total sales until all new trucks and buses sold are emission-free models by 2040.

It's time that we reframe concerns about the upfront expense of purchasing an MHDV. Instead of posing the issue as a matter of *price*, it should be framed as a matter of *cost*. We must consider the costs of conventional road freight over its lifespan, as well as the costs of TRAP-related diseases and health issues. And this cost is not insignificant. The Atmospheric Fund has calculated that Canada's proposed federal zero-emission vehicles regulation will result in more than $90-billion in health savings over the next 25 years, including up to 11,000 avoided premature deaths.

This reframing will not happen organically. The federal government must advance the electrification of MHDVs through implementing policies and regulations (including a progressive sales standard) that accelerate the replacement of internal-combustion MHDVs with low-carbon ones. Given the host of benefits that accompany a switch to zero-carbon road transport, and the urgency of the climate crisis, there is little time to lose. Stronger regulations to speed up the transition to emission-free vehicles is vital to reducing the negative health impacts of fossil-fueled MHDVs and ensuring a climate-safe future for all Canadians.

Adam Thorn is the director of the Pembina Institute's transportation program. Sarah Butson is the incoming CEO of the Canadian Lung Association.

The Hill Times

Canada has all the resources and tools we need to benefit from a clean and green economy

Continued from page 19

ers, it is convenient and affordable to install a home energy charger. For plug-in hybrids, it is easy to use an extension cord to any three-prong utility plug.

The claims I hear repeated in the House from rural MPs that EVs will not work because the charging stations have not yet been installed in their area are laughable. Anyone living in a rural area with an electric vehicle already knows how much money they save just plugging in their car to standard outdoor plugs. None of this is complicated.

Where it does get complicated is in ensuring that Canada's electricity grid is smart and integrated between and among provincial jurisdictions.

We are less connected with each other than the separate sovereign nations of the European Union are. We need a full-court press for co-operation to enhance the grid. If the EU can be described as having a "smart grid," we have a really stupid one. Yet, to be competitive we need to be able to use our grid like a battery. Wherever you are in Canada, everyone should be encouraged to install renewable energy systems, generate electricity when the sun is shining and the wind is blowing, and feed electricity production in excess of domestic requirements into the grid.

When the wind is not blowing and the sun is not shining, every Canadian should be able to pull electricity from that grid. Across the pond, separate nation states have it figured out. Denmark sells its excess wind-generated electricity by underwater cable to Norway. Norway's elegant electricity "battery" is in "pumped storage." The Danish wind-generated power pumps water from lower elevations into reservoirs at higher levels. When Norway needs more electricity, it opens the floodgates in those reservoirs to generate hydro power. The released water awaits wind-generated electricity to pump it back to higher elevations and future recycled hydro power in Norway.

The technology is elegant, simple, and clean. And it meets another COP28 goal: the move toward a circular economy.

Canada has all the resources and tools we need to benefit from a clean and green economy. We only lack the political will to remove jurisdictional obstacles that hold us back. We owe it to Canadians to think—and act—like a country.

Elizabeth May is the Green Party Leader and MP for Saanich–Gulf Islands, B.C.

The Hill Times

Charging, range anxiety, and price still barriers to mass EV adoption—but there are potential solutions

The things holding back a lot of people from taking the EV plunge are a mix of real problems and lingering myths.

Kristine D'Arbelles

Opinion

Electric vehicle sales in Canada have grown tremendously in the last couple of years to the point where they have burst through 10 per cent of new vehicle purchases. But there's lingering doubt whether this rate of growth will continue or if we could be coming to the end of the first great boom in EV sales.

The things holding back a lot of people from taking the EV plunge are a mix of real problems and lingering myths. It's a fact that four-in-10 Canadians buy used vehicles, and that market is in its infancy for EVs. It's a fact that most Canadians buy pickups and SUVs, two categories in which EVs are just starting to make their mark. And it's a fact that the average new EV is at a higher price point than an equivalent internal-combustion vehicle—a gap in pricing that may not lessen in the short term, as government incentives appear to be melting away, with Quebec being the latest to announce plans to phase them out.

Although the satisfaction rates among EV drivers are extremely high, if we want to get to mass adoption, we need to take a real hard look at our public charging infrastructure, writes Kristine D'Arbelles. *Unsplash photograph by Zaptec*

But there are some more positive facts as well: both the range of models available and the used market will continue to grow. So, to a certain extent, the market will take care of some of the reasons people hold back.

Meanwhile, according to the Canadian Automobiles Association's (CAA) recent survey of 16,000 EV drivers in Canada, satisfaction rates among EV drivers are extremely high. An overwhelming majority (97 per cent) say they will purchase another EV when it comes time to replace their existing one. To buy one is to love them, despite some of the obstacles.

Nevertheless, there are a couple of key barriers outside the auto market itself that need to be addressed, as CAA research has shown.

Range anxiety is still a top barrier, only behind price. The reality is that the average Canadian drives about 40 kilometres a day, making it highly unlikely they will run out of charge on the side of the road. But this myth persists, and our research shows that more than half of Canadians say they won't purchase an EV because they worry about the vehicle's range.

This ongoing range anxiety goes beyond just the everyday drive. Two-thirds of Canadians say they won't purchase an EV because driving range is limited on road trips. This is a more valid worry, as the charging network gets sparse once you are out of the big cities and major highway corridors. Even EV owners don't trust the out-of-town network: more than two-thirds in our survey still own an internal-combustion engine vehicle, and more than a third of them say they prefer taking their gas vehicle on long road trips.

If we want to get to mass adoption, we need to take a real hard look at our public charging infrastructure. More than one-in-four EV owners in Canada rated their satisfaction with charger reliability, location convenience, and speed of charger negatively. Our country is good at installing chargers, but not so good at maintaining them. It is important that governments require organizations who install chargers to provide a maintenance plan if they want to qualify for funding. There are too many stories of broken chargers.

We believe clear and fair labelling of EV range is also crucial in building up confidence. We live in a winter country, and while studies on cold-weather performance of EVs vary, they all agree that an EV battery loses range in the cold. And yet, auto manufacturers only publish an average driving range for their vehicles, despite the fact EVs can lose up to 40 per cent of their range in the cold.

These labels also need to be prominent. More than half of Canadians are not even aware that new EVs must display even the average driving range on their window sticker. And those averages come from American work from the Environmental Protection Agency. CAA believes this work should be done in Canada, under Canadian conditions, by a neutral third party such as the government.

Honest, apples-to-apples figures will lead to greater consumer confidence, and fewer myths.

EVs are an important part of the future. With an increased focus on getting public charging right and clear labelling of EV range, we can help increase the confidence drivers have in making the switch.

Kristine D'Arbelles is the senior director, public affairs for Canadian Automobile Association (CAA) National. She strategically manages and executes communications initiatives and programs on CAA's five pillars: road safety, environment, mobility, infrastructure, and consumer protection. D'Arbelles has been one of the lead spokespersons on CAA National's research on EVs in Canada.

The Hill Times

EV sales regulation sets Canadians up for failure

Instead of regulating what vehicles Canadians buy, time and resources would be better spent regulating the availability and reliability of Canada's charging network.

Brian Kingston

Opinion

The ink is barely dry on the federal government's electric vehicle (EV) sales mandate and there are already signs that the regulated sales targets are out of reach. Without stronger efforts to address the barriers facing Canadians who want to switch to electric—namely affordability and charging infrastructure—the regulations are designed to fail.

The sales mandate dictates what vehicles Canadians can and can't buy, with a requirement for 100 per cent EV sales by 2035. With only 11 years to increase EV sales from 11 per cent of light-duty vehicle sales in 2023 to 100 per cent, a serious plan is required to not only address the well-know barriers to widespread EV adoption in Canada, but also to ensure a successful transition for the automakers that have invested in Canada.

According to the federal government's own analysis of the regulation, the sales mandate will have a disproportionate and negative impact on low-income, rural, and northern Canadians. This is due primarily to the higher costs of EVs and a lack of charging infrastructure options at home and in public places.

The average transaction price for an EV today is approximately $14,000 higher than the average price of a vehicle powered by an internal-combustion engine. While that price gap is expected to close over the next decade, stronger consumer purchase supports are required if sales are going to reach the mandated target levels.

The federal government's consumer Incentives for Zero-Emission Vehicles program offers Canadians up to $5,000 when they purchase an EV. The program has been hugely successful, rebates totalled $712.6-million last year. At the current pace, the program will be out of funds well before the first mandated sales target of 20 per cent EV sales in 2026. Budget 2024 should recapitalize the program and increase the size of the incentive if the sales targets are to be realized.

But solving the affordability challenge is relatively straightforward compared to the bigger barrier: a lack of convenient charging infrastructure. A recent survey of EV drivers by Pollution Probe found that most drivers are not satisfied with the existing public charging network. Even in Quebec, the province with the best charging network in Canada, just 40 per cent of EV drivers reported satisfaction with charger availability.

The federal environment and sustainable development commissioner underlined Canada's charging infrastructure challenges, noting in a 2023 report that "if the number of charging ports does not keep pace with the zero-emission vehicle sales targets, there is a risk that these targets will be unachievable."

With only 27,000 operational public chargers of a required minimum of 442,000 chargers, there is no path to 100 per cent ZEV sales. Closing the charging gap requires more than 100 public chargers to be built every single day for the next 11 years.

Even more concerning is the survey findings on charger reliability. Nearly 20 per cent of EV drivers in Quebec and up to 44 per cent in other provinces reported experiencing outages. Imagine half of the population reporting gas station outages.

The unreliability of Canada's charging infrastructure is simply unacceptable. Instead of regulating what vehicles Canadians buy, time and resources would be better spent regulating the availability and reliability of Canada's charging network. The European Union and United States understand this and have developed charging coverage and reliability standards. Canada must follow suit.

Failing to address these barriers to EV adoption, while simultaneously mandating sales, will leave Canadians at the curb. Transitions to new technology require industry and government to work together on solutions. An honest conversation about barriers to success and how to manage this transition considering those is long overdue. Without it, we risk not just losing ground on the transition, but losing jobs in the process.

Brian Kingston is president and chief executive officer of the Canadian Vehicle Manufacturers' Association.

The Hill Times

The good news is that national registrations of zero-emission vehicles reached 11.7 per cent of new vehicle registrations in 2023, up from 8.9 per cent in 2022, writes David Adams. *The Hill Times photograph by Andrew Meade*

Will we beat the clock to achieve our zero-emission vehicle adoption goals?

All of us are in uncharted territory, but the known obstacles represent some real challenges to hitting the zero-emission vehicle targets.

David Adams

Opinion

From the point of view of the automotive industry, the more relevant question is: will we beat the clock in achieving our sectoral greenhouse gas emission reduction goals? However, that ship has sailed with the federal government passing its national zero-emission vehicle (ZEV) mandate regulation late last year, packaged in a more voter friendly wrapper as the Electric Vehicle Availability Standard (EVSA).

Government and industry are now collectively focused on technology adoption as opposed to GHG emissions reduction, and—let's be clear—one is not a proxy for the other. The other reality is that those two parties—the regulator and the regulated—are largely dependent on a third party: Canadian consumers, who through their choice of vehicle that meets their personal utility, lifestyle, and affordability needs, will determine if we hit the ZEV targets under the EVSA of 20 per cent in 2026, 60 per cent in 2030, and 100 per cent in 2035. So, the obvious questions are: where do we sit right now with respect to ZEV adoption, and what's it going to take to give us any hope of being able to achieve those targets?

On the first question, the good news is that according to S&P Global, national registrations of zero-emission vehicles reached 11.7 per cent of new vehicle registrations in 2023, up from 8.9 per cent in 2022, with pure battery electric vehicles making up 8.8 per cent of those registrations (versus seven per cent in 2022), while plug-in hybrid electric vehicles comprised 2.8 per cent of total registrations (versus 1.9 per cent in 2022). However, 11.7 per cent—while fantastic—is a long way from the almost double 20 per cent that will be required in 2026, and before we start thinking that that's still almost two years away, remember that automakers will be introducing some 2026 models in January 2025, or nine months from now.

According to S&P Global, back in April of last year, the forecast was for 2023 to end up with ZEVs reaching 12.8 per cent of new registrations, which we didn't quite achieve and the number they forecast almost a year ago for 2024 was 17.3 per cent. If that forecast persists, then getting to 20 per cent by 2026 looks achievable.

With respect to the second question of what it's going to take to give us any hope of being able to hit those targets, I'd highlight that there are some key obstacles in the way of hitting the S&P target for this year and next, and the 20 per cent for 2026 when the mandate kicks in, as well as the remaining mandate targets. These obstacles, in no particular order, are: how adoption is actually occurring, the old chestnuts of vehicle price and lack of sufficient charging infrastructure, mortgage renewals in Canada, and continued reliance on public incentives.

Touching briefly on each of these obstacles, with respect to adoption we need to understand that we are likely through or almost through the early adopters, so new ZEV consumers are going to require more education and convincing to make the shift, and this adoption curve moving forward will be lumpy, not smooth.

Regarding price, the federal government noted in its own regulatory impact statement issued along with the Electric Vehicle Availability Standard last year that it did not expect price parity with internal-combustion-engine vehicles until beyond 2035 in most segments. This represents a real challenge, and Quebec recently added insult to injury by announcing in its 2024 budget the phasing out of its ZEV incentive, which will likely significantly impact sales in the price-sensitive province.

With respect to charging infrastructure, our deficit there has been well documented and will continue to give consumers cause to reconsider whether the ecosystem can support their driving habits, regardless of how much they may wish to move to an EV. We are woefully behind where we need to be, but the real issue is ensuring that consumers can charge their vehicle where they live, and we have a herculean challenge to retrofit multi-unit residential buildings.

A less-obvious obstacle is the fact that last fall, the Canada Mortgage and Housing Corporation forecast that 2.2 million Canadians will be renewing their mortgage over the next two years and can expect a 30-40 per cent increase in their mortgage payments. Homeowners are also those well-enough heeled to afford relatively expensive ZEVs, so their budgets are going to be squeezed in a big way. This sleeper obstacle may become one of the more significant issues we need to overcome to attempt to hit our targets.

All of us are learning and are in uncharted territory, but the known obstacles represent some real challenges to hitting the ZEV targets, never mind the black swans that invariably appear and upset the apple cart. In the end, it will still all come down to the consumer.

David Adams is president and CEO of Global Automakers of Canada. Global Automakers of Canada members include 15 of the world's most prestigious auto manufacturers representing over 25 brands in the Canadian marketplace, as well as Canada's two largest vehicle producers, Toyota and Honda.

The Hill Times

INNOVATION

The Hill Times
February 5, 2024

Big look at Innovation Minister Champagne

Canada's innovation challenges

INNOVATION IN AI IN CANADA:
Lib MP Ryan Turnbull

INTELLECTUAL PROPERTY LITERACY AND CANADA'S PATH TO PROSPERITY

CANADIAN WOMEN RESEARCHERS make their mark

HIGHER VALUE MUST BE PLACED ON THE CREATION OF KNOWLEDGE: NDP MP CANNINGS

BEYOND COMMERCIALIZATION to full societal impact of research

CANADA HAS A STRONG HEAD START IN THESE EASY INNINGS OF AI

National strategy needed to address fragmented innovation ecosystem, say researchers

'There is a sense that we are not certain as to how we are going to invest, grow, and make our innovation ecosystem prosperous for the next generation,' says the University of Saskatchewan's vice-president of research.

BY JESSE CNOCKAERT

Innovation Minister François-Philippe Champagne said that 'today's science is tomorrow's economy,' and that the Liberal government is 'committed to ensuring that our talented, world-class researchers have the right support for the crucial work they are doing,' in a departmental press release on March 20, 2023. *The Hill TImes photograph by Andrew Meade*

Industry Minister François-Philippe Champagne shows "energy and passion," but putting the country's innovation ecosystem back on track will require addressing funding problems, and the fragmentation of vision and research support, according to researchers.

"We are at a standstill when it comes to either investments in innovation, which is part of the research, development and innovation landscape, and whether it comes to taking care of our major research facilities in the country, or making Canada an attractive place for talent to come and get educated and build their careers and advance their innovation story in our country," said Baljit Singh, vice-president of research at the University of Saskatchewan. "I use the word 'standstill' a little bit out of charity, but actually we have been losing ground on this front for a few years now."

When it comes to innovation, Canada is falling behind globally, according to Singh, with one of the major challenges stemming from a lack of a coherent, national strategy. Addressing fragmentation across the innovation ecosystem was among the recommendations in a report released on March 20, 2023, that was prepared by an independent advisory panel on the federal research support system.

"Because we know that today's science is tomorrow's economy, our government is committed to ensuring that our talented, world-class researchers have the right support for the crucial work they are doing. That is why we requested this report by experts and will thoroughly consider the report's recommendations as we advance our efforts to strengthen the federal research support system," said Champagne (Saint-Maurice—Champlain, Que.) in an Innovation, Science and Economic Development press release announcing the release of the advisory panel's report.

Singh was among the experts on the advisory panel, which was chaired by Frédéric Bouchard, dean of the faculty of Arts and Sciences at the Université de Montréal.

According to Singh, no progress has been made in implementing any of the report's recommendations almost a year after its release, although he said it could take some preparatory work for the federal government to take in the scope of the report and "really understand where the action needs to be."

"If I have to sum it up: Canada is uncertain. There is a sense that we are not certain as to how we are going to invest, grow, and make our innovation ecosystem prosperous for the next generation to come, and make Canada a very attractive place for the top-level talent to come into this country," said Singh. "How do we create an end-to-end connected system, not only for the funding from basic science to commercialization, but also from the cities or the villages and towns, to the provinces, to Ottawa?"

The three national funding agencies in Canada supporting research at post-secondary institutions are the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council of Canada, and the Canadian Institutes of Health Research—collectively referred to as the Tri-Agency or Tri-Council.

The granting councils "have excelled at their mission of knowledge creation and talent development," but funding levels have not kept pace with evolving needs, and the councils are also often tasked with mandates that are similar, but uncoordinated, according to the report. This fragmentation creates "lack of clarity among the various players with respect to their individual roles and responsibilities, non-complementary overlaps, inconsistency in supports between disciplines, and increased administrative burden for the research community," the report says.

To address fragmentation issues, the report recommends development of a new governance mechanism, called the Canadian Knowledge and Science Foundation, to work in parallel with the Tri-Agency, with the role of addressing emerging research and innovation needs, supporting co-ordination and planning across the research system, and co-ordinating the planning and implementation of talent development programs.

With the 2024 federal budget on the horizon, Singh said he is hoping for announcements that are "very emphatic, very bold," and that "will clear out all the uncertainty" for Canada's innovators.

"[Champagne] understands that it is through innovation we can ensure a prosperous way of life for Canadians," he said. "Whenever I met with him, I believe he has the drive and the energy. He's doing regular activities and bringing investments into electric batteries, for example. But we need to work together somehow to move this file forward."

NDP MP Brian Masse (Windsor West, Ont.), his party's innovation critic, told *The Hill Times* that he considers industry scale-up to be one of the biggest hurdles holding back innovation in Canada.

"That's where I think we lag behind is protecting some of our own intellectual property patents," he said. "I think we have too many Canadian companies that are bought up as they scale-up. And it's very attractive to cash in on some of those advances that you make as a company, but not see it [through] to become a Canadian champion."

Masse said to help companies scale up, measures should be implemented aimed at reducing costs associated with supporting employees, such as through training, health and wellness.

"Supporting employees … is far more advantageous, because even if those companies decide to either leave, or are bought up or do not go forward, the skill set remains with the Canadian investment of the worker and a family," he said.

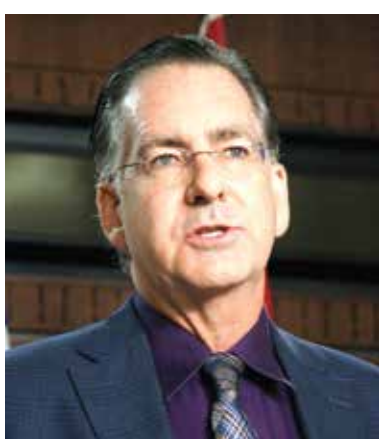
Masse said he gives Champagne credit for working hard and being approachable, but added he would like to see more national policies.

"I'd like to see more national strategies that are clear, [and] have direct, identifiable goals, and they're ones that can be measured, whether they be in aerospace, auto, all kinds of different other sectors … instead of trying to do one-hit wonders across the board or hail mary passes at the last end," said Masse.

Elicia Maine, associate vice-president of knowledge mobilization and innovation at Simon Fraser University in British Columbia, told *The Hill Times* that Champagne is doing a lot of things well, with examples including recent investments in bio-manufacturing. Since March 2020, more than $2.1-billion has been invested in the Canadian biomanufacturing and life sciences sector, according to an Innovation press release issued on Oct. 27, 2023.

Maine said that Canada is a nation of inventors that punches above its weight, but the challenge lies in converting inventions into patents and products. The university science innovation ecosystem needs a "build-for-scale" strategy that takes a longer view, according to Maine.

Baljit Singh, vice-president of research at the University of Saskatchewan, says 'If I have to sum it up, Canada is uncertain,' regarding the innovation ecosystem. *Photograph courtesy of Baljit Singh*



NDP MP Brian Masse says Canada lags behind when it comes to 'protecting some of our own intellectual property patents.' *The Hill Times photograph by Sam Garcia*

Elicia Maine, associate vice-president of knowledge mobilization and innovation at Simon Fraser University, says the university science innovation ecosystem needs a 'build-for-scale' strategy. *Photograph courtesy of Elicia Maine*

Continued on page 27

Investing in Canada's Future

Since the invention of the telephone in 1874, Canada has been at the forefront of innovation in telecommunications, and a leader in revolutionizing the way the world communicates.

Consistently among the largest R&D investors in Canada, network operators invested more than $2B in R&D in 2022 and Canadian-based equipment vendors spent hundreds of millions more.

In addition to driving technological advancement and competitiveness, these investments support thousands of jobs for highly skilled Canadians and maintain Canada's position as a hub for top-talent in the global telecommunications landscape.

Policies that foster continued private sector investment in network infrastructure and advanced technologies are essential to ensuring Canada's long-term prosperity, competitiveness, and sustainability.

Investing in innovation is investing in Canada's future.

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Canadian Telecommunications Association

Association canadienne des télécommunications

Innovation in AI in Canada

Start-ups and scale-ups in Canada's AI ecosystem are pushing boundaries in various domains, from healthcare and finance to natural language processing and computer vision.

The Artificial Intelligence and Data Act, part of Bill C-27, sets a foundation for regulating the design, development, and deployment of AI systems, writes Liberal MP Ryan Turnbull. *Photograph courtesy of rawpixel.com, distributed under a CC0 1.0 DEED license*

Liberal MP Ryan Turnbull

Opinion

Canada has emerged as a global hub for innovation in artificial intelligence (AI), fostering an environment that encourages research, development, and application of cutting-edge technologies. We were the first country to launch a fully funded national AI strategy to grow the economy and improve living standards, while retaining and attracting top research talent, and promoting the responsible development and use of AI.

Canada plays a leading role internationally. Through forums such as the G7, G20, OECD, and UNESCO, Canada actively shapes guiding principles for responsible AI, and helps develop tools to empower other countries to turn these tools into practical action. Through 2023, Canada played an active role in the Global Partnership on AI, the United Kingdom's AI Safety Summit, and the G7 Hiroshima AI Process. All direct governments and companies on how to safely and responsibly develop and deploy advanced AI systems.

Here at home, the Government of Canada is driving innovation through strategic initiatives such as the Global Innovation Clusters and the Strategic Innovation Fund. These programs are incubators for transformative AI projects, bridging the gap between conceptual AI research and market-ready innovations.

I'm proud to say these efforts are paying off: today, Canada is home to some 1,500 firms developing or implementing AI solutions, 20 public AI research labs, 75 incubators and accelerators, as well as 60 groups of AI investors. It should come as no surprise that Canada leads G7 nations in the growth rate of AI talent and ranks third in venture capital investment for AI.

The strong emphasis on diversity in the Canadian tech landscape has also contributed to the perspectives fuelling AI development. Inclusivity is not only a moral imperative, but also a catalyst for unlocking the full potential of AI technologies, ensuring they serve the needs of a diverse and global society.

Start-ups and scale-ups in Canada's AI ecosystem are pushing boundaries in various domains, from health care and finance to natural language processing and computer vision. As AI technology is becoming integrated into our critical systems, it is increasingly clear that the world is at an inflection point. As legislators, it is our duty to make sure we understand the capabilities of this technology and to put in place the right guardrails to move from challenges to opportunity, all the while protecting Canadians.

To that end, the government has proposed a legislative framework to guide AI innovation in a positive direction, and to support trust in the adoption of AI by businesses and Canadians alike. The Artificial Intelligence and Data Act (AIDA), part of Bill C-27 (Digital Charter Implementation Act, 2022), sets a foundation for regulating the design, development, and deployment of AI systems. For businesses, this means clear rules to help them innovate and realize the full potential of AI. For Canadians, this means that AI systems built or used in Canada will be subject to strict requirements designed to reduce the risk of harms. The government also recognizes that, to be effective, the act needs to align and work with the approaches being taken by our key trading partners, including the United States and the European Union.

While AIDA is being considered by Parliament, and to bridge the gap in time until its regulations are developed and in force, the government has developed a Voluntary Code of Conduct for Advanced Generative Artificial Intelligence Systems to provide Canadian companies with effective guardrails to ensure that they are developing and using generative AI systems responsibly. In addition to undertaking specific measures related to fairness and equity, accountability, transparency, and safety, signatories commit to developing and deploying AI systems in a manner that will drive inclusive and sustainable growth in Canada, including by prioritizing human rights, accessibility and environmental sustainability, and harnessing the potential of AI to address the most pressing global challenges of our time.

As Canada charts its course in the dynamic landscape of AI innovation, our country stands as a beacon of progress, showcasing how collaboration, ethical considerations, and a diverse talent pool can propel a country to the forefront of the global AI revolution.

Liberal MP Ryan Turnbull, who represents Whitby, Ont., is the parliamentary secretary to the minister of innovation, science and industry.

The Hill Times

Higher value must be placed on the creation of knowledge

The period between innovation and commercialization has been called 'The Valley of Death.' The period before a market has been established requires considerable investment with little return.

NDP MP Richard Cannings

Opinion

In its recent report on intellectual property, the House Science and Research Committee stated that Canada has "the lowest level of corporate R&D funding in OECD and G7 countries." This low level of corporate investment means that every year, ideas developed with our tax dollars are exploited by foreign companies willing to take the investment risk—a risk Canadian companies are unwilling to take.

Intellectual property lawyer Jim Hinton elaborates: "we allow our publicly funded IP to be given away. We do the hard work of funding the research and creating the great ideas, but then we assign the rights to that IP to foreign companies. They make the money on our IP, sell the products back to us and, most devastatingly, they use Canadian-funded IP against us."

Baljit Singh, vice-president of research at the University of Saskatchewan, gives the example of a vaccine against a pig virus: "Researchers at the University of Saskatchewan discovered a virus, which led to the development of a vaccine in collaboration with Queen's University Belfast in [Northern] Ireland and Ohio State University in the U.S." However, that vaccine technology was purchased by a company in France, so although the university and inventors received more than $100-million in royalties, the job creation took place in France.

Mike McLean, CEO of the Innovation Asset Collective, frames the problem like this, "You cannot commercialize what you don't own. Only companies with sufficient freedom to operate can be assured of capturing the high returns that deliver prosperity to Canada's economy. In comparison, many countries are implementing strategies to successfully commercialize innovation and build dominant IP positions."

McLean suggests this lack of investment may be due in part to Canada's history: "For me, the largest roadblock is the lack of understanding about IP strategy and approaches to capture and commercialize IP. Canadian companies do not have access to role models or peers who understand these issues. Our economy has been dominated by resource companies and financial institutions for a long time. Until recently, those businesses have not needed to build strong IP positions in order to succeed. Our technology and knowledge-based companies, however, do. They don't have access to the right talent sets, peer groups and networks to build those capacities and understand those businesses. We need to build institutions and role models that can help drive that change and build successful companies that can then spawn others."

This period between innovation and commercialization has been rightly called "The Valley of Death." The period before a market has been established requires considerable investment with little return.

Louis-Félix Binette from the Mouvement des accélérateurs d'innovation du Québec, stated, "The valley of death extends to the early commercialization period, because when you have a highly technological, highly innovative solution, there is a fair chance that your first clients will get a prototype-level solution and it will probably cost you three or four times, 10 times or 100 times more to produce that first prototype than you can actually get from the sale. The more you sell, the more your balance sheet goes into the red. That's the valley of death."

While the risks and costs are very high, so, too, are the rewards, as Binette says: "For an investment fund, sometimes it's enough for one company to succeed in order to replenish the entire fund. That one transaction out of the 20, 30, 40 or 60 can be enough."

Along side this loss of IP is the continued loss of researchers to other countries simply due to lack of financial support for early career scientists and for basic research. Financial support graduate students and post-doctoral fellows—the people who do the majority of on-the-ground work in Canadian research—has remained stagnant for over 20 years. Meanwhile the three federal granting agencies are facing a five per cent budget cut.

Unless Canadian governments and businesses begin placing a higher value on the creation of knowledge, our future prosperity is at risk.

NDP MP Richard Cannings, who represents the riding of South Okanagan-West Kootenay, B.C., is his party's deputy critic for innovation, science and industry.

The Hill Times

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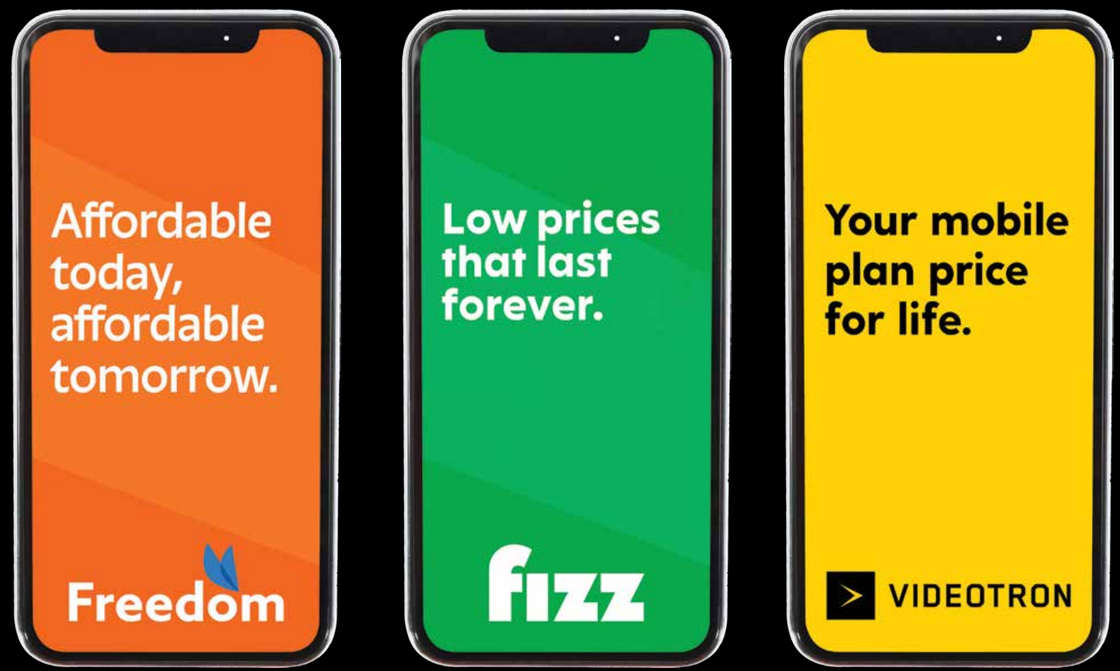

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In then-prime minister Jean Chrétien's last term, innovation was held as Canada's great economic hope, writes Ken Coates. Chrétien is pictured in a Hill scrum in 2016, years after he left office. *The Hill Times photograph by Jake Wright*

Canada's innovation challenges

Canada's innovation challenges will not be overcome by another government program or an infusion of more federal cash.

Ken Coates

Opinion

Canada's innovation conversation has sure changed.

In then-prime minister Jean Chrétien's last term, innovation was held as Canada's great economic hope. Expand the universities. Hire hundreds of Canada Research Chairs. Create the Canadian Foundation for Innovation, and give it a start-up contribution of several billion dollars. Expand academic research funding. Create subsidy programs for scientific and technical research. Open commercial incubators. Expand Canadian-owned intellectual property.

The country did all of these things and more. Billions of dollars have been spent on the Canadian version of the widely implemented national innovation "equation." Universities and research institutes threw themselves wholeheartedly into the enterprise. So did many communities, with conspicuous successes (Waterloo, Fredericton, and Kelowna) but generally limited achievement. Some companies flourished, like Open Text, and others languished, like BlackBerry. Potential commercial superstars continue, like Ballard Power, but at less than three per cent of its peak market capitalization in 2000.

What did Canada get for its investments, beyond hundreds of press conferences and ribbon cuttings, many government announcements, and millions of hours spent applying and accounting for government grants? The answer is far from ideal.

Our national competitiveness is falling, and Canadian GDP forecasts for the coming decades have us near the back of the OECD. Far from the innovation-fuelled, research and education-driven robust economy promised by the advocates of scientific and technological innovation, we have a country where the only real growth industry is government, where the future of our cornerstone resource sectors are in doubt, and where universities have been made curiously dependent on international student fees.

The problem is even greater than this. Entrepreneurship—never this nation's roaring strength—appears to be in decline. Investment capital remains tight, save for that for residential construction that moves slowly in the same direction as rapid urban population growth. Canadian innovation, often paid for in substantial measure by government grants, loans and subsidies, is highly mobile, often accompanying the inventors and entrepreneurs out of the country.

This does not mean that advocates of innovation were and are wrong. In the highly competitive and tumultuous global economy, radical economic transformation remains a clear avenue toward prosperity. There are numerous success stories, and not just in Toronto, Calgary, and Vancouver. The high-tech sectors in Victoria, Edmonton, Saskatoon, Sherbrooke, and Halifax are doing well. But on a national scale, the country falls short of both its lofty aspirations and many competitor nations. Smaller cities, rural areas, and northern communities, all of which would benefit from focused commercialization of technology, have been largely left out of the innovation economy.

Canadian efforts to build a new economic order have foundered on two very different forces. First, the country's traditional reliance on natural resources has protected the country from the vicissitudes of the global economy. Even as the federal government tries to undermine the oil and gas sector and constrain the mining industry, the nation's economy relies heavily on oilsands activity and revenues, and on the industrial activity associated with drilling, extraction, and pipelines. Central Canadians struggle to appreciate the central role energy plays in national prosperity, and the risks associated to interfering with proper development. But even as Canadians largely ignore the western Canadian resource sector, it remains the backbone of national prosperity.

More ominously, Canadians have become remarkably dependent on government payments and subsidies. Even before the pandemic and CERB took reliance on government spending to new levels, our innovation efforts had become substantially dependent on government financial support. The nation's greatest new economy initiative—excepting some remarkable largely private investments in transformation in the oil sands and broader energy industry—is a dramatic multi-billion-dollar subsidy for EV battery plants in central Canada. Innovation that is routinely propped up by government funding is neither sustainable in the long-term, nor likely to be internationally competitive.

Canada's innovation challenges will not be overcome by another government program or an infusion of more federal cash. This has not worked in the past, and it is unlikely to do in the future. The fundamental goal must be to unleash domestic creativity and entrepreneurship. To get here, Canada must—like Norway—embrace its energy wealth, and use the wealth to fuel commercial development. Government direction and innovation management has produced some results, but they are meagre compared to the spending and even less compared to the opportunity.

Our national innovation economy needs real innovation. It needs honest talk about our national strengths and weaknesses, and a realization that sustaining entrepreneurship is more crucial to the next economy than scientific discovery. It has taken Canada billions of dollars in ever-so-optimistic government spending on innovation to realize that the current pattern does not work. Sadly, it is not yet clear the lesson has been learned.

Ken Coates is a professor of Indigenous governance at Yukon University, and formerly the Canada Research Chair in Regional Innovation in the Johnson-Shoyama Graduate School of Public Policy. He is also a distinguished fellow with the Macdonald-Laurier Institute in Aboriginal and Northern Canadian Issues.

The Hill Times

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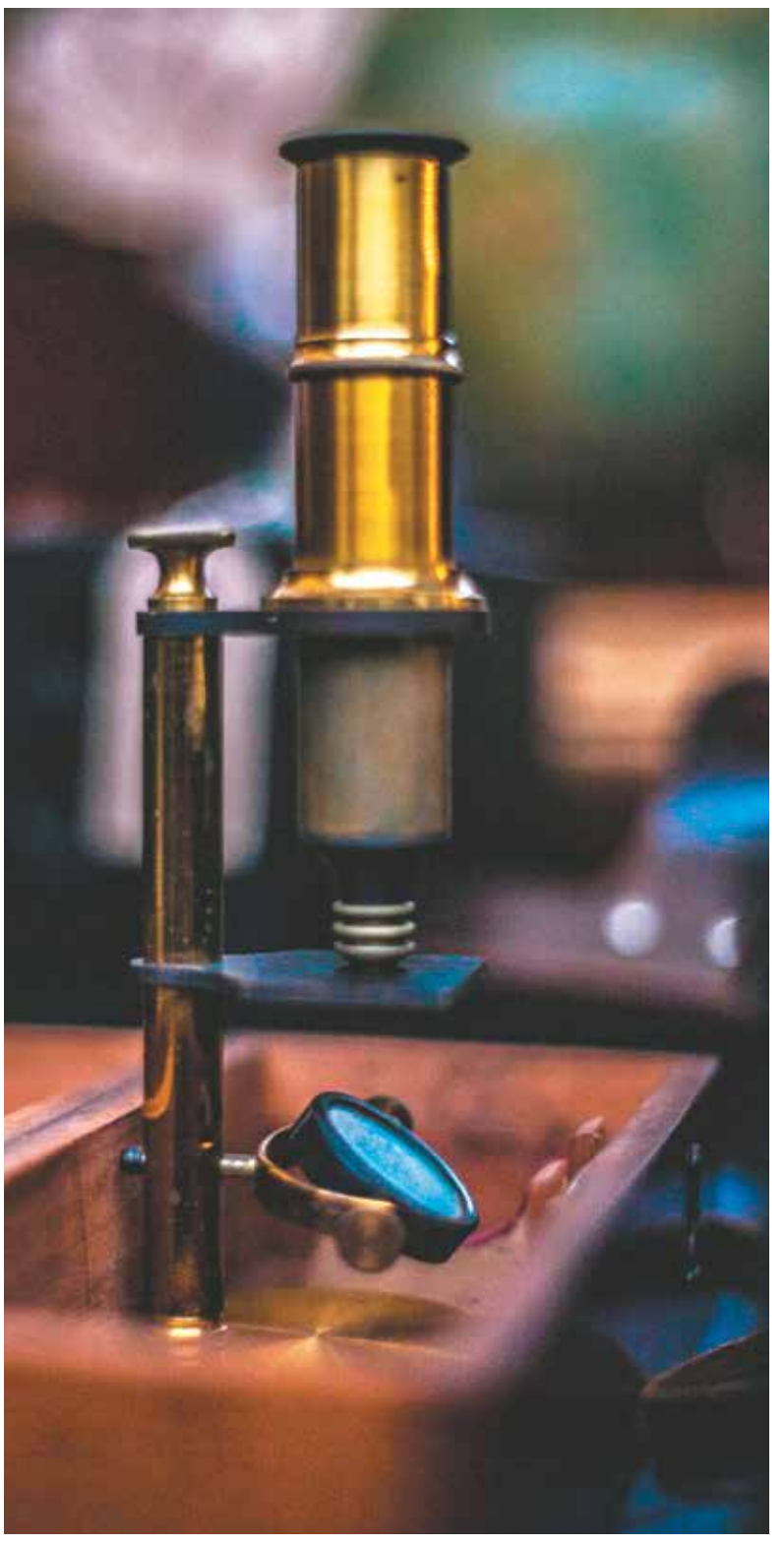
Canadian women researchers make their mark



As we celebrate the International Day of Women and Girls in Science on Feb. 11, here are a few stories of women who have added and who continue to add significantly to research and innovation through their personal work, writes Roseann O'Reilly Runte. *Image courtesy of Pexels.com*

International Day of Women and Girls in Science is a time to celebrate the talented researchers and entrepreneurs who are inspiring the next generation. We will all benefit when we are truly inclusive and see the possibilities of greater good.

Roseann O'Reilly Runte

Opinion

In Voltaire's story *Candide*—which has been made into a film and musical—after having searched the world over for wisdom, the titular character returns home and, leaving his mistress in the kitchen to bake pies, concludes that the path to happiness lies in "cultivating one's garden" where he works with a group of his friends. The garden and teamwork are the keys to prosperity.

We think less frequently of Voltaire's story, *Le Crocheteur borgne*, in which a one-eyed beggar is consoled by the fact that he only sees half the evil in the world. Yet he also sees only half the good. Like Candide, who did not include women as active contributors to the success of the garden, the beggar knew a world where the contribution of women was largely restricted.

Today, Catalyst, the global non-profit that helps build workplaces that work for women, has published statistics illustrating the impressive success of businesses that include women on boards and in the C-suite. The numbers are clear. They tell us that the boards of the 10 most profitable companies in the Fortune 500 include women, and 82 per cent of the top 50 firms have at least one female director. Yet, how many of us can name more than a handful of women board directors?

As we celebrate Feb. 11, the International Day of Women and Girls in Science, we ask the same question about women researchers. It is appropriate and timely to focus on a few stories of women who have added, and who continue to add significantly to research and innovation through their personal work, and who have undertaken to create the conditions which will encourage the participation of others. If we want to succeed today, we need to recognize the extraordinary achievements of women in science and enterprise.

Let me introduce you to Dr. Leyla Soleymani who is working on wearable sensors, continuous glucose monitoring for diabetics, and is developing a cardiac patch which will be used by astronauts. She has helped to establish companies that produce medical devices and antimicrobial nanoparticle films which ensure surfaces remain free of contagious pathogens. Each time Soleymani completes a project, she consults her list of ideas and starts on the next. In between, she has taken on the role of associate vice-president of research at McMaster University, assisting students and colleagues in their work.

Her colleague at McMaster, Dr. Sheila Singh, is a pediatric neurosurgeon who focuses her research on cancer, and is best known for her truly significant laboratory discoveries that will save lives. She has also been instrumental in founding companies such as Empirica Therapeutics and spinoffs such as Century Canada Labs which have international connections and offer opportunities for her former students to carry on her vision.

Dr. Priti Wanjara works for the National Research Council where she looks at problems: from designing economical and environmental solutions to manufacturing. They include repairing aluminum cathodes used to extract zinc for use in protective coatings on cars to developing the 3D printers that may one day be used in outer space. Back on Earth, she proposes innovative designs that will make manufacturing plants more efficient and profitable.

At the University of British Columbia, Dr. Gail Murphy, a computer science professor and vice-president of research and innovation, is co-founder and chief scientist at Task Top Technologies Inc. She works on improving software to enable companies to keep up to date with evolving technologies and demands of the workplace. Murphy puts her colleagues first, and always promotes their work and helps connect discovery and innovation with the application of new knowledge.

As a professor in the chemistry department and dean of science at Carleton University, Dr. Maria De Rosa leads the Aptamer Lab for the Discovery and Development of Emerging Research where she works on synthetic nucleic acids, folding them into 3D nanoscale structures. Her research applies this knowledge to plant genetics and Parkinson's disease. At the same time, she actively supports her students and fellow colleagues, making possible their discoveries and encouraging innovative applications.

These women are but a small sample of the extraordinary women researchers who contribute to the discoveries and innovations that will improve the health and economic development of our country. They are not only committed to their own work, but also to nurturing the next generation of researchers and supporting their colleagues in their work. It is an honour and privilege to recognize them on Feb. 11. And I do so knowing full well that they are but a few of the many researchers, innovators, and leaders who merit recognition and inclusion among those we celebrate and those we will invite to serve on the boards of businesses and industry that will in turn become even more successful for having included them. We will all benefit when we are truly inclusive and open *both* eyes to the possibilities of *greater good*.

Roseann O'Reilly Runte is president and CEO of the Canada Foundation for Innovation, a non-profit corporation that invests in research infrastructure at Canadian universities, colleges, research hospitals and non-profit research institutions.

The Hill Times

Beyond commercialization to the full societal impact of research

To address big national issues, we need a broader approach that incentivises and supports the mobilization and translation of all the knowledge generated by Canadian researchers to all sectors of the economy and society.

Amir Asif & David Phipps

Opinion

Whether it's rising antisemitism, Islamophobia, and racism; interest rates and inflation; housing and homelessness; carbon pricing and climate change; or truth and reconciliation, the issues dominating Canadian headlines are multifaceted and complex.

Knowledge and expertise in our research organization can make a valuable contribution to these which are just some of the many issues that researchers are working on every day: conducting research, gathering data, developing new theories and approaches, teaching the next generation, and sharing their knowledge.

These big issues are captured in national priorities for science, technology and innovation. The Canadian government has five science, technology and innovation priorities encompassing 58 specific areas of focus, all underpinned by advanced technologies, social sciences and humanities, including ethics. The five priorities are Healthy Canadians, Innovative and Resilient Communities, Sustainable Food Systems, Clean and Resource Rich Canada, and Technologically Advanced Canada.

Government policy in recent years has prioritized research commercialization: incentivizing universities and academics to collaborate more with industry, and measuring success with indicators such as the number of patents, the licensing of intellectual property, and the creation of start-up companies. The Ontario government recently launched a Commercialization and IP Framework, and created a new government agency to drive commercialization activities in the post-secondary sector. The federal government launched Lab2Market and the Canada Innovation Corporation. The Report of the Advisory Panel on the Federal Research Support System focused on commercialization as a pathway to economic impact. And Canadian research institutions respond in kind establishing supports for commercialization, industry liaison and entrepreneurship.

But here's the gap between our priorities and the response: fully half of Canada's focus areas for science, technology, and innovation will never be realised by filing a patent application, or starting up a new company.

We are never going to patent our way to reconciliation.

In order to address big national issues, we need a much broader approach that incentivises and supports the mobilization and translation of all the knowledge generated by Canadian researchers to all sectors of the economy and society. Commercialization is one important pathway to impact, but there are many more.

In 2006, we started Research Impact Canada—a network of 31 universities and research institutions—to build capacity for knowledge mobilization with a focus on research's societal impacts. These include the significant contributions to public policy, social services, community development, and professional practice. These can be harder to quantify than commercial impacts, but they are no less important for our ability to achieve national goals.

For example, research on youth homelessness conducted at York University in partnership with A Way Home Canada, a national non-profit group, is helping thousands of Canadian youth to stay in school, re-establish positive relationships with family, obtain employment, and avoid the criminal justice system.

A new framework for Canada and Canadian research organizations should encourage researchers to think about impact from the beginning of their projects rather than trying to measure it after the fact. It should support partners from community as well as public sector agencies to engage on an equal footing with academic researchers. It should build capacity for this work across the country, and support collaboration rather than creating more rankings that drive competition.

The federal granting agencies—NSERC, SSHRC, CIHR—fund programs that support knowledge mobilization, but only at the project level. One way for government to ensure Canada's universities can maximize the social and economic impact of research is to increase institutional support for all forms of knowledge mobilization.

From 1995 to 2009, the granting agencies funded the Intellectual Property Mobilization program, which funded VPs Research to invest in capacity for technology transfer and commercialization. Today, university supports for impacts mediated through policy, social services and professional practice are similar to supports for commercialization in 1995. Some universities are doing it. Many are not. And there are few standards and programs to build capacity. Canada needs funding for institutions to build capacity to support all federal priorities, not just those mediated through patents, licensing and start-up companies.

With funding, capacity building and collaboration among research organizations across Canada, we can maximize our contribution to the big issues facing our society.

Amir Asif is the vice-president, research and innovation and professor, electrical engineering and computer science at York University in Toronto. As assistant VP research strategy and impact, David Phipps is the administrative lead for all research programs and their impacts at York University.

The Hill Times

Canada has a strong head start in these early innings of AI

Canada's coordinated AI strategy was the first ever in the world, though many other countries caught up by quickly developing their own.

Rikia Saddy

Opinion

As I write this, Google announced that its Bard AI chatbot had outpaced Chat-GPT.

Things move fast in AI, but one thing remains constant: the Canadian tendency to discount our place in it.

For example, when you learned that the pan-Canadian AI strategy had chosen three research clusters to support in Toronto, Montreal, and Edmonton, did you assume the latter was tacked on for regional parity? Yet Edmonton's Amii institute, created back in 2002, is a model of AI literacy, expansion, and research at the highest ranked Canadian university for AI research over the past two decades.

Canada's coordinated AI strategy was the first ever in the world, though many other countries caught up by quickly developing their own. In the intervening years, it seems some of them have passed us, with billions of dollars in centralized government funding (China), private venture capital from a pool larger than anywhere in the world (United States), or uniting neighbouring countries already linked through binding agreements (European Union).

Canada's simultaneous commitment to ethical development and deployment has furthered our place on the world stage, assuring that fairness, transparency, safety and accountability be part of the national dialogue. This is an essential step when so many experts in the field have spoken out on the risks and dangers of generative AI.

There remain immediate areas for funding and improvement. Canadian researchers urgently require greater computational power. Currently their public supercomputer networks hum at maximum capacity, 24 hours a day. Corporate Canada needs to be quicker to adopt AI, with only 3.7 per cent of businesses having done so as of 2021. This may require university business and accountancy programs adapted to include coursework and post-graduate upgrade opportunities that will help financial decision-makers understand key AI opportunities and metrics to improve their bottom line.

None of this means that Canada is failing. Far from it. In 2023, the three national institutes plus Canadian Institute for Advanced Research, in conjunction with Deloitte, released a report on Canada's success so far. Despite a sub-40 million population, Canada ranks fifth in the world for AI start-ups. We're first among G7 nations in building and retaining AI talent. Canadian researchers produced more AI publications per capita in 2022 than any other G7 nation. And from 2022–2023 the total number of Canadian AI patents leapt 57 per cent, the second highest growth rate in the G7. This is IP power.

For all this work to take root in Canada, it must have a place to grow. Sustaining the health of the entire ecosystem is essential, by connecting talent to industry, venture capital, and global innovation networks.

This makes it both a government and citizen challenge.

On top of funding research and collaboration, governments must work to preserve digital sovereignty, set frameworks to manage ethical risks, and lead by example in adapting and modelling their own use of AI. Governments can also play a role in fostering innovation through new taxation models, STEM education initiatives, and re-training citizens for the new economy.

Business and finance will need to be braver, investing in AI to increase profitability, productivity, and global competitive advantage. The alternative is to live in a world where public innovation in Canada becomes privately held by companies in other countries.

Canada's AI researchers have earned lifetime achievement awards, global recognition, and even the Turing Prize for contributions of lasting and major technical importance in computer science. The old guard has mentored, led, and nurtured a group of major scientists 1,000-strong across the country, all while contributing to patents that underpin the most well-known and promising technologies in the world. The rest is up to us.

Rikia Saddy is a strategic adviser to CEOs in Canada, the United States and Europe.

The Hill Times

Innovation Minister François-Philippe Champagne, centre, said that 'developing and retaining intellectual property is vitally important for the success of Canada's innovation strategy,' in a departmental press release on April 26, 2022. *The Hill Times photograph by Andrew Meade*

Intellectual property literacy and Canada's path to prosperity

IP strategy, both as a matter of public policy and as an essential business strategy for SMEs, has a direct impact on our national prosperity.

Karima Bawa & Myra Tawfik

Opinion

For the better part of the last two decades, we have been working in various capacities on the commercial and academic aspects of intellectual property (IP) strategy, recognizing that such a strategy, both as a matter of public policy and as an essential business strategy for SMEs, has a direct impact on our national prosperity.

For too long, however, this topic has been relatively neglected, understood by few, and truly valued by even fewer people. The result has been a generation of entrepreneurs, innovators, researchers, and industry and policy leaders who failed to properly understand the strategic value of IP and its impact on the competitiveness of Canadian firms.

Thankfully, this began to change in 2018 when the federal government launched the National Intellectual Property Strategy (the National IP Strategy) to help Canadian SMEs protect their ideas, and realize commercial success. A suite of programs and services was established in support of this objective. Similar IP policy initiatives are occurring at the provincial level, as well. Ontario and Quebec have both created unique agencies that offer IP services and resources. Other provinces—notably Alberta, British Columbia and the Atlantic jurisdictions—are in the process of finalizing or implementing their own approaches. Across all these policy initiatives, the emphasis is on ensuring that innovators and entrepreneurs possess IP literacy skills that focus on the importance of IP strategy—namely, the ways in which businesses can generate, protect, and deploy their IP assets for commercial advantage. In some cases, government funding is now contingent upon the successful completion of approved IP education programs.

The recent evaluation of the National IP Strategy conducted by Innovation, Science, and Economic Development (ISED) in June 2023 concluded that "[t]he ISED-led initiatives contributed to increased IP literacy and awareness among federal officials, SMEs, and underrepresented groups, particularly for those with a low baseline level of IP knowledge." From our experience developing and delivering IP education programs across Canada's innovation ecosystem, we unequivocally agree with this statement.

Federal and provincial initiatives are showing positive results in terms of raising awareness of IP, especially among innovators and entrepreneurs. Indeed, in our own work with start-ups, we have been witnessing greater levels of IP literacy, something that we could not say with confidence before the launch of the National IP Strategy. Canadian SMEs have become more adept at identifying the different forms of IP, recognizing IP risks, communicating with IP experts, and taking advantage of IP funding opportunities.

This increased literacy and awareness, however, has yet to fully translate into the commercial outcomes we collectively need to ensure our future prosperity. As the ISED evaluation concluded: "there remain "[c]hallenges around low awareness of services among some stakeholders and a need for more advanced or specialized IP training." Once again, we could not agree more.

A common and pressing concern among those with whom we have been working is that they lack the sophisticated skills needed to effectively leverage IP to advance their commercial interests. It is one thing for business leaders to know what a patent is and how to secure patents in Canada and globally, but it is quite another for them to grasp the commercial nuances of a revenue-generating licensing agreement.

Similarly, while our SMEs are engaging in collaboration efforts and showcasing their innovations to investors, they are still vulnerable when it comes to properly securing and sharing their IP. And while legal advisors are necessary to assist in these and other IP commercialization efforts, lawyers can only ever play a supporting role. It is up to the business to ensure that its business objectives are met in the commercialization of its IP, and the implementation of its IP strategy. This requires greater facility in the more complex aspects of IP strategy and a solid familiarity with the business of IP. Existing foundational IP literacy programs do not address these kinds of issues, nor were they intended to.

Advanced and specialized IP education programs are required to enable Canadian businesses to reap the economic rewards of IP commercialization. We are very encouraged by the success of the National IP Strategy and its provincial counterparts in increasing the levels of IP awareness across the system.

Policymakers must now redouble their efforts. Continued policy engagement is required to encourage mastery-level skills in the practical aspects of the business of IP.

Karima Bawa is the chair of IP Ontario, a member of the board of directors for the College of Patent Agents and Trademark Agents, and is a senior fellow at the Centre for International Governance Innovation (CIGI). Myra Tawfik is the Don Rodzik Family Chair in Law and Entrepreneurship and distinguished university professor at the University of Windsor. She is also a senior fellow at CIGI. She is an expert in intellectual property law and capacity-building in IP literacy.

The Hill Times

National strategy needed to address fragmented innovation ecosystem, say researchers

Minister of Innovation, Science and Industry François-Philippe Champagne speaks with reporters before the Liberal cabinet meeting in West Block on Jan. 30, 2024. *The Hill Times photograph by Andrew Meade*

Continued from page 16

"These research-based, scalable science-based ventures, and the other types of social and economic value creation that can come from our strong invention, intangible assets, these things [happen] over a long timeframe," she said. "They're over a long timeline, they go from basic research and discovery, [and it] may be 20 years before the full scope of the value is seen."

As an example, Maine pointed to AbCellera Biologics, a British Columbia-based biotechnology firm that was founded in 2012 by Carl Hansen, Véronique Lecault, Kevin Heyries, Daniel Da Costa, and Oleh Petriv.

"Carl Hansen, when he was doing his PhD at Caltech, this is when the first relevant patent was filed. That time period is also when international networks are formed. That's when the ideas start to get shaped," said Maine. "You don't see them being an overnight success story until DARPA [the U.S. Defense Advanced Research Projects Agency] invested in them in about 2018, and then after COVID they suddenly became a $15-billion market cap company."

"That's not taking an existing company and helping it scale up. That's setting the conditions in place to allow us to convert more of our world leading invention into innovation," she added.

Leah Cowen, vice-president of research and innovation and strategic initiatives with the University of Toronto, told *The Hill Times* in an emailed statement on Jan. 31 that challenges to commercializing research discoveries in this country include a lack of venture capital support at the early stages.

"[University of Toronto] startups tell us they face challenges moving from startup to scale-up and beyond. Competing for highly skilled talent is also an increasing challenge. To drive innovation, we need to collaborate on those challenges and simultaneously protect the investments made to date into the foundations of innovation," said Cowen in the emailed statement. "Canada has the skilled talent learning at our universities who are eager to innovate. Many of them are taking their [intellectual property] to U.S. hubs that have robust innovation ecosystems and strong entrepreneurial cultures."

The federal government cannot lose sight of the need to invest in the people who create tomorrow's economy, and "in the ecosystem that supports their success," according to Cowen.

"We need to reverse stagnant funding for our top students and increase investment in priority advanced fields, from life sciences to advanced manufacturing and [artificial intelligence]," said Cowen in the emailed statement. "Recent investments by the United States into energy security, R&D, regional high-tech hubs and a bigger STEM workforce create a magnet for talent and further investment. To maintain competitiveness, Canada needs to invest here at home over the next decade."

In the email, Cowen described Champagne as a champion of innovation who understands the relationship between research and innovation very well.

"Innovation depends on all parts of the ecosystem working together, including our universities and all levels of government. To advance innovation, our universities must continue to welcome the world's top talent," she said in the emailed statement.

John Wilson, president and CEO of Innovate Calgary, an innovation hub at the University of Calgary, argued that Canada does poorly on business expenditure and research and development because, historically, "our industries have not come out of our universities." He argued that innovation in Canada could be improved through university-led investment funds which could support commercialization of technology and intellectual property from those institutions.

"We should continually work with the industries we've got, and work collaboratively together with our universities, but in addition, we should try and generate a whole new set of industries, as much as we can, reasonably, using our universities and other intellectual assets centres. And that is what we haven't done," he said. "If you go to Cambridge, U.K., the whole of the drive 30 miles around … [is] full of high-tech industries that have come out of the university, and so not surprisingly, again, they collaborate intensively back with Cambridge University, and you end up with great stats."

Dan Breznitz, co-director of the Innovation Policy Lab, a hub within the Munk School of Global Affairs and Public Policy at the University of Toronto, argued that Canadian businesses are able to have high profit margins without investing in new technology and innovation, and the federal government should try to understand why.

"[Canadian businesses] are doing the right thing. Canadian businesses see their profit margins and say 'Our role is to maximize profit, not to fix innovation … [and] if Canada gives us a place where we can have such high profits without taking risks, why should we take risks? We're doing the right thing.' It's the government that need to change that equation," said Breznitz. "It's the federal government … or public officials and the Canadian public, which should worry about our productivity completely being stagnant."

Dan Breznitz, co-director of U of T's Innovation Policy Lab, says the federal government should 'start coming up with systematic approaches' to address challenges facing innovation. *Photograph courtesy of the Donner Prize*

Breznitz argued that Canada's innovation ecosystem has been in decline for more than two decades, and this is a systemic problem that cannot be fixed with "one-time programs."

"We have to admit it is serious and start coming up with systematic approaches that looks at the market framework, looks at our trade regime, [and] looks at our innovation regime," he said. "It needs to have a systematic approach over many years in which you experiment to see what works … and you need to understand why our system allows, or actually incentivizes, Canadian business to make a lot of profit by not engaging with new knowledge."

jcnockaert@hilltimes.com
The Hill Times

Business innovation support stats

- In 2021, as Canada recovered from the COVID-19 pandemic, the federal government provided more than 33,000 businesses with innovation and growth support valued at $4.5-billion through 134 federal programs.
- Across Canada, Business Innovation and Growth Support (BIGS) mainly went to small- and medium-sized enterprises, which accounted for 96 per cent of all recipients in 2021. The BIGS database defines small and medium enterprises as those with fewer than 500 employees. These enterprises received more than three-quarters (77 per cent) of the total support value.
- The payroll of BIGS recipient corporations grew by 16 per cent year over year in 2021, compared with a five per cent increase from 2019 to 2020.
- In terms of revenue, BIGS supported corporations also saw a year-over-year increase, up 18 per cent in 2021, three times higher than that in 2020 (+six per cent). Export revenue increased by 15 per cent during the same period, after declining by four per cent from 2019 to 2020.
- BIGS recipients continued to innovate in 2021, as their research and development spending grew by 12 per cent on a year-over-year basis, which was comparable with the 11 per cent increase seen for this type of expense from 2019 to 2020.

Source: Business Innovation and growth support, 2021, Statistics Canada, released on Nov. 2, 2023

Innovation in Canada and the world

- In the Global Innovation Index's 2023 report, Canada was ranked 15th out of 132 nations for innovation, behind nations including Israel, Japan, China and France. The top three ranked nations for innovation in the report were Switzerland, Sweden and the United States.
- Canada leads in some innovation indicators, including venture capital recipients (at first place), impact of its scientific publications (4th) and software spending (5th).
- In 2023, Canada, along with Norway (ranked 19th) and Uzbekistan (ranked 82nd) all improved in converting inputs into outputs, no longer underperforming on this metric.
- Globally, "two promising innovation waves are making their presence felt across economies and societies: a digital innovation wave, built on artificial intelligence (AI), supercomputing and automation, and a deep science innovation wave, based on biotechnologies and nanotechnologies," according to the report.
- On the other hand, "anemic growth and high inflation, coupled with the lingering effects of the pandemic, are hampering global innovation. After a remarkable boom in 2021, innovation finance fell back dramatically [in 2022], with the value of venture capital investments declining by 40 per cent," according to the report.

Source: The World Intellectual Property Organization's Global Innovation Index, 2023, released Sept. 7, 2023

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TELECOMMUNICATIONS

Involvement with global telecommunications coalition gives Canada 'a seat at the table,' say telecom experts

Areas of focus for the Global Coalition on Telecommunications include diversification of telecom supply chains, telecom security and resilience, and 6G.

BY JESSE CNOCKAERT

Innovation Minister François-Philippe Champagne says the Global Coalition on Telecommunications 'provides an opportunity to advance important work with our allies toward more secure and reliable telecom networks.' *The Hill Times photograph by Andrew Meade*

Canada's recently announced participation in a group of international partners dedicated to ensuring innovation and resilience in the telecommunications sector is a step in the right direction, but expanding and maintaining Canada's networks will require predictable regulations, according to the president and CEO of the Canadian Telecommunications Association.

"If you're looking for more investment by telecoms, the number one thing that the government can do is ensure that there is a stable regulatory environment that encourages investment," said Robert Ghiz. "Investors need to have the confidence in the regulatory system so that … telecoms are continuously able to make those investments."

On Oct. 5, Innovation Minister François-Philippe Champagne (Saint-Maurice–Champlain, Que.) announced that Canada joined with the United Kingdom, the United States, Australia, and Japan in launching the Global Coalition on Telecommunications (GCOT). The coalition partners have committed to improve information sharing on telecom matters, build international agreements on areas relating to telecom policy, and promote growth opportunities, according to a joint statement of intent.

Ghiz told *The Hill Times* that he's happy Canada is at the table, and that it's always great to learn best practices from other countries. When it comes to ensuring a resilient telecommunications network, Ghiz said predictable regulations are among the most important factors in attracting investment by telecommunications providers.

Regarding the stability of Canada's current regulatory environment, Ghiz said "it varies." As an example of fluctuation, he cited the Canadian Radio-television and Telecommunications Commission (CRTC), which in recent years changed the rules governing mobile virtual network operators (MVNOs), or the companies that use the network of another Canadian wireless service provider.

In April 2021, the CRTC approved a facilities-based model that requires regional providers to have invested in network infrastructure and spectrum to gain MVNO access. On Oct. 19, 2022, the CRTC established several additional details, including that large wireless providers must begin accepting requests for access to their networks, and enter negotiations with regional wireless providers to agree on wholesale MVNO rates.

"We don't want to see that reversed overnight or anything like that. We want to make sure that the regulatory environment has incentives in place for investment that supports facilities-based competition," said Ghiz. "What ISED [Innovation, Science, and Economic Development Canada] does is they send a directive over to the CRTC for them to use that as an overall concept on making their regulatory decisions. Within that, we want to see investment be something that's important, and then we want to make sure that the CRTC has predictable decisions—doesn't reverse a decision overnight or do something that can hurt a company's incentive to invest."

Canadian Telecommunications Association president Robert Ghiz says 'we want to make sure that the CRTC has predictable decisions,' and 'doesn't reverse a decision overnight or do something that can hurt a company's incentive to invest.' *The Hill Times photograph by Andrew Meade*

Ghiz said providing a stable regulatory environment is about ensuring that Canadians are connected.

"There's still more that needs to be done, and especially in the rural and remote areas there's more investment that needs to be done there. And yes, government does have a role to play, but ensuring that the private sector has the incentives to be able to invest is also important as well," he said.

Areas of focus for the GCOT include diversification of telecom supply chains; telecom security and resilience; telecom skills; 6G and future telecommunications; and co-ordinated approaches to telecom standards development, according to an ISED press release.

"Canadians rely on telecommunications services every day. The Global Coalition on Telecommunications provides an opportunity to advance important work with our allies toward more secure and reliable telecom networks. We look forward to deepening our collaboration with our allies on these crucial issues to provide Canadians with secure and reliable telecommunications services," said Champagne in the press release.

A GCOT steering group is expected to meet twice per year to "discuss co-operation on topics of shared interest," according to the joint statement of intent.

In an Oct. 23 statement, ISED media relations adviser Andréa Daigle told *The Hill Times* the steering group will include representatives from each of the five member countries, and in Canada's case, representation will come from the innovation department.

"While the date of the first meeting has not been fixed, ISED is working actively with GCOT members on the next steps," said the statement.

In regard to supply chain diversification, ISED said that "reliable and secure telecommunications networks have never been more important for Canadians," but the number of vendors providing the key components of telecom network infrastructure has declined over the years.

"Promoting telecom supplier diversity, including by supporting telecommunications standards development, enables network reliability and security while also supporting innovation and competition in the telecom industry," Daigle said.

The Hill Times also asked ISED whether the security concerns to be addressed by the GCOT include plans for China.

In May 2022, Champagne announced Canada would ban Huawei, a Chinese multinational company that designs, manufactures, and sells telecommunications equipment, and ZTE, a Chinese state-backed telecommunications firm, from the country's 5G network, citing national security concerns.

ISED's response did not reference China, and stated that the GCOT will build on existing partnerships and align with the objectives of the Telecom Reliability Agenda, the Prague Proposals, and the U.K.'s Open RAN Principles, which Canada endorsed in 2022.

"The GCOT intends to work collaboratively with other potential partners, including industry and academia, on topics of shared interest," said the ISED emailed statement.

Robert Crawhall, executive director of the Canadian Academy of Engineering, told *The Hill Times* that the GCOT's launch confirms Canada has "a seat at the table," but he said Canada will need to show a willingness to invest in telecoms research and development (R&D) to back up its participation.

"[The GCOT] gives a good context in which to talk about telecoms and telecom strategy in Canada in a way that's more inclusive—that we can talk to the industrial sector, the academic research sector, the government research sector, as well as the policy people," he said.

To build up Canada's telecoms infrastructure, the federal and Ontario governments announced $219-million in combined funding on Aug. 28 for Rogers to bring high-speed internet access to more than 66,000 households in more than 300 Ontario communities, including more than 600 Indigenous households.

Crawhall said that announcements related to telecoms infrastructure are important, but ensuring Canada is developing

Continued on page 18

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Canadian Telecommunications Association

Association canadienne des télécommunications

Involvement with global telecommunications coalition gives Canada 'a seat at the table,' say telecom experts

Continued from page 16

and commercializing new technologies means emphasizing R&D investment.

"There's been very good support in some specific areas, but I would say that it needs to be framed as a more comprehensive package of support under the banner of telecommunications," he said. "Not all quantum is telecommunications. Not all AI is telecommunications. But I think it's important to say that, commensurate with our size at that table, that we are proportionately invested in the future of telecommunications to the others that have signed."

Alongside the GCOT's launch, the U.K. government announced an investment of 70-million pounds in R&D to develop telecommunications technology through the launch of a Future Telecoms Technology Missions Fund Programme. The investment is intended to help the U.K. become a leader in 6G technology, as well as develop new technologies to better connect space-based and terrestrial networks, and improve energy efficiency of telecoms networks through cloud computing, according to a U.K. government press release.

Crawhall argued that Canada should follow suit with a similar announcement of investment in telecoms R&D.

"I think it's always a problem if you throw a potluck and somebody doesn't bring anything," he said. "I think there's an expectation, certainly from a technical perspective, that Canada historically has played above its weight in these areas."

Marina Pavlović, an associate professor in the University of Ottawa's law faculty and a member of its Centre for Law, Technology, and Society, told *The Hill Times* she finds the coalition's goals and plans "a little bit opaque."

"It sounds like a really great idea, but I don't really know what they're actually supposed to do. The countries who are members of the coalition have very different market situations. The situation in Canada is very different from the one in the U.S. and in Australia, etc. I just don't know what they're trying to achieve, other than it would be really great to have everybody in those jurisdictions connected and have access to high speed broadband," she said. "They talked about information sharing. That would be really interesting. What kind of information is being shared?"

Pavlović agreed that the priority of greater security for telecoms networks outlined in the GCOT press release is important, because "the networks are under attack constantly."

Hackers attacked the Canadian government about 2.3 trillion times in 2022, which works out to an average of 6.3 billion disruptions every day, according to the Communications Security Establishment's (CSE) annual report published on June 29. In that same time frame, CSE responded to 2,089 "cybersecurity incidents," which included 957 involving federal government institutions, and 1,132 against critical infrastructure organizations.

Pavlović added that increased security always raises questions about increased surveillance.

"Having a more secure network comes with the reciprocal challenge that then certain traffic is not going to go through," she said. "Every time we talk about network security, I think it's really important to balance it with human rights and freedom of expression, to ensure that even though the networks remain secure, there is no trampling on speech and communication by people."

jcnockaert@hilltimes.com
The Hill Times

Canadian telecommunications statistics

- Total in-house R&D spending in the telecommunications industry was roughly $837-million in 2020, a decrease from 2019 ($840-million) and 2018 ($845-million). This $837-million total is composed of $798-million in R&D spending in wired and wireless telecommunications carriers (except satellite), and $39-million spending in satellite telecommunications and other telecommunications.
- In 2019, the gross value added of the mobile telecommunication industry represented 1.2 per cent of Canada's gross domestic product at basic prices. This includes value added from the industry itself, its supply chain, and impacts on spending from wages generated by the production (directly and indirectly) of the industry.
- In 2021, the total output generated by the mobile telecommunications industry was $48.4-billion. This includes revenue from the industry itself, its supply chain, and impacts on spending from wages generated by the production (directly and indirectly) of the industry.
- The contribution to GDP by the mobile telecommunication industry was $28-billion in 2021.
- In 2022, the wired and wireless telecommunications industry employed 102,309 people.
- In 2021, approximately 91.4 per cent of Canadian households had access to unlimited broadband Internet coverage with at least 50 megabits per second upload and 10 Mbps download speeds.

—Source: Telecommunications: Connecting Canadians, published on Oct. 3, 2023, by Statistics Canada

Canada versus Big Tech

The proposed regulations for the Online News Act need a major adjustment to free up funds for private sector news media, and to provide Canadians with an alternative to what Facebook has offered, write Elizabeth May and Sandy Crawley. *Photograph courtesy of Unsplash*

We think there is a way forward to mitigate our apparent dependency on the social media giants that are doing so much to damage our information ecology.

Green Party Leader Elizabeth May & Sandy Crawley

Opinion

Meta, the company that owns Facebook, is playing hardball on the Online News Act (formerly Bill C-18). It is clear that the digital giants require regulation in more ways than one. They are pushing against it, slow-walking while they continue to reap obscene profits and scrape our personal data for resale to advertisers. The same goes for Google, although it seem open to a reasonable compromise as opposed to Meta, which is willing to starve Canadian news media into submission.

It has come down to brass tacks: the draft regulations. We think there is a way forward that can mitigate our apparent dependency on these social media giants that are doing so much to damage our information ecology (eg. Bell Media, Postmedia, and Nordstar have recently eliminated many positions in their news divisions, and we have lost 482 local newspapers). Meta made a deal with Australia, but it seems that Canada is too close to home, what with the Federal Communications Commission in the United States breathing down its neck, and Meta has drawn a red line. We Greens think it is incumbent on Canada to show some grit and cross it. The world is definitely watching.

The proposed regulations would see approximately $230-million of the big tech ad revenues redistributed annually to Canadian news media through a formula based on the number of journalists they employ. This is pocket change for these tech giants. Spending in the Canadian digital advertising market is projected to reach US$14.91-billion in 2023. The largest market is search advertising, with a market volume of US$7.34-billion in 2023. We think most Canadians would agree that requiring these companies to support Canadian journalism in this context is reasonable.

That said, the Green Party of Canada does see the need for a major adjustment to the proposed regulations. We suggest that CBC/Radio-Canada be removed as a recipient. This would free up a good percentage of the funds to be allocated to private sector news media, including local non-profit newspapers, community broadcasters, and web sites that are so vital to Canadians' informed decisions on all kinds of issues, including their safety when wildfires and floods occur—which, alas, have become more frequent with the advent of climate change.

This removal of CBC/Radio-Canada must be accompanied by an additional allocation of federal funding to the public broadcaster that will allow it to forgo ad revenue. This would be a boon to our private-sector media. We suggest that the Canadian Radio-television and Telecommunications Commission develop a formula weighted in favour of the truly independent press as opposed to the large corporate media players, several of whom already have deals with Meta and Google.

Fully public, advertising-free radio and television news services from CBC/Radio-Canada should expand their local and regional coverage to increase Canadians' access to information.

A properly funded public broadcaster would also provide public bulletin board functions as in the past to strengthen communities outside the major urban centres. The goal should be to provide Canadians with an alternative to what Facebook has offered: one that does not operate to steal private information, capitalize on that invasion of privacy, nor undermine local journalism.

The Online News Act is not a panacea to the social ills that the tech giants have exacerbated. We are eager to see the government's long-promised bill to confront online hate as well as the promised copyright reform.

In the meantime, let's keep working in the public interest to protect Canadian journalism.

Elizabeth May is an MP for Saanich–Gulf Islands, B.C., and Green Party co-leader. Sandy Crawley is the Green co-critic for heritage, arts, and culture.

The Hill Times

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Innovation Minister Champagne could solve connectivity in Canada

Time and time again, Innovation Minister François-Philippe Champagne has signalled that his priorities align more with corporate interests than the needs of everyday people across the country, writes Rosa Addario. *The Hill Times photograph by Andrew Meade*

By using spectrum conditions in Toronto, he's let it slip that he has the power to bring affordable bills to the hands of people across the country.

Rosa Addario

Opinion

Earlier this fall, Innovation Minister François-Philippe Champagne mandated that Rogers share access to its networks with other providers to provide connectivity to all Torontonians travelling on the Toronto Transit Commission (TTC). So why won't he do the same for all Canadians?

He didn't step in from the start. In April 2023, Rogers entered an agreement to purchase the 5G infrastructure on the TTC. But shortly after its purchase, Rogers started using delay tactics to avoid sharing access to that network with other providers, with the likely intent of gaining a market advantage with Toronto customers. Unexpectedly, fate intervened: the confidence of Torontonians in their health and safety on the TTC was rocked by a series of violent incidents, and suddenly there was intense public scrutiny on why a telecom monopoly was being allowed to shut most of us out of contacting our loved ones on Canada's largest transit network. Spectrum conditions—the terms on which wireless networks are granted exclusive access to a segment of our airwaves—were suddenly quite different in Champagne's view, and in September, he decreed all wireless customers would have to have reasonable TTC access. By Oct. 2, all travellers on the TTC were able to access much-needed cellphone and internet services when riding along Line 1's "Downtown U" stations. Mission accomplished. So, if all that held up universal network sharing in Toronto was Champagne's word, why won't he bring other Canadians the connectivity we need at the prices we deserve?

It's a fact: people in Canada pay some of the highest prices in the world for cellphone and internet services. That's largely due to the oligopoly that grips our telecom market. The Big Three—Bell, Rogers, and Telus—own almost all the wired and wireless physical infrastructure in Canada, and can charge smaller and independent network providers whatever rates they want for access to those networks. And city dwellers are the lucky ones; the connectivity gap is significantly worse in rural Canada where many remote and Indigenous communities only have access to one provider that can charge every household hundreds of dollars a month for abysmal connection speeds. But if there's one thing we've learned from the economic squeeze of the past year, it's that more competition equals lower prices, and quasi monopolies—from telecom to groceries—will always squeeze Canadians dry.

When a small number of companies dominate any given market, they dictate the prices that consumers pay. A strong and competitive economy drives down prices, promotes innovation, and provides the needed environment for small and medium-sized businesses to flourish. Right now, Rogers, Bell, and Telus don't have to compete for your business because there is nowhere else to go. If you're thinking that providers like Koodo and Fido are meaningful competition, I'll beat you to it. Those are so-called "flanker" brands owned by the Big Three to create the illusion of choice. In reality, the very few independent telecom providers we have are disappearing at an alarming rate because they can't afford to pay the rates the Big Three charge to access their physical infrastructure. In the last year alone, Oxio, Start.ca, Ebox, Distributel, Altima, and Vmedia have been bought out by larger providers—and TekSavvy, the largest of them all, is up for sale.

So if the Big Three control the physical infrastructure, how can smaller providers get fair access to it? It only happens when the Canadian Radio-television and Telecommunications Commission (CRTC) steps in—and mostly, they don't. To date, they've denied wireless access altogether, while delaying basic wired internet decisions for years. But the TTC decision reminds us that the CRTC is not the only way. If and when the minister really wants action, he has broad discretionary power to change the game, whether by using spectrum conditions or directing the CRTC to fix things. We could have more competition within a year, and with a wealth of providers jostling for our business. Our telecom behemoths would finally be forced to offer competitive prices and incentive deals to retain us as customers.

Yet he isn't budging. Time and time again, Champagne has signalled that his priorities align more with corporate interests than the needs of everyday people across the country. From upholding the exorbitantly high wholesale network access rates that are driving small internet service providers out of business, to approving the Rogers-Shaw buyout, making Rogers the single biggest giant in Canadian connectivity history, so far he's spoken up for Toronto—but not for Canada.

We're often told the minister is powerless, and the CRTC must decide. But when the chips are down, that's not necessarily true. Champagne just showed us a key page in his playbook, and it's a potent one. By using spectrum conditions to mandate TTC infrastructure access to all providers operating in Toronto, he's let it slip that he has the power to bring affordable bills to the hands of people across the country. Now more than ever, all eyes are on Champagne. At a time when we need it most, when inflation has hit record highs, accusations of corporate profiteering are flying, and our own prime minister has acknowledged just how much the economy is squeezing families, can Canada continue to uphold the world's least affordable connectivity? Ask Minister Champagne; he holds the key after all.

Rosa Addario is a writer and consultant based in Montréal. Her work has appeared in The Toronto Star*, and through publication by her former employer, OpenMedia.*

The Hill Times

Inaction is perpetuating Canada's digital divide

Changing the way we deploy spectrum is a key part of the solution to bridging the rural-urban divide, and ensuring equitable access to affordable and reliable telecommunications services for all Canadians.

CSG Senator Dennis Patterson

Opinion

Policymakers and politicos know Canadians in urban centres enjoy a wide range of options and packages for high-speed internet, while rural Canadians face connectivity challenges, and Bill S-242 could help, writes Sen. Dennis Patterson. *Photograph courtesy of Pexels*

We continue to perpetuate Canada's digital divide by our inaction. The federal auditor general's March 27, 2023, report, *Connectivity in Rural and Remote Areas*, clearly states: "We concluded that a digital divide still existed in Canada when it came to access to high-speed Internet and mobile cellular connectivity. This divide was between Canadians living on First Nations reserves and in rural and remote areas and Canadians living in urban areas."

On April 28, 2016, Prime Minister Justin Trudeau stood in Shoal Lake 40 First Nation and vowed to close the digital divide. Aside from funding announcements, no real progress has been made. In fact, the Centre for International Governance Innovation contended in their July 26, 2021, report that the "digital divide has become a chasm."

Most, if not all, policymakers and politicos know that Canadians in urban centres enjoy a wide range of options and packages for high-speed internet, while rural Canadians face connectivity challenges. Studies and anecdotal evidence indicate that Canadians pay more for telecommunications services, and rural and remote areas are underserved compared to their urban counterparts.

Our current spectrum policies have exacerbated disparities in connectivity. I contend that changing the way we deploy spectrum is a key part of the solution to bridging the rural-urban divide, and ensuring equitable access to affordable and reliable telecommunications services for all Canadians.

Spectrum is a valuable, reusable natural resource that can provide communications to millions of people. In Canada, spectrum has been used for this purpose, but it has also been bought and sold for financial gain and speculation, or to be used in the most profitable markets only. To ensure that spectrum is used for the benefit of Canadians, the "use-it-or-lose-it" principle has been pushed to the forefront of spectrum discussions.

Over the past years, we've seen too many companies speculate on spectrum, or use it in limited geographies to maximize financial returns. To illustrate this issue, take the example of Vidéotron, which has earned more than $300-million by selling the subsidized spectrum it got from the government at the market value. In short, it turned an effective subsidy into profit. Use-it-or-lose-it discourages spectrum speculation by letting the industry minister take away licences that are obviously being used for speculation, or not being deployed to maximize the value to all Canadians and not just those living in the urban and metropolitan centres in Canada.

My bill, S-242, addresses the issue of spectrum usage in Canada. The bill requires that spectrum be deployed to 50 per cent of the population within three years of acquiring the licence in each of the Tier 5 geographic areas within Tier 1-4 licences. This requirement aims to prevent providers from focusing solely on urban centres and neglecting rural areas within the licence area.

During committee study in the Senate, S-242 has been strengthened by friendly amendments that allow for Use-It/Share-It arrangements. Those amendments were the result of extensive discussions with smaller providers that operate where the Big Three do not, and with direct input from organizations such as the Canadian Association of Wireless Internet Service Providers. This means that more than one provider can service larger-tier licences if the main licence holder is unable to meet the deployment conditions. This flexibility ensures that spectrum is effectively utilized and benefits all Canadians, not just those in urban and metropolitan areas.

The bill passed the Senate on April 20, and has continued to sit on the Order Paper in the House of Commons at second reading since May 11. It received one round of debate on Sept. 19. Meanwhile, rural and Indigenous Canadians continue to live in this disparity, paying outrageously high prices for sub-par internet compared to their urban counterparts.

There is no grandfather clause in my bill—its passage would immediately start a three-year clock for all spectrum bought prior to the bill passing. This is important to note as Canada's latest spectrum auction took place on Oct. 24.

My message to the House: let's get this done, pass my bill, and start ensuring that the spectrum we all rely on in this digital age is properly deployed. We need action not words and the time to act is now.

CSG Senator Dennis Patterson is a former premier of the Northwest Territories who served for 16 years in its Legislative Assembly. He played a key role in the creation of Nunavut and represents the territory in the Senate.

The Hill Times

Navigating the country's telecommunications landscape a tricky task

On the telecom side of things, the CRTC's long-standing focus on the fundamental issues of access and affordability is far more tangible than the ethereal cultural ambitions that have swamped the broadcasting boat.

Peter Menzies

Opinion

CRTC chair Vicky Eatrides, left, is clearly feeling pressure to implement the Online Streaming Act as quickly as possible, writes Peter Menzies. *Photograph courtesy of the CRTC and The Hill Times photograph by Andrew Meade*

Canada's communications policy playing field is more uncertain today than it has been in decades.

The cause is primarily the Online Streaming Act (Bill C-11), which attempts to "modernize" the Broadcasting Act by defining all internet-based audio and visual content as "broadcasting." Promoted by a series of heritage ministers as a simple matter of ensuring that streaming companies support Canadian content, the act has alarmed a thriving community of unregulated online creators while causing targeted offshore operators to question how they can continue operating in Canada.

Canadian Radio-television and Telecommunications Commission (CRTC) chair Vicky Eatrides, appointed last January, is clearly feeling pressure to implement Bill C-11 as quickly as possible. Following a series of rushed preliminary processes that made it challenging for many companies in the regulatory "rookie" category to participate, the CRTC's first public hearing is scheduled for Nov. 20.

It involves 127 intervenors, is scheduled to last three weeks, and Eatrides hopes to have initial decisions made by the end of 2024.

With all her staff's hands to the pumps on that file, Eatrides has shut down dealing with new licensing matters in the traditional broadcasting fields of television and radio for at least two years. All TV licences up for renewal this year were administratively renewed until 2025 (Bell has filed a court appeal). All of those expiring next year were renewed as is until 2026, and the radio industry was informed the CRTC won't accept applications in that genre for at least two years, putting it in a regulatory cryo-chamber.

Meanwhile, active broadcasting files have been triaged to the extent that they are backed up, in some cases for years, leaving those involved without the decisions they need. The renewal of the CBC's licence, for instance, remains incomplete 33 months after the CRTC's public hearing into the matter.

On the telecommunications side, life is much more steady as she goes. Early in July, the CRTC laid out what it described as a more streamlined and flexible manner for determining wholesale access rates with the goal of fostering competition. But these matters are rarely dealt with swiftly, and incumbent companies affected by this new—and, to many, refreshing—approach have a long track record of being able to drag things out.

Continued on page 25

In today's media environment, strengthening the national public broadcaster takes on a new importance and urgency, writes Sen. Andrew Cardozo. *Photograph by Bob Matheson via Glotman Simpson Consulting Engineers*

Rapid change in our media scene highlights the growing importance of CBC/Radio-Canada

Every Canadian has views about how to change it, and some even want to kill it, but some kind of vision fit for a rapidly changing world needs to come out of the dialogue.

PSG Senator Andrew Cardozo

Opinion

This is one for the history books. Here we are at a major inflection point in the communications age, and we have huge, multinational private-sector corporations thumbing their noses at elected governments. It is that turning point where we may well see a great setback for democracy, and a big win for corporate czars who are accountable to no one. One way of looking at it is that global corporate dictatorships are taking over from democratic governments.

Two federal acts, the Online Streaming Act and the Online News Act (bills C-11 and C-18, respectively), have been developed in recent months while two tectonic shifts are taking place that relate to news media and technology.

News media has always been in a state of evolution. If we consider the print media to be the original mass media, the invention of radio and television seemed to be a threat. But the three media found an accommodation, and a way to share consumers and to share revenue from the public and from advertisers. Over time, the proportion of revenue from advertising has grown to a sizeable majority. But over the last decade, with the growth of online media, things have changed dramatically. A large part of news and entertainment content is now free to consumers, and as consumers shifted to the online world, so did the advertising, leaving traditional media with a rapidly dwindling share of advertising and subscriber revenue.

And at the same time, there is a growing pushback against all institutions from a loud and vociferous populist segment of society, largely on the right and far right of the political spectrum. They may be a minority, but they have a voice that is not marginal. COVID-19 seems to have been a catalyzing factor, although this populism does move from issue to issue: from immigration, to anti-COVID mitigation measures, to trans rights. Their organizing principle is to use anxiety and fear.

All of this has created the perfect existential storm for traditional media: falling revenue while a free—or freer—alternative garners increasing interest and usage. And some might say: "So what? Times change, too bad for them."

But here's the thing: there is a gargantuan difference between the quality of traditional and online media. Traditional media has historically been a combination of neutral reporting and some opinion content. (Full disclosure: I have for many years been writing opinion columns for various newspapers.) The neutral media has had a high standard with the all-important editorial rigour in place. You could trust traditional media. And even the point-of-view content would include a variety of writers and opinions within a single newspaper or TV news panel. Generally speaking, traditional media have some level of bias, narrow or broad, but that was always open and clear.

There are many valiant examples of online media that are high quality, with journalistic standards and editorial functions, but these are generally new and small, so do not yet have a wide reach. Until these online outlets are big and comprehensive, traditional media is still where quality and balance exists for mass consumption. Balanced media coverage is key to a peaceful and harmonious society, but this is being undermined.

What is growing the fastest online is point-of-view media, sometimes rage-media. This is coupled with the power of algorithms, which do at least two unfortunate things: they bring consumers more of the same of anything we look at, shielding us from other views; and they highlight that which is controversial and grabs the most attention. Hence online media is dominated by content that is angry, controversial, and attention-getting. Divisiveness, whether intended or not, is the new normal for media output.

In terms of entertainment programming, services such Netflix, Disney+, and Spotify are taking over the field from traditional television services, and again, Canadian services are losing out.

Over the last 70 or so years, a major objective of broadcast regulation has been to protect and develop Canadian content, Canadian artists, and the Canadian arts and media industry. With the relatively new and significant growth in online streaming, once again Canada is challenged. Canadian content is challenged. And Canadian culture is challenged.

Most private-sector broadcasters are thinning out, even where they are consolidating. CTV for example, recently laid off 1,300 employees, including many high-profile journalists and closed most foreign bureaus. Yes, 1,300.

As such, the case for the national public broadcaster and the role CBC/Radio-Canada plays becomes more important than literally ever before. Strengthening this broadcaster takes on a new importance and urgency. And discussing and reviewing this iconic Canadian institution to make it relevant for the decades ahead is essential. Every Canadian has views about how to change it, and some even want to kill it, but some kind of vision fit for a rapidly changing world needs to come out of the dialogue.

The war in the Middle East shines the light on the enormous crisis facing the state of media in our society. Experts are saying the level of misinformation, disinformation, and online threats and attacks are higher than ever before. And this is all feeding the growth of polarization in our society, as it is in many other countries. Online media is rapidly feeding destabilization across the world.

Yeah, it's pretty doom and gloom. The two above-noted pieces of legislation are part of the solution, but in the end, a small part of the solution.

This also raises the stakes for the work of the Canadian Radio-Television and Telecommunications Commission in the months ahead, as it develops and implements the regulations flowing from the two new acts.

Andrew Cardozo is an independent Senator from Ontario and a member of the Progressive Senate Group. He is a former CRTC commissioner.

The Hill Times

The original sins of C-18

The fundamental problem lies in the premise Meta and Google somehow misappropriated news content and derived unfair benefits from links to this content.

Independent Senator Julie Miville-Dechêne

Opinion

The Senate first voted on Bill C-18 at second reading last April. At the time, among the three Independent Senators who are former journalists, two—Senator Pamela Wallin and myself—voted to refer the Online News Act for committee study. Senator Paula Simons abstained.

Two months later, at third reading, my two colleagues voted against the bill. I was the only member of our trio to vote "yes"—albeit with considerable, documented doubt. At that point, my support for C-18 hinged on an amendment I had introduced, recognizing the value that news organizations derive from the online traffic referred by Google and Facebook.

But the House of Commons rejected that amendment a few days later. When the Senate took its last vote on the Online News Act—to consider the House's response to our amendments—my two colleagues again voted "no," and I abstained. How did a bill designed to save journalism end up getting no support from the former reporters in the Senate?

A flawed premise

From the beginning, critics of C-18 have pointed to several issues with the bill: ill-defined exemption criteria, biased arbitration procedures, overbroad definition of eligible news organizations, uncapped liability for platforms, counterproductive rules on preferences, etc. While legitimate, most of these concerns did not appear insurmountable, at least initially.

The fundamental problem of the legislation lay in its premise: that Meta and Google somehow misappropriated news content and derived unfair benefits from links to this content. Many of us were skeptical: do the platforms really get more value from news links than the news media get from the traffic the platforms refer to them? Both sides refused to provide data.

To get around this uncomfortable assessment and achieve its objective, Bill C-18 proposed a rather blunt solution: when negotiating the "fair compensation" to be paid to news organizations, the parties had to consider only one side of the value equation. That is, the value that news organizations get from their links freely circulating on Facebook and Google was deemed to be… zero. The draft regulations made this explicit: the compensation "does not include any value assigned to merely making news available online [i.e., linking to news content]."

My amendment sought to correct this anomaly. It specified "the purpose of the bargaining process is to determine the value that each party derives" from the sharing of news links on Google and Facebook, and then "to determine the portion of that value that will be transferred to the eligible news business." In my view, this change gave the bill a more realistic foundation. The Senate agreed.

A flawed solution

The other fundamental problem with C-18 was the solution the bill put forward: mandated payments for links. Faced with the same policy challenge—how can we ensure the viability of independent news in the age of Google and Facebook?—the European Union proposed a solution based on expanded intellectual property rights. Several experts recommended yet another approach based on an independently administered public fund to support journalism to which online platforms would contribute. Both approaches seem workable. (In the EU, Google announced last week that it has concluded more than 2,600 deals with news organizations across 16 countries.)

But the Canadian government chose the Australian model as an inspiration, and decided to force platforms to pay for news links. This led to two problems. First, this approach violates the basic "free linking" norm of the internet enshrined in copyright law. Second, it gave Meta and Google an easy way to exclude themselves from the legislative scheme by simply removing news links from their platforms. Meta has already done so. Google is signalling it will follow suit.

Where do we go from here? No one knows. It may be possible to fix or minimize some of the bill's flaws in the final regulations, but that would require significant changes. Maybe the government can find a way to buy time as it pursues talks with Google. Maybe a compromise can be found. At the end of the day, however, it's difficult to see how regulations could alter the fundamentals of C-18.

Considering the current situation—no more news links on Meta and (possibly) on Google, no new funding for news businesses, a drop in traffic—the government may have no choice but to get creative in its application of C-18, guarantee Google an exemption or, as a last resort, amend the law.

Julie Miville-Dechêne is an Independent Senator for Quebec. She is currently the vice-chair of the Senate Standing Committee on Transport and Communications.

The Hill Times

Canada must embrace digital transformation to achieve climate change and sustainability goals

Realizing the full benefits of this intersection of connectivity, digital transformation, and sustainability will not happen without the right policies and collaboration.

Robert Ghiz

Opinion

In just the last year, Canadians have experienced the devastating effects of wildfires, flooding, hurricanes, heat waves, and drought. Shaped by the effects of climate change, the increasing frequency and intensity of severe weather events is concerning for all Canadians, with recent opinion polls indicating that 89 per cent have noticed an increase in natural disasters over the past decade, and 63 per cent agree that climate change is a crisis and necessitates "immediate action."

Policymakers in Canada understand the importance of combatting climate change. Canada is a signatory of the 2015 Paris Agreement on climate change, and is aiming to achieve net-zero emissions by 2050 and 40-50 per cent reductions from 2005 levels by 2030. Though progress has been made towards these goals, emissions have only reduced by nine per cent, and Canada remains a large consumer of natural resources and produces more industrial waste per capita than any other nation.

The current policy approach to climate change mitigation and sustainability focuses largely on renewable energy and clean technologies. While these are important initiatives, Canada must expand its approach.

In a new report entitled *Canada's next sustainability frontier: Powering digital transformation with connectivity*, Accenture concludes that the digital transformation of Canada's industrial and agricultural sectors has been an underutilized tool in our efforts towards achieving its sustainability goals.

In simple terms, digital transformation involves industries using data and digital technologies to modify or reinvent their operations. In its report, Accenture illustrates how the use of connected devices and sensors in industries such as oil and gas, mining, and agriculture, along with technologies such as digital twins, artificial intelligence, and cloud computing can be used by businesses to operate more efficiently and safely, and in turn reduce energy and fuel consumption as well as produce less waste.

For example, in oil and gas, predicting failure of equipment before it can occur can drive 20 per cent energy efficiency. In mining, real-time sensors that monitor tailing ponds (where waste is collected) can deliver 15-20 per cent in preventative maintenance savings. The higher accuracy of these sensors means that clean water can be recycled into the environment quicker, reducing environmental safety incidents by up to 90 per cent. In agriculture, using sensors and drones to monitor crops can reduce water and fertilizer use by 20-40 per cent.

Critically, each of these use cases requires advanced wireless and wireline networks to support the exponential growth in bandwidth, speed, simultaneous connections, and reliability needed to power the devices and technologies that enable digital transformation and greater sustainability.

On this front, Canada is well-positioned to support digital transformation as it has some of the world's most advanced next generation telecommunications networks. This is in large part due to the billions of dollars of capital investments made by Canada's network operators each year.

But realizing the full benefits of this intersection of connectivity, digital transformation, and sustainability will not happen without the right policies and collaboration. As Accenture sets out in its report, a connectivity-powered digital transformation requires the following key enabling conditions:

1. Telecom policies that maintain incentives for Canada's communications service providers to continue to invest in the expansion and enhancement of their networks;

2. Solution providers must develop the software and devices that meet industry verticals' digital transformation and business requirements;

3. Industry must embrace digital transformation, including investing in the necessary tools and processes, and the hiring and training of workers with the needed skillsets; and

4. Government will need to offer incentives for digital transformation similar in scale to investments in renewables and clean technology. This should include a strong emissions measurement strategy so that government and industry can focus on the type of digital transformations that have the largest impact.

On the solid foundation built through years of investments by the telecommunications sector, government and industries must work together to enable the digital transformation of Canadian industries. This will not only make for a more productive Canadian economy, it will also help build a more sustainable future for all Canadians.

Robert Ghiz is the president and CEO of the Canadian Telecommunications Association and was previously premier of Prince Edward Island.

The Hill Times

Inadequate Online News Act regulations pay lip service to journalistic independence

The transparency provisions in the Online News Act fall short of ensuring Canadians can comprehend the extent of non-cash influence that tech giants may wield in the news industry.

Sara Bannerman

Opinion

Google and Meta are demanding changes to the new online news regime. The Online News Act will require them to provide compensation to Canadian news organizations if they carry news on their platforms. Meta has stopped serving news to Canadians—and Google has threatened to do the same—if changes are not made. Draft regulations designed, unsuccessfully, to mollify them would allow non-monetary compensation to satisfy the requirement to provide compensation. Non-monetary compensation could include training, technical support, and technology licensing discounts in lieu of traditional cash payments. This carries significant risks for the independence and transparency of Canadian journalism organizations. While the act purports to protect journalistic independence, its measures do not cover the more insidious forms of influence such compensation could bring.

If Google and Meta continue to serve news in Canada, non-monetary compensation could expand their power in Canadian news. Recently, Jason Kee, governmental affairs and public policy counsel for Google Canada, expressed Google's desire to count "in-kind programs, training, and other kinds of programming and support" towards its exemption criteria for smaller publishers. If such in-kind support is permitted to count, those publishers might become further reliant on Google's technologies and support, potentially jeopardizing their independence from a business-model standpoint, encouraging reliance on platforms' evolving technologies, metadata, training, algorithmic newsfeed business decisions, and access channels to news consumers. This dependency could become an even greater problem if these tech giants decide to withdraw, once again, from news provision in Canada to align with their global strategies and profit margins.

Former journalist and Independent Senator Paula Simons noted in a recent Senate speech that Facebook and Google have encouraged news organizations to "pivot to video" or to "search-engine optimize" their stories. These strategies "turned out to be a waste of time" for news organizations, she said. Yet, there is nothing in the Online News Act preventing platforms from investing in specific projects or incentivizing specific types of content, such as video. Such incentives could erode quality public-interest news reporting in favour of platform addiction and clickbait. Further, Meta and Google could encourage or require data practices that would facilitate the sale of ads on their platforms.

Inadequate proposed regulations pay lip service to journalistic independence requiring that platforms commit, under compensation agreements, not to "take actions that undermine freedom of expression and journalistic independence," including: (a) taking retaliatory action in response to an editorial decision of a news business; (b) restricting actions a news business may take to protect journalistic independence; and (c) intervening in a news business's editorial process." That, and that alone, would be sufficient to meet the journalistic and freedom of expression requirements of the act.

Such regulatory provisions, while important, do not begin to cover the forms of influence that are likely to affect the independence of Canadians and Canadian news organizations. A predictable casualty of this approach may be the independence of news organizations' business models from digital intermediaries, along with likely erosion of news consumers' privacy.

The transparency provisions in the Online News Act fall short of ensuring Canadians can comprehend the extent of non-cash influence that tech giants may wield in the news industry. The independent review by an auditor requires only general industry-level information, and confidentiality provisions favour the privacy of both Google/Meta and news organizations.

If "compensation" can be non-monetary, an adequate description should be made publicly available to help news consumers, regulators, and others to understand and assess the influence of platform data practices, technologies, and training on Canadian news. Parties could be required to commit to publishing a description of the non-monetary compensation provided under the agreement, to be updated annually throughout the term of the agreement.

The independence of news organizations' business models may become a casualty of permitting non-monetary measures to count as "compensation" under the Online News Act. It is imperative to ensure that any compensation provided to news organizations is subject to scrutiny. The future of Canadian journalism and its independence may hinge on how these issues are addressed.

Sara Bannerman, Canada Research Chair in Communication Policy and Governance, is a professor of communication studies at McMaster University.

The Hill Times

When it comes to safeguarding Canadian news, let's stick to the fundamentals

Remember that the motivating purpose of the Online News Act is to ensure fair rent from those who use the work of Canadian journalists.

Marla Boltman

Opinion

The irreplaceable value of credible and reliable journalism has been brought into sharp focus with the escalation of the conflict in Israel in recent weeks. Unfortunately, Canadians trying to remain updated on developments have found themselves caught in the middle of another kind of conflict: the clash between our federal government and foreign tech giants over the Online News Act, which mandates compensation to Canadian news outlets for use of their content.

The petulant move by Meta to deny access to news on all its platforms has left Canadians to wade through an ocean of disinformation, doctored videos, malicious propaganda, and outright lies. Suddenly, a game of push and pull between our government and Silicon Valley billionaires takes on a whole new gravity. The vital lesson to be learned is not just that foreign tech giants are resorting to bullying tactics, but also that the coverage we seek from the Middle East, or anywhere else, does not come free.

This is, of course, the whole point behind the Online News Act which presently sits in a sort of limbo as we wait for the government to issue the final regulations needed to operationalize this important piece of legislation. The period for comment and input into the drafting process has been closed since Oct. 2. Now, we need the government to come forward with the fine-print details before turning to the last stage of regulatory implementation at the Canadian Radio-television and Telecommunications Commission (CRTC).

Even more importantly, we need the government to stand strong in the face of what is sure to be intense pressure from private interests. Google is already signalling its intent to use the CRTC proceedings to unleash its paid army of lobbyists, lawyers, and inside influencers. It is seeking to win back in regulation what it lost in legislation.

That cannot be allowed to occur.

FRIENDS comes from a very different place. We speak for the majority of Canadians who wish to see the Online News Act implemented in a fair and sensible fashion. Our hope is that the government will compose these regulations with one clear principle in mind: safeguard Canadian news.

Don't retreat or overreach. Remember that the motivating purpose of the Online News Act is to ensure fair rent from those who use the work of Canadian journalists. Because if you use it, you pay for it. Simple as that.

Fulfilling this goal will require—at a minimum—three actions.

First, draw a clear line on mandatory financial contributions. The foreign tech giants want to worm off the financial hook. They seek outsized recognition for so-called non-monetary contributions. Obviously, we applaud investments in Canadian news from these platforms. But let's not get dazzled by a bunch of crosstalk. Those contributions should be on top of—not instead of—the amounts paid to Canadian news organizations for their content.

Second, ensure the monies collected go where they're intended: to news production. Use these funds to pay journalists, producers, editors, and crews. Make new hires. Invest in technology. But do not permit tech platforms to direct those dollars into share buybacks or the vest pockets of hedge fund managers. The CRTC should be the guarantor that those funds are delivered to their intended destinations.

Finally, remember that the Online News Act is one piece of a much bigger puzzle. Keep in mind other priorities that complement this legislation, such as investments in local news production from the Online Streaming Act. The goal is to boost the whole of the Canadian news sector. Regulatory models must take that whole into full consideration.

The foreign tech giants will fight and try to impose their will. They'll spend millions of dollars just to prevent millions from being paid to workaday Canadian journalists. The pending regulations represent the last best hope the tech tycoons have to crush an approach they've opposed every step of the way.

They cannot succeed. Let's get it right. And let's get it done.

Let's stand up for Canadian news, for now and for good.

Marla Boltman is the executive director of FRIENDS. With more than 20 years of combined experience in policy and regulatory advocacy, content production, and entertainment law, Boltman is a trusted and passionate leader in the Canadian media sector.

The Hill Times

Lack of regulatory oversight of online platforms has exacerbated divisions in our society, and created a media ecosystem flooded with unreliable content that makes users more prone to radicalization, writes Phaedra de Saint-Rome. *Unsplash photograph by Adrian Swancar*

An online safety bill in Canada: time to get on with it already

Canadian youth are at greater risk online than their peers in much of the democratic world because our federal government won't table a long-promised bill.

Phaedra de Saint-Rome

Opinion

The year is 2020. You are washing your groceries, making sourdough starter, attempting choreography on this burgeoning platform called TikTok. All the stores within a 30-kilometre radius have run out of toilet paper. The Canadian government announces it will be introducing legislation to tackle online harms, as does the European Union.

Fast forward a year. Canada's legislation has not yet been tabled, but the Canadian Commission on Democratic Expression, co-chaired by former Supreme Court chief justice Beverley McLachlin and McGill University professor Taylor Owen, along with its corresponding Citizens Assembly, publish a six-step report on how to tackle online harms in Canada. Australia introduces updates to its 2015 Online Safety Bill, and the United Kingdom tables its own bill.

That same year, the Canadian government publishes a proposal addressing online safety and receives widespread backlash for its notice-and-takedown recommendation. Australia successfully passes the updates to its bill. The Canadian prime minister calls an election, and the Liberal Party commits to introducing legislation addressing online harms in the first 100 days if re-elected.

And they were re-elected.

In the 757 days since, the government has conducted a wide range of consultations, including hearing from two national commissions, an Expert Advisory Group, and four citizens assemblies, one of which featured Canadian youth. But still no bill.

During this period, the EU—rarely described as nimble when it comes to policymaking—has tabled its own online safety legislation and seen it enter into force. The U.K.—facing its share of governance crises over the same time—has successfully passed its Online Safety Bill, slated to become law in the coming months.

We know from internal documents exposed by whistleblowers that platform companies are aware of the harmful impacts of their products. And yet unlike other industries that sell consumer-facing products to Canadians, much less to Canadian youth, still no framework exists in Canada to ensure these companies take steps to mitigate the harms caused by their products. The result is that Canadian youth are at greater risk online than their peers in much of the democratic world because our federal government won't table a bill.

Youth around the world are increasingly subjected to cyberbullying, forced to navigate content that fuels eating disorders and self-harm behaviours, which at the worst end of the spectrum can lead to suicide. Lack of regulatory oversight of online platforms has contributed to mental health challenges across multiple age groups, a crisis of reliable information, and an increased vulnerability to foreign interference in Canadian politics. It has exacerbated divisions in our society, and created a media ecosystem flooded with unreliable content that makes users more prone to radicalization.

We are nearly four years out from the first time the government promised to table online safety legislation and a bill has yet to see the light of day. With this amount of consultation, an increasing number of jurisdictions that have passed legislation to learn from, and a growing volume of online harm, one has to wonder when the government will just get on with it already.

The benefit of being slow to move is that we know what needs to be done. A systems-based, duty of care approach to online harms, outlined in the Expert Advisory Group final report, and adopted by the EU, the U.K., and Australia, would mean platforms would be expected to shift away from the content moderation strategies for addressing harmful content that they presently follow, and towards tools and procedures that enable them to take reasonable steps to mitigate foreseeable harms in the design and use of their products.

There are promising signs that the government is getting close to tabling something. At an Oct. 16 event announcing the new Special Envoy on Holocaust Remembrance and Combating Antisemitism, Justice Minister Arif Virani said the bill was in its final stages of development—though he stopped short of providing a timeline.

Has the government made a mess of other digital-focused legislation? Sure. Are there issues like cost of living and housing that the government should prioritize? Definitely. But do those things mean that it can't table a bill that four years of consultation have gone into?

This bill won't be perfect; few pieces of legislation are. But surely tabling legislation—even legislation that draws controversy—is better than being part of a shrinking group of democracies who are failing to respond to the harms youth face online.

Phaedra de Saint-Rome is the director of operations at McGill University's Centre for Media, Technology, and Democracy.

The Hill Times

Navigating the country's telecommunications landscape a tricky task

Continued from page 21

Competitor access rates is a matter that has preoccupied the CRTC for a decade; the rates have wavered back and forth since at least 2016, and the lack of regulatory certainty has had a debilitating impact on smaller service providers. The largest of those—TekSavvy—threw in the towel early this summer and put itself up for sale.

The management of so-called mobile virtual network operator rates, particularly relevant in the shadow of Quebecor's purchase of Freedom Mobile, has moved along efficiently. This is another positive sign involving an area in which the CRTC is attempting to foster competition with increased regulatory certainty. When it comes to the telecom side of things, the regulator's long-standing focus on the fundamental issues of access and affordability is, while complicated in terms of implementation, far more tangible than the ethereal cultural ambitions that have swamped the broadcasting boat.

Two other matters are worth watching.

The first—the CRTC's role in overseeing negotiations as foreseen in the Online News Act—may evaporate. Meta has moved out of the business of carrying news in Canada, with disastrous consequences for those in the business of creating it. News Media Canada, the industry's lobbying arm, is now asking the government to bow to Google's demands before it does the same.

That could mean significant legislative amendments which could eliminate the CRTC's role entirely. Seeing as the commission has already delayed decisions on which news organizations would qualify until late 2024, this would be a welcome relief.

The second will be whether the CRTC, when dealing with the likes of Disney and Netflix next month, realizes what's at stake. The United States-based companies aren't interested in contributing solely through official funds while all the commission appears to want to talk about is how much they should pay and to which funds.

Neither has threatened, as Meta and Google did with Bill C-18, to disconnect Canada if they don't get the outcomes they need.

Not yet, anyway.

Peter Menzies is a senior fellow with the Macdonald-Laurier Institute, a former newspaper executive, and past vice-chair of the CRTC.

The Hill Times

INNOVATION

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Innovation Minister François-Philippe Champagne, pictured recently on the Hill. The Advisory Panel on the Federal Research Support System report, released March 20, 2023, showed that the government is not providing the right support for science research in Canada, writes NDP MP Richard Cannings. *The Hill Times photograph by Andrew Meade*

Our scientists need action now, not more study

A post-industrial economy like our needs a constant stream of innovation to remain competitive. By underfunding our brightest scientists early in their careers, we're forcing them to either drop out, or leave the country.

NDP MP Richard Cannings

Opinion

For members of Canada's science community, the Liberal election in 2015 seemed the end of the Dark Ages. The headlines proclaimed, "Canada is finally ending its war on science," exclaimed *Vox* or, "How science helped to swing the Canadian election; after nine years of government attacks on Canadian research, the science community is looking forward to a fresh start under Justin Trudeau," said the United Kingdom's *The Guardian*. Eight years later, scientists here may well wonder if it was all just for show as this government is providing less support for science than the Harper government did.

"Because we know that today's science is tomorrow's economy, our government is committed to ensuring that our talented, world-class researchers have the right support for the crucial work they are doing," said Innovation Minister François-Philippe Champagne on March 20 when he released the report by the Advisory Panel on the Federal Research Support System. Unfortunately for Champagne, the report showed that the government is not providing the right support, which could be why, when asked about implementing the report's recommendations, the minister's only response was that he's studying it.

The Bouchard Report—after the panel's chair Dr. Frédéric Bouchard—found that Canada was falling further behind in support for science. For example, the budget for the Natural Sciences and Engineering Research Council—the federal science funding agency—is currently about 3.7 per cent lower than it was in 2007 (in 2007 constant dollars). Not only has Canada stagnated science funding, but it has done so at a time when other nations are dramatically increasing their support for scientific research.

Japan is creating a US$87-billion fund for science and technology. Since 2007, the Australian Research Council's budget has increased by 1.1 per cent. The United Kingdom has committed to increasing annual government investment to $20-billion by 2024-25. Germany is increasing its research investment to 3.5 per cent of its GDP by 2025, while Finland has set a science funding target of four per cent of its GDP by 2030. The United States has dramatically increased federal funding support for science. Between 2007 and 2022 the U.S. National Science Foundation's budget grew by 5.2 per cent, the American CHIPS and Science Act commits some US$81-billion over 10 years, and the Inflation Reduction Act, signed into law last August by U.S. President Joe Biden, invests nearly US$400-billion in green technology.

Canadian science investment is about 1.6 per cent of our GDP.

Not mincing words, the Bouchard Report states: "Given the staggering investments we see in other countries and the stagnating investment levels we see in Canada, a top priority must be increasing funding for research and talent. For the panel's recommendations to be successful, it is critically important that core funding of the granting councils be significantly increased to address:

1. the pressures resulting from the growth in the system (e.g., increasing number of graduate students and postdoctoral fellows);
2. the effects of inflation; and
3. the importance of nurturing a globally competitive research and talent base."

In addition to stepping up our funding of research, there is an even more urgent need to increase financial support for the people doing the research. Laboratories are staffed by graduate students and post-doctoral fellows. Actual dollar amounts for Canadian graduate scholarships has not changed in 20 years while the federally funded post-doctoral fellowship stipend has been constant since 2015. The impact of years of inflation means these supports, in terms of buying power, are worth only half today.

Little surprise, another key finding of the Bouchard Report was: "It is also clear to the panel that current support for graduate students, the researchers of tomorrow, is at a breaking point. The values of the government's awards for university research trainees have remained virtually stagnant for the past 20 years. As a result, they have not kept pace with increases to the cost of living nor with research trainee compensation trends around the world. This situation has significantly eroded Canada's position as a global hub for the attraction and retention of research-enabled talent and this erosion will be accelerated by the increase in investments by our global peers. As a result, the panel also urges the government to significantly increase funding for students and postdoctoral fellows to an internationally competitive level."

A post-industrial economy like Canada's requires a constant stream of innovation in order to remain competitive. By underfunding our best and brightest at the start of their scientific career, we force many to either drop out of their studies or leave this country. Both choices are a loss to Canada.

What will be the result if Canada continues to underfund science?

"The risk of brain drain is only increasing," Dr. Bouchard told *Research Money* in July 2023. "At the graduate student level and post-doc level, it's becoming very difficult to explain why they should accept a Canadian offer instead of a generous U.S. or European offer."

Canadian Dr. Thomas Bell, a professor at Imperial College London, U.K., told the Science and Research Committee, "In Britain and Europe, the funding opportunities are much greater and more varied than in Canada, and the concentration of universities is also much greater and more varied. The system over here is far from perfect, but from that perspective Canada starts at a disadvantage."

At only 62 pages, it shouldn't have taken the minister more than six months to study the Bouchard Report. Canadian scientists need action now, not more study.

NDP Richard Cannings, who represents South Okanagan-West Kootenay, B.C., is his party's innovation, industry and science crisis.

The Hill Times

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Innovation Can Help Achieve a Smoke-Free Canada, Faster

Seizing an Opportunity to Ensure Government Legislation Keeps Pace with Innovation.

Despite decades of government programs and regulations, today, nearly five million Canadian adults continue to smoke.

About 22 per cent of the world's population still smokes, despite successive measures by governments around the world to reduce smoking rates.

In 2019, as one of Canada's largest tobacco companies, we launched "Unsmoke" Canada, guided by the driving principle that the best choice is never to start smoking cigarettes or for those who do, to quit entirely.

We acknowledge that this is not a message people expect to hear from our company. But we must open our minds to have meaningful conversations about how scientific advancements have opened new doors.

There's an opportunity before us, right now, with the second review of the federal government's *Tobacco and Vaping ProductsAct (TVPA)* that is currently underway.

While the best choice is to quit smoking altogether, innovation can help current adult smokers by switching them from cigarettes to different, alternative technology, such as heated tobacco, vaping products and snus.

These alternatives are not risk free, they contain nicotine, which is addictive. **But they do not involve burning,** and therefore can produce potentially significantly lower levels of the harmful chemicals compared to those found in cigarette smoke, which are the primary cause of smoking-related diseases.

Regulations should be risk-proportionate and follow a commonsense approach. Not all tobacco and nicotine products are the same. The most harmful products involving combustion and smoke – such as cigarettes – should be subject to the most restrictive regulations, and adult smokers should have access to accurate information to understand how smoke-free products are fundamentally different.

What is the Role of Government?

Quite simply, governments should not regulate these smoke-free alternatives the same as cigarettes because scientific evidence shows they are not the same.

The second review of the *Tobacco and Vaping Products Act (TVPA)* that is underway now, **provides an opportunity for a thorough review to ensure that regulations make sense for these new technologies.**

And that includes guarding against youth taking up any form of nicotine. We are emphatic – our company believes that no nicotine or nicotine-containing product should ever be in the hands of minors. The same applies to adults that aren't currently smoking or using other nicotine products.

We support new measures to prevent youth vaping, and enforcing stricter penalties for sales to minors as well as restrictions on advertising and promotion. We also support product quality and tampering standards to ensure that products purchased by adult smokers are manufactured consistently and used as intended.

But if we think about the adults who smoke in our lives, shouldn't they also know that different alternatives exist? Shouldn't they be able to make informed choices about which products are right for them?

That is why Canada needs to take a balanced approach – to remove the barriers and help adult smokers by providing access to and accurate information about smoke-free alternatives, while also guarding against youth access with smart regulations. Both can be achieved.

There's no doubt Canada can be a global leader in reducing the harm caused by smoking, but it **requires actionable steps, such as creating policy that differentiates between smoke-free products and cigarettes.**

Canadians are not well informed about the alternatives to smoking that are available because our current laws don't allow them to have access to information about these options or to distinguish the relative risks of one product to another.

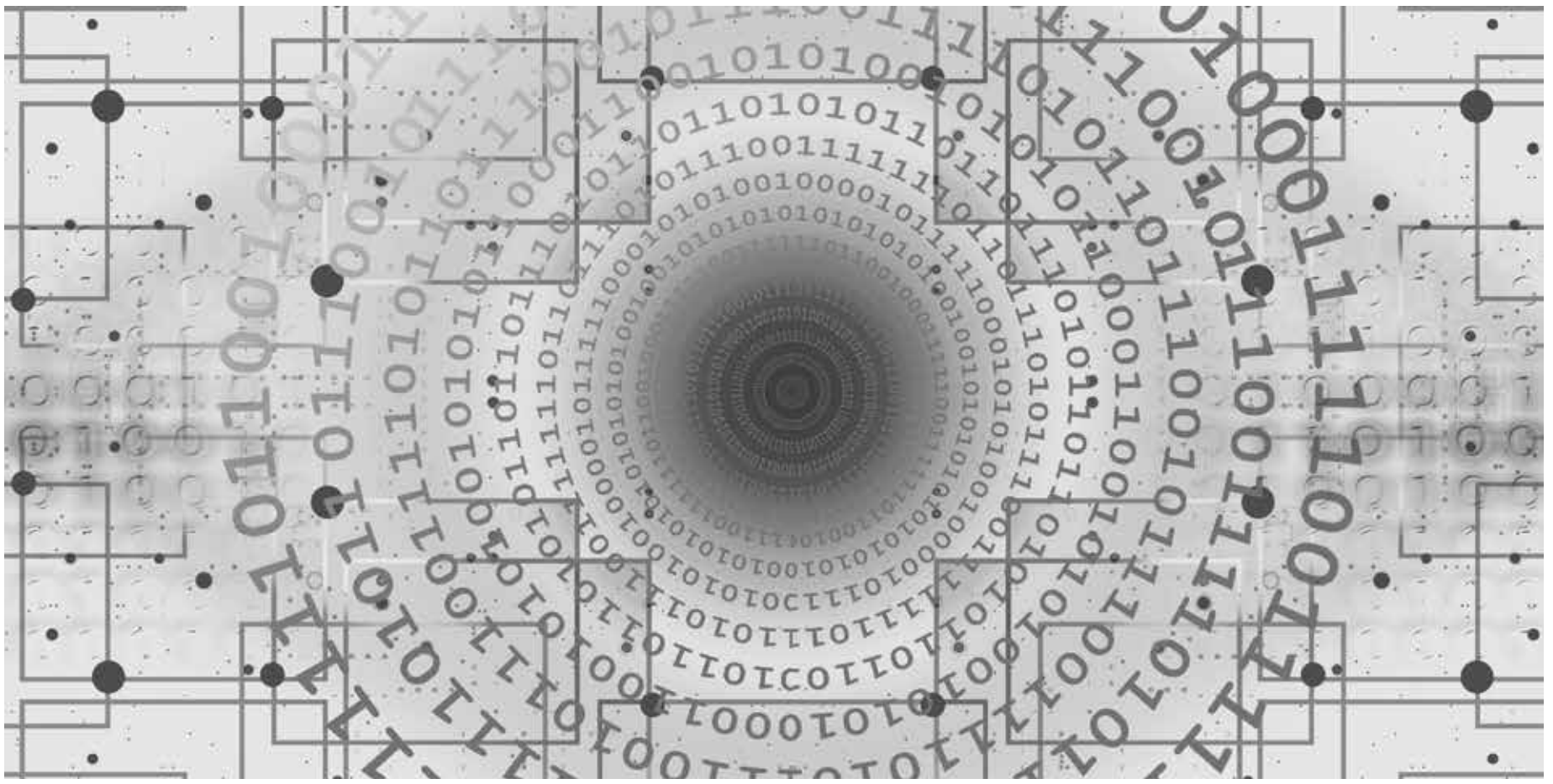
Smoke-free products should be regulated based on their relative risk to cigarettes. This would go a long way to reducing the barriers to choice for adult smokers.

The federal government has started to acknowledge that not all nicotine products are the same as cigarettes, but further steps are needed. Now is the time to modernize Canadian laws so that adult smokers have access to better alternatives; by doing so, we can create lasting change.

That is how together, we can Unsmoke Canada.

Mindaugas Trumpaitis, Managing Director, Rothmans, Benson & Hedges Inc.

Kory McDonald, Head, External Affairs, Rothmans, Benson & Hedges Inc.



Canada's globally renowned strengths in AI have emerged from a sustained focus on promising subfields of AI, such as machine learning, deep learning and neural networks, placing our researchers on the vanguard of academic AI, writes Liberal MP Ryan Turnbull. *Image courtesy of Pixabay*

Canada's innovation advantage

Canadians and the government's investments are helping cement our position as a world leader in research and innovation, building a global brand that will attract talent and capital, writes Liberal MP Ryan Turnbull.

Liberal MP Ryan Turnbull

Opinion

The world is undergoing some of the most substantive social and economic changes since the Industrial Revolution. Climate change has become the driving force behind a generational shift, creating the imperative to transition to a cleaner and greener market. The worldwide push for net-zero requires employing a broad range of new clean technologies across industries. Alongside clean-tech industries, digital technologies are similarly transforming the global industrial base.

Canadian companies are global leaders in areas such as hydrogen, battery technology, biofuels, and carbon capture, utilization and storage. In fact, this year, 12 Canadian firms made it onto the Global Cleantech 100, an annual list of the world's most innovative green technology companies. The sector even employed more than 188,000 people, and clean technology businesses contributed more than $34-billion to the Canadian economy in 2021.

To help support the industry as it navigates the transition, the government is investing in research and development, commercialization and scale-up, as well as introducing measures to encourage the adoption of clean technologies across other sectors. The $8-billion fund Net Zero Accelerator initiative has been a core tool to help steer this revolution to success through supporting the accelerated reduction of greenhouse gas emissions.

Canada's internationally renowned strengths in artificial intelligence (AI) have emerged from a sustained focus on promising subfields, such as machine learning, deep learning and neural networks, placing our researchers on the vanguard of academic AI.

According to MarcoPolo's Global AI Talent Tracker, Canada's AI talent pool is world-class in respect of both quantity and quality. We have the third largest pool of top-tier AI researchers of any country, and 10 per cent of the most elite AI researchers are in Canada, second only to the United States. Canadians are leading on one of the greatest technological transformations of our age, and the government is here to support their talent and innovation.

In fact, the Pan-Canadian Artificial Intelligence Strategy was designed to take advantage of these strengths. Launched in 2017, the first phase of the strategy, led by the Canadian Institute for Advanced Research (CIFAR), invested $125-million over five years to consolidate Canada's talent base and global competitiveness in AI research. Since then, CIFAR has been working to support a national network of regional AI ecosystems. This has been achieved through support for Canada's leading centres of AI research and innovation at Amii in Edmonton, Mila in Montreal, and the Vector Institute in Toronto—a group of not-for-profit organizations known collectively as the National Artificial Intelligence Institutes.

To continue Canada's growth in AI, the government launched a second phase of the strategy with an investment of more than $443-million last year. This phase brings together partners from across Canada to advance efforts under three pillars: commercialization, standards, and talent and research. The objective is to both amplify and broaden the gains of the first phase, while helping to leverage these efforts to foster responsible adoption and commercialization of AI.

The Scale AI cluster, for example, acts as a nationwide nexus fostering the entire AI ecosystem by encouraging and funding collaborations between academia, industry players, start-ups and SMEs across Canada. Scale AI focuses on stimulating the demand side by co-investing with industry to help lessen the risks associated with early investment. It also focuses on supporting the supply side by enabling start-ups to reach their first customers, and helping SME service and solutions providers to commercialize their offerings and leverage their intellectual property.

Overall, Canadians and the government's investments are helping cement the country's position as a world leader in research and innovation, and building a global brand that will attract talent and capital. We are well-positioned to meet the demands of the 21st century with a highly educated workforce, world-class research institutions and abundant sources of clean energy.

I'm beyond proud of the contributions and achievements Canada is making, but I'm even more excited to see what we will accomplish as we continue on the path of discovery, not only as contributors, but as trailblazers.

Liberal MP Ryan Turnbull, who represents Whitby, Ont., is the parliamentary secretary to Innovation, Science and Industry Minister François-Philippe Champagne.

The Hill Times

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Champagne lauded in innovation industry, but more can be done on infrastructure, faster regulatory updates, talent retention, say experts

The infrastructure development sector 'is a bit of an orphan,' says Toronto Metropolitan University's Wendy Cukier, but responses to the housing crisis offer the chance for a rethink.

BY MIKE LAPOINTE

Experts say Innovation, Science and Industry Minister François-Philippe Champagne has done a good job shepherding Canada's innovation base and setting its business interests internationally, particularly on the electric vehicle file, but that there's room for a stronger focus on innovation within infrastructure development, retention of top talent, and speeding-up necessary regulatory changes.

"It's hard to imagine a better ambassador—he's just relentless, I don't know how many miles he's flying per year, but he's everywhere and he's really pitching for Canada everywhere," said Arvind Gupta, a computer scientist at the University of Toronto who took part in roundtable discussions informing the government's plan for steering innovation in the data economy back in 2018.

"Think of the big EV companies that are now setting up shop in Canada, think of Moderna who's setting up vaccine manufacturing in Quebec, it's very impressive," said Gupta. "These things don't happen accidentally. You have to put a team around you and get them to execute, and that starts with the minister."

"He's just a power unto himself," said Matthew Holmes, the Canadian Chamber of Commerce's senior vice-president of policy and government relations.

"He's just a force of nature, and we need somebody like that, we need somebody who's a champion of Canada as a place to do business, and is a great place for foreign direct investment," said Holmes.

But Holmes also said Champagne (Saint-Maurice-Champlain, Que.) wants business to succeed "without government getting in its way or making it do something, if at all possible."

"And I think that's a really healthy perspective," he said. "This government has endless ambition. It has all kinds of ideas for where we need to be. But it can't get out of its own way to help us get there."

"And so business is often an obstacle, rather than a partner," Holmes added. "I think that what we've seen from Minister Champagne, which is critical in this ministry, is the ability to work with the corporate sector, with corporate Canada, whether that's small and medium enterprise, or the big giants."

Champagne was first elected to Parliament in the 2015 election, and has been in his current role since 2021.

Day-to-day, the innovation minister interacts and works with several other ministers across government, and is responsible for a wide swath of files including, but not limited to critical minerals, telecom and high-speed internet projects, electric vehicles, innovative drug discovery, and artificial intelligence.

A considerable amount of funding across a number of files has gone out the door from Innovation, Science and Economic Development (ISED) in recent years, especially as the innovation economy plays an increasingly important role both globally and in Canada.

According to a January 2023 Chartered Professional Accountants Canada interview with Nicole Barry, chief financial officer of MaRS Discovery District, "when you count the number of startups, plus the technology investments being made by industry, the innovation economy represents 12 per cent of the Canadian GDP."

Clean technology businesses contributed more than $28.2-billion to the Canadian economy in 2021, and exported $9.2-billion in goods and services, according to a February 2023 ISED press release announcing $68.2-million in 17 Canadian cleantech firms.

Sustainable Development Technology Canada, an arm's-length foundation created by the government in 2001 to fund new clean technologies, has invested more than $1.58-billion in over 500 companies that have generated $3.1-billion in annual revenues, created 20,942 jobs, brought 194 new technologies to market, and reduced greenhouse gas emissions by 22.6 megatonnes of CO2 annually, according to a February 2023 press release.

The global market for mass-manufactured clean energy technologies could be valued at approximately US$650-billion annually by 2030, according to Forbes.

In the biomanufacturing sector, the government provided $2.2-billion over seven years in the 2021 budget toward the domestic life sciences sector and securing pandemic preparedness. The government has also allocated $3.23-billion to provide high-speed internet access to 98 per cent of Canadians by 2026, as well as $568-million over two phases to support AI commercialization, standards, talent and research.

Champagne has worn many high-level hats in cabinet

Champagne also has considerable cabinet experience, having served as foreign affairs minister, infrastructure and communities minister, and international trade minister, before being moving to the innovation portfolio.

In addition to Champagne, there are a number of ministers associated with the ISED department, including: International Trade Minister Mary Ng (Markham-Thornhill, Ont.), Rural Economic Development Minister Gudie Hutchings (Long Range Mountains, N.L.), Tourism Minister Soraya Martinez Ferrada (Hochelaga, Que.), and Small Business Minister Rechie Valdez (Mississauga-Streetsville, Ont.).

According to the government's main estimates, ISED will see $5.85-billion in 2023-2024 spending plans, up from $3.09-billion in 2021-2022, but down from $5.87-billion in 2022-2023 spending estimates to date. The government's total budgetary main estimates for 2023-2024 are $432.94-billion.

According to a rundown of ministers' officers 2022-2023 expenditures, Champagne's office had $2.46-million in total gross expenditures, with $2.24-million covering personnel costs. That's up from 2021-2022, when the minister's office saw just under $2-million in total gross expenditures, with $1.90-million covering personnel costs.

"We have this huge innovation system, and I would say that the government needs to start thinking about how to pivot or evolve that system and support industrial strategy," said Gupta.

Industrial strategy involves understanding the structure of Canada's economy and which sectors the nation has a chance of being amongst world leaders, according to Gupta, "and then figuring out how to build ourselves in those particular sectors, how to attract employees, how to link smaller companies to those employees or supplies."

Electric vehicles are a "really good example," said Gupta, noting that Canada could be a big player in the automotive transformation.

"Champagne, in three or four years, was able to give Canada what looks like a pretty substantial footprint," said Gupta. "The work is done and we don't know if it will all work out, but it looks like Canada will be a pretty significant player."

Gupta pointed to Finance Minister Chrystia Freeland's (University-Rosedale, Ont.) 2022 fall economic statement, where she made note of Champagne's "fight for Canada" to land large company operations within the country.

"And he's definitely been doing it, the results speak for themselves," said Gupta.

One of the minister's major moves in recent months was landing a new Volkswagen EV battery plant in St. Thomas, Ont., with what Parliamentary Budget Officer Yves Giroux found would cost $16.3-billion in public funds.

But in a statement, Giroux said "the economic benefits of building the new facility are marginal" and that "we estimate the plant will increase real GDP in Canada by 0.01 per cent above its baseline projection by 2027 and will add around 1,400 jobs by the same time."

Gupta said "of course we can say that [the cost] is too much or too little for Volkswagen over 30 years. I don't know, but there are definitely people who criticize and say 'we spent too much.'"

"Do we know that? If Volkswagen is a raging success, $15-billion will look like chump change," said Gupta. "But we have to try, otherwise we're not going to have a piece of this market."

Gupta also said "if this pans out, Canada could have a bigger share of the EV market" than the country had of the internal combustion engine market.

Another accomplishment was the joint $5-billion investment from LG Energy Solution, a leading battery manufacturing company, and automaker Stellantis N.V. to construct a facility in Windsor, Ont., that will manufacture batteries for EVs in Canada. The facility is expected to be operational by 2025.

Innovation, Science and Industry Minister François-Philippe Champagne, pictured, has the 'ability to work with the corporate sector,' according to the Canadian Chamber of Commerce's Matthew Holmes. *The Hill Times photograph by Andrew Meade*

Matthew Holmes, the Canadian Chamber of Commerce's senior vice president of policy and government relations, says 'we need somebody [like Champagne] who's a champion of Canada as a place to do business and is a great place for foreign direct investment.' *Photograph courtesy of LinkedIn*

Arvind Gupta, a computer scientist at the University of Toronto, says 'industrial strategy involves understanding the structure of Canada's economy and which sectors Canada has a chance of being amongst world leaders.' *Photograph courtesy of LinkedIn*

Canada needs to 'update its toolbox' around regulation; top talent programs have 'stagnated'

But some experts have noted there is still work to be done on a number of files within Champagne's portfolio.

In this edition of *The Hill Times*' Innovation Policy Briefing, interim president and CEO at Universities Canada Philip Landon writes that Canada is losing ground in the race for top research talent, as "for more than 20 years, Canada's talent programs for graduate students and post-doctoral fellowships have stagnated, losing more than 50 per cent of their real value, and falling behind comparable programs in peer countries."

Nicholas Palaschuk is a senior research associate in innovation and technology at the Conference Board of Canada, and points to a report that shows "83 per cent of Canadian-based private climate-tech investments leave the country—the majority of which move to the United States."

"If Ottawa fails to reshape its clean-tech investment strategy, it does so at the risk of Canada's competitive position in the new green economy," writes Palaschuk.

Nova Scotia Senator Colin Deacon, a member of the Canadian Senators Group (CSG), and Bob Fay, managing director of digital economy at the Centre for International Governance Innovation, write that Canada "needs to update its toolbox" when it comes to regulatory standards, and "that "strong laws and appropriate regulations are essential, but how we currently create them can't keep up with the accelerating pace of technological change."

Toronto Metropolitan University professor Wendy Cukier, who teaches and researches technology and innovation, told *The Hill Times* that "invention is not our problem, it's innovation, and what innovation requires is implantation," said Cukier. "We have all this AI stuff, and we have to obviously look at the regulatory framework and keep those up to date.

"But we also have to look at why there is such a gap in the potential of AI versus the utilization of AI, especially in small businesses," she said.

"I think we have to apply the same thinking to green tech," said Cukier. "It's wonderful to have all this clean tech. But if nobody's using it, we will not achieve the benefits and move towards our net-zero goals."

"If you don't have strong lab to market commercialization and adoption strategies, it it's not going to produce the results that you want," she said.

Cukier said she believes Champagne is thinking about structures "because it's one thing to have the strategy without implementation, and I would argue that one of the biggest challenges government faces, generally, is not that they don't need to do, it's figuring out mechanisms to actually implement."

"We can do better, we can get more business to invest in research and development, and that remains an ongoing challenge," said Cukier.

Alain Francq, director of innovation and technology at the Conference Board of Canada, said "innovation is important, but it's actually important at the firm level."

"Firms and other organizations that innovate successfully will enhance their competitiveness, and position themselves for growth and to go global," he said.

The government is trying to put together the environment and the framework to enable that, "but at the end of the day, there is a cultural component here, where we, at the firm level, are simply not investing," said Francq.

Champagne 'very successful in building Canada's brand'

But Cukier said the minister, working with cabinet colleagues, has been "very successful in building Canada's brand and attracting massive investments in key strategic areas."

Cabinet processes are "always push and pull," and Cukier said she thought Champagne had been successful in getting significant investment in key strategic areas.

"We default almost always to thinking of technology when we think about innovation, and there's no question that technology is a key driver of innovation, but it's not the only driver," said Cukier.

She said there were some "amazing opportunities" in infrastructure construction, something which she said our innovation strategies have tended to overlook.

"I think we're seeing with the housing crisis that there may be an opportunity to really think critically about all dimensions of infrastructure and construction, from tools and techniques, to processes, and what we're doing with modular housing and additive manufacturing," said Cukier. "Especially in terms of serving rural in rural communities. What are we thinking about in terms of integration, innovative approaches to skills training, and employment?"

"Canada is not where it should be internationally in terms of infrastructure development given its skills and capacity, and that sector, to me, has tended to be a bit of an orphan," she added.

Holmes said Canada has historic industries that can be "really challenged" by net zero, like the automotive and mining industries.

With Canada's critical minerals, strong intellectual property protections, talented knowledge workers and our automaking capacity, "we can tie them all together with a net-zero ambition," said Holmes.

"And I think that's what really compelling and impressive about not just the Volkswagen piece, but this broader move by the government, and by Minister Champagne," he added, calling him the "champion" behind creating a new industrial policy in Canada.

Francq said "nothing happens in a vacuum, it has been happening for a long time, regardless of who has been in office," alluding to Canada's slide in innovation globally since the beginning of the century.

"We're not talking about invention—we're really quite good at invention—but it when it comes to translating it into innovation-based economic growth, we have been heading in the wrong direction," said Francq.

In Francq's view, the government is trying to put together the environment and the framework to support increased business expenditures, research and development, increased patents and increased productivity.

Minister sets sights on rising grocery prices

Most recently, Champagne has made headlines around his efforts to stabilize food prices in consultation with Canada's five largest grocery chains.

During an Oct. 5 press conference, he said he had "secured initial commitments from the top five grocers to take concrete actions to stabilize food prices in Canada" and that "starting soon, Canadians will be able to see rollout of actions such as discounts across a basket of food products, price freezes, and price-matching campaigns, to name a few."

"Grocers need to compete to meet the expectation of Canadians across the country and that's really what you're going to see," said Champagne. "I think what we've been able is to provide a catalyst to have a more competitive environment, which will bring benefits to Canadians."

mlapointe@hilltimes.com
The Hill Times

Innovation Minister François-Philippe Champagne's 2022–2023 office expenditures

- $2.46-million in total gross expenditures
- $2.24-million in personnel costs

2021-2022 office expenditures

- $2-million in total gross expenditures
- $1.90-million in personnel costs

Departmental budget

- $5.85-billion in 2023-2024 spending plans
- $5.87-billion in 2022-2023 spending estimates to date
- $3.09-billion in 2021-2022 spending plans

As the digital transformation of our economy evolves, we need to put consumer trust and control at the centre of policy-making. While we can learn from other jurisdictions, restricting ourselves to being a follower increasingly limits our potential, write Senator Colin Deacon and Robert Fay. *Image courtesy of Pixabay*

We're at the wrong end of a data vacuum: let's fix it!

Bill C-27, the Digital Charter Implementation Act, proposes to update privacy laws and create a legal framework for AI and data.

CSG Senator Colin Deacon & Robert Fay

Opinion

Canadians live at the wrong end of a data vacuum. DOMO's "Data Never Sleeps" report estimates that each person generates about 1.7MB of data per second, equivalent to roughly 850 pages of plain text—*every second*. Currently, we have little control over where these data go, or who ultimately derives the greatest benefits from their use. This needs to change.

Consumers are the heart of our economy, and their data is at the heart of the digital economy. Therefore, lasting economic prosperity requires that we put consumer interests at the centre of data governance, and that we update our regulatory frameworks accordingly.

Australia recognized this years ago with the introduction of the Consumer Data Right. Its creation was prioritized because the government recognized that giving consumers the right to control the use of their data spurs competition, innovation, prosperity, and consumer choice. That's what markets are supposed to do. And, with sound data governance and strong guardrails in place, this right also protects individual and collective freedoms and sovereignty. The alternative is higher costs, less innovation, entrenched corporate interests, and fewer choices for consumers. This is never acceptable, but is even less so in 2023, as households struggle with the high cost of living, and while foreign and domestic oligopolies use our data for their benefit, not ours.

What is required for sound governance? Canada has the ingredients in place. Bill C-27, the Digital Charter Implementation Act, currently before the House Industry committee, proposes to update privacy legislation and create a legal framework for artificial intelligence and data. Although there is still much to be done, the act recognizes the importance of giving consumers control over who uses their data and for what purposes (called data mobility), and that guardrails be created so consumers can trust when and how their data are shared.

Less recognized is the need for a whole-of-government approach.

Take open banking, for example. This is essentially about making the legislative and policy changes necessary to give consumers secure and trusted control over the use of their financial data. This clearly falls under the purview of Finance Minister Chrystia Freeland, yet continues to face an uncertain future.

And there's more. The provinces are responsible for certain areas of financial services and consumer protection, so federal-provincial collaboration is essential. Interoperability between privacy regimes is needed, as is an agreed framework for authenticating consumer credentials. This would provide all parties with greater certainty and trust, and consumers with greater control.

Canada can build on a strong history of sectoral collaboration. For example, the Financial Institutions Supervisory Committee brings together the relevant institutions that supervise the financial sector—this structure served Canada well during the Global Financial Crisis of 2008.

The value of collaboration is increasingly recognized. By creating the Digital Regulators Forum, the CRTC, the Competition Bureau, and the Office of the Privacy Commissioner acted on the need to work together "to strengthen information sharing and collaboration on matters that relate to digital markets and platforms." Other jurisdictions have expanded this framework to include financial regulators and online harms.

But Canada also needs to update its toolbox. Strong laws and appropriate regulations are essential, but how we currently create them can't keep up with the accelerating pace of technological change. One way to safely improve the pace of modernization is to update the Statutory Instruments Act so that it recognizes standards as an effective instrument to streamline and accelerate digital rule-making. Standards, set in a transparent, multi-stakeholder and representative manner, can introduce the agility necessary to quickly adapt to changes in technology.

More generally, policy-makers and regulators need to begin to keep up with these changes and their implications. To this end, Canada is fortunate to have the Canada School of Public Service and, at the political level, the interim measure of the Parliamentary Caucus on Emerging Technology.

As the digital transformation of our economy evolves, we need to put consumer trust and control at the centre of legislative and policy decision-making. Certainly, we can learn from other jurisdictions, but restricting ourselves to being a follower increasingly limits our potential. By accelerating our own efforts, Canada can become the jurisdiction to which others look for leadership.

Senator Colin Deacon (Nova Scotia) is a member of the Canadian Senators Group. Previously a tech entrepreneur, Deacon is an advocate in Canada's Upper Chamber for innovation and harnessing of the digital economy. Bob Fay is managing director of digital economy at the Centre for International Governance Innovation.

The Hill Times

Unlocking Canada's potential for a more competitive future

Namir Anani

Opinion

Canada's global reputation for an exceptional quality of life is widely recognized, yet our productivity and competitiveness on the global stage trail behind our counterparts. Recent reports from the OECD and the International Institute for Management Development have highlighted a decline in our economic output and efficiency. This trend is underscored by the IMD ranking Canada 15th in the world for competitiveness out of 64 nations. The IMD's World Competitiveness Ranking considers a multitude of factors including productivity, efficiency, business legislation, R&D investment, innovation, and the environment, which paints a comprehensive picture of our competitive standing.

Persistent productivity challenges pose a significant threat to Canada's economic future. This not only leads to inflationary trends, but also lowers the living standards for Canadians.

Despite historical challenges in our labour productivity compared to other countries, we must reimagine our economic strategy and pioneer innovative methods to surge ahead in the competitive race. While the federal government continues to assess the impactful role that competition plays in benefiting consumers, Canada's economic strategy must also recognize the critical role of our competitive advantage in the global economy.

At the heart of our productivity challenge are innovative technologies that are enabling innovations while at the same time disrupting industries faster than economies can adjust. And herein lies Canada's challenge and opportunity to accelerate its industrial and competitive strategy. Artificial intelligence—the pinnacle of modern innovation—has the potential to revolutionize industries across the board. AI can significantly boost productivity and efficiency from optimizing manufacturing to enhancing healthcare diagnostics. By harnessing the power of data analytics and machine learning, businesses can make informed decisions, streamline operations, and unlock unprecedented growth. Businesses must also integrate sustainable practices at their core to mitigate environmental impacts and ensure long-term viability. Sustainable business solutions not only contribute to a healthier planet, but also appeal to consumers and investors.

Other areas that urgently need attention include enhancing R&D investments, reversing a risk-averse business culture towards global markets, and boosting commercialization and market access for Canadian businesses. Domestic R&D investment has been steadily declining, falling to nearly 1.7 per cent of GDP in 2021, compared to the OECD average of over 2.7 per cent. Government R&D investment is vital as it serves as a platform for experimentation and encourages private investment. We must also incentivise Canadian businesses to invest in R&D, understand the significance of innovation, and protect intellectual property. Collaboration between research institutions and businesses can accelerate the application of innovations across our economy.

Furthermore, boosting commercialization and expanding market access are imperative. Canadian businesses must prioritize both product commercialization and market expansion beyond domestic borders. This necessitates leveraging tax incentives and innovation incentives like the "Patent Box" to support entrepreneurs and small businesses in their scaling journey. Additionally, raising awareness about trade agreements and providing timely market research to businesses is essential. While Canada is privy to some of the most favourable trade deals in the world, our companies lack awareness of how to leverage them. Recent ICTC research analyzing the impact of the Comprehensive Economic and Trade Agreement on Canadian businesses identifies a concerning reality: despite the agreement being our most beneficial yet, exports from Canada to the European Union have stagnated since ratification, while imports from the EU have grown.

In the dynamic landscape of today's global economy, empowering businesses to enhance their productivity, foster a culture of risk-taking, and optimize commercialization and market access is not just an option—it's a necessity. It's the pathway to a more resilient, innovative, and prosperous future for Canadian enterprise. How do we get there? First and foremost, business capacity-building forms the bedrock of this transformation. Our businesses need to equip their teams with the technical and business skills required to thrive in a competitive world.

Government undoubtedly has a role to play in bolstering a more competitive business climate and steering economic strategy to position Canada for success in the global economy. Building the capacity of businesses to enhance productivity and embrace risk-taking is a collective responsibility. Government, educational institutions, and industry must work hand in hand to accelerate Canada's competitive advantage. By doing so, we can create an ecosystem where Canadian businesses thrive, innovate, and contribute to a more robust and prosperous economy for all.

Namir Anani is the president, CEO and chief strategist at the Information and Communications Technology Council.

The Hill Times

Canadians do face a few challenges: our population is both aging and sparsely spread across the country, labour costs are generally higher, and we need to invest in new methods and smart technologies so our smaller population can accomplish work of the highest quality and value. *Image courtesy of Pixabay*

Canada has all the ingredients for success, and a few challenges, too

Canada is in an enviable position and we must seize the opportunity presented by our great wealth and the potential we have to serve our communities and the world, and to prosper at the same time. Canada should be known not only as a country with immense natural resources but one with a wealth of ideas and talent.

Roseann O'Reilly Runte

Opinion

If you walk down the street and ask passersby "What is Canada's biggest challenge?" you are likely to get as many answers as the number of people you ask: housing, inflation, homelessness, the cost of food, national security, wildfires, climate change, etc. And if you asked how to solve those challenges, the responses will range from a helpless shrug to angry diatribes.

It is easy to focus on the extremes. We often forget the many sincere and honest efforts to respond to the challenges we face. To succeed, they require leadership, dedication, and funding.

Few people ever point out that everything is interrelated. We forget that we are all responsible not only for our family and friends, but also for our country and the values for which we all stand.

Communities are the backbone of our nation. Time and again we see communities come together: people opening their homes and offering aid to the victims of catastrophic events, building dams against floods, or planting trees in areas devastated by forest fire.

Communities welcome immigrants, and everyone is richer and wiser for the knowledge and traditions shared. Communities are also home to small businesses—the largest employers in the country with 8.2 million individuals or 67.7 per cent of the total private labour force. Healthy communities offer safe, connected and clean environments, and they include businesses that are closely interwoven with residents, celebrating success and sponsoring the cultural and sporting activities that form part of their collective memories.

But one cannot simply pick a model community from a catalogue and replicate it. Each region is different. Its natural resources, geography, accessibility, and the size and skills of its population offer a unique set of keys to successful growth and development.

Research that is taking place in universities, colleges and hospitals across the country underpins our ability to transform the economy, and sustainably extract value from the wealth of natural resources surrounding us. It also provides necessary training for the next generation of highly skilled workers that will be required in many sectors in the future.

While our economy has fared quite well over the years, Canada is currently facing a decline in productivity. This can be addressed, in part, through investment in research by business and governments, coupled with an approach that not only encourages its commercialization, but also recognizes its contribution to all areas of importance to Canadians.

As a resource-rich country, Canada has many of the critical minerals required today to support the technologies that will be at the core of tomorrow's economy. There are untold riches buried beneath our feet. We have the opportunity to discover, extract and develop our mineral wealth, increasing its value to the economy, protecting the environment, and providing employment for highly skilled workers.

In a recent article published in the *Gaiko Forum*—an online journal of Japanese perspective on diplomacy—Kanji Yamanouchi, Japan's ambassador to Canada, wrote that: "Canada … boasts approximately 250 per cent food self-sufficiency and 190 per cent energy self-sufficiency while Japan's food self-sufficiency rate is 38 per cent and energy rate is 13 per cent."

But Canadians do face a few challenges of our own. Our population is both aging and sparsely spread across the country. Labour costs are also generally higher here than in other parts of the world. Therefore, to ensure our competitive edge, we need to invest in new methods and smart technologies so our smaller population can accomplish work of the highest quality and value.

Canada is in an enviable position, and we must seize the opportunity presented by our great wealth and the potential we have to serve our communities and the world, and to prosper at the same time. Canada should be known not only as a country with immense natural resources, but also as one with a wealth of ideas and talent.

Roseann O'Reilly Runte is president and CEO of the Canada Foundation for Innovation, a non-profit corporation that invests in research infrastructure at Canadian universities, colleges, research hospitals, and non-profit research institutions.

The Hill Times

A social innovation approach is needed to tackle homelessness

Ted Hewitt

Opinion

Housing, as we know, is a critical issue for Canadians. Daily media headlines range from the lack of affordable homes to the meteoric rise in rents across all regions; from young adults giving up on home ownership to seniors on fixed incomes who can't afford to stay in their homes. The message is clear: Canada is facing a housing crisis. In response, the federal government has made housing a national priority.

Sometimes—but not always—media articles focus on a devastating issue that's sometimes but not always linked to a direct result of the housing crisis: homelessness. As the Canadian Observatory on Homelessness notes, homelessness is commonly defined as "the situation of an individual, family, or community without stable, safe, permanent, appropriate housing, or the immediate prospect, means, and ability of acquiring it."

During the pandemic, homelessness became a more "visible" problem as encampments and tent cities sprung up in rural areas and city centres. COVID-19 not only exposed pre-existing social inequities and injustices, it also intensified them and worsened the conditions for already marginalized populations and individuals. Globally, an estimated 150 million people are homeless on any given day. In Canada, an estimated 235,000 people experience homelessness annually, of which around 40,000 are youth aged 13-24. These figures are best guesses only and likely underestimate Canada's homeless population. Statistics Canada is currently attempting to provide a more accurate national portrait of homelessness.

Homelessness is a wicked problem due to its persistence, complexity, and interdependencies. It intersects with a range of other issues such as mental health, addiction, influx of refugees, domestic violence, sexual abuse, cracks in the child welfare system, availability of education and training supports, racism, and even the effects of climate change. Homelessness is also compounded by structural forces such as inflation, scarce low-cost housing, shelter system capacity, insufficient mental health services and the lack of clean water in remote and Indigenous communities. This is a policy issue that transcends all jurisdictions of governance.

To meet the goal of reducing chronic homelessness by 50 per cent by 2027-28, as outlined in Canada's 2017 National Housing Strategy and 2018 Homelessness Strategy, it is clear that we must look to new and inclusive pathways. What's needed for such a vexing problem is a social innovation approach and solutions.

Social innovation involves designing policies and strategies at a systems level. It requires developing creative and practical solutions that build in inclusion, knowledge co-creation and resilience, and take into consideration the unique causes and experiences of homelessness for specific groups such as youth and Indigenous people. It features cross-sectoral, cross-government multidisciplinary collaborations.

Insights generated by high-quality research in the social sciences and humanities are proving to be the foundation for developing effective social innovation policies to tackle homelessness. For example:

• The recommendations from research on and with 2SLGBTQ+ homeless youth, organized by Alex Abramovitch from the Centre for Addiction and Mental Health Institute for Mental Health Policy Research, have led to new inclusive housing programs. The project also revealed the prevalence of mental health problems among these youth and their lack of access to mental health services;

• Led by Stephen Gaetz of York University, a recent Canadian Observatory on Homelessness project aims to move the sector from a reliance on emergency services to a strategic and coordinated system of policies, services and practices grounded in preventing homelessness. The project integrates a focus on developing reciprocal partnerships with Indigenous stakeholders to support an Indigenous-led research agenda to end Indigenous homelessness; and

• A community-driven research collaboration in Victoria, B.C., between older women experiencing homelessness, academic researchers and community partners has increased understanding of the pathways into homelessness and its impacts on the health and quality of life of older women. Led by Denise Cloutier at the University of Victoria, the research also made actionable recommendations to generate systems-level changes through multi-sectoral collaboration.

Crisis is often a powerful spur for social innovation. Canada must leverage its research strengths in taking a systems-level approach to address the homelessness crisis.

Dr. Ted Hewitt is president of the Social Sciences and Humanities Research Council of Canada. He can be reached at ted.hewitt@sshrc-crsh.gc.ca.

The Hill Times

Instead of competing directly with the U.S., Canada should develop a parallel clean-tech strategy

Our ability to invest big in clean tech and innovation is constrained. Amidst a challenging economic outlook, Ottawa needs to retain fiscal flexibility while finding ways to accelerate private investment in this industry.

Nicholas Palaschuk

Opinion

Over the past two decades, Canada has gained recognition as a global leader in clean technology with a strong emphasis on low-carbon innovations and start-ups. However, recent reports suggest that our country may be losing ground in this race.

In a June 2023 Boston Consulting Group Report analyzing the current landscape of Canada's clean-tech investments, the results underscored that while private climate-tech investments have increased four times since before the pandemic, approximately 83 per cent of Canadian-based private climate-tech investments leave the country—the majority of which move to the United States. Inevitably, this has raised concerns about our ability to mobilize private capital, and scale Canadian-made low-carbon innovations into readily deployable technologies.

If the goal is to strengthen Canada's position as a global clean-tech leader, the federal government must recognize that trying to outspend or subsidize the United States is not a sustainable strategy. Instead of competing directly with the U.S., Canada should focus on developing a complementary strategy.

Canada's ability to invest heavily in clean tech and innovation is currently constrained. With a looming recession and a challenging fiscal outlook, the federal government needs to retain fiscal flexibility while finding ways to accelerate private investment in clean technologies.

RBC Capital Markets highlights that private sector investment in emissions reductions has slowly come to a halt for numerous reasons, including—but certainly not limited to—the intensive capital requirements, uncertainty surrounding carbon pricing, and a lack of policy clarity. Moreover, the passing of the subsidy-ladened Inflation Reduction Act (IRA) in the U.S., providing $370-billion in funding and incentives for green energy investments, puts it in a prime position to lure a growing number of our home-grown clean-tech founders south of the border.

If Ottawa fails to reshape its clean-tech investment strategy, it does so at the risk of Canada's competitive position in the new green economy.

Despite these challenges, Canada's clean-tech sector still holds promise. As of 2023, it ranks second, after the U.S., on the Global Cleantech Innovation Index, and is home to 12 of the top 100 cleantech ventures worldwide. TD Economics estimates that Canada has spent a total of C$139-billion since budget 2021, or five per cent of nominal GDP, on clean-tech initiatives. This compares favourably to the U.S. IRA which is estimated to have spent US$393-billion, or 1.5 per cent of nominal GDP.

Shifting focus to our incentive structure, the federal government plans to commit C$8.6-billion by 2030 to the Investment Tax Credit. Additionally, the 2023 federal budget includes several tax credits and incentives supporting the proliferation of clean tech, such as the Clean Electricity Investment Tax Credit, the Clean Technology Manufacturing Tax Credit, and the Clean Hydrogen Investment Tax Credit.

Instead of directly competing with the IRA, the federal government can take several concerted steps to accelerate private investment in clean growth opportunities:

Strengthening Canada-U.S. Collaboration: The Canada-U.S. energy relationship plays a critical role in ensuring energy security, and driving economic prosperity for both countries. In addition to the potential for bilateral trade of Canada's 83 per cent clean electricity, Canada and the U.S. should focus on expanding their energy trade, and working together on promising low-carbon technologies and clean electricity. It is worth noting that 88 per cent of Canada's clean-tech sector growth has been driven by environmental and cleantech services, which can be leveraged to support the growth of migratory start-ups and establish a strong presence in American low-carbon supply chains.

Leverage our existing technological strengths: Canada can focus on areas where it has a technological advantage to boost its export potential. By investing in domestically-owned nuclear intellectual property and exploring critical minerals, Canada can decarbonize its energy infrastructure and expand clean electricity production. Additionally, Carbon Capture, Utilization, and Storage (CCUS) technology holds great promise for our country. With ongoing policies being finalized, Canada's support for CCUS in the oil and gas sector is expected to surpass that of the U.S. and provide carbon revenue certainty.

Expand the battery advantage in the auto industry: As the only country in the Western Hemisphere with known reserves of all the minerals necessary to manufacture EV batteries, Canada is in an excellent position to negotiate with the U.S. to relax domestic content requirements and tap into existing American supply chains. Building off our critical mineral strategy, successful lobbying efforts have secured concessions to include Canada in IRA provisions. What does this mean? The federal government can tap into American EV supply chains and increase material efficiency by offering advanced battery manufacturing capacity.

The window to secure Canada's position in the new carbon economy is narrowing. By strengthening synergies rather than disunities, the federal government can create market signals that incentivize investment in clean-tech innovation, both domestic and foreign, all while enabling Canadian clean-tech to punch above its weight along the journey towards a net-zero future.

Nicholas Palaschuk is a senior research associate in innovation and technology at the Conference Board of Canada.

The Hill Times

Do not rule out universities to drive innovation

Only by training a diverse generation of leaders with the skills to keep pace with the evolving technologies transforming our world will we ensure that the innovation they generate benefits everyone equitably.

Guy Levesque

Opinion

While the private sector is often credited with driving the prosperity formula, universities—the great incubators of ideas, talent, and training—are essential to today's innovation agenda.

Gone are the days when international delegations and venture capital tours skip over the National Capital Region en route from Montreal to Toronto. These days, for anyone probing Canada's innovation agenda, the capital city and the University of Ottawa are must-stop destinations.

As U.K.-based economist Mariana Mazzucato points out, public funds and public institutions like universities offer the distinct advantage of being able to absorb high-risk investments. Those investments in basic and applied research often lay the groundwork for private-sector innovation: from the digital transformation of our society to the green energy transformation.

"History tells us that innovation is an outcome of a massive collective effort—not just from a narrow group of young white men in California," Mazzucato told *Wired* magazine in a 2019 interview. "And if we want to solve the world's biggest problems, we better understand that."

At uOttawa, we understand. This is why we are nurturing an entrepreneurial culture designed to generate innovation by forging strategic partnerships, and turning ideas and discoveries into life-changing products, services, and disruptive new ways of thinking, learning and doing.

We also understand the urgency of making sure equity and diversity are intrinsic aspects of how we foster innovation.

Only by equipping and training a diverse generation of leaders with the skills to keep pace with the evolving technologies transforming the world around us will we ensure that the innovation they generate benefits everyone equitably.

It's the reason our new Advanced Medical Research Centre, due to break ground by the end of this year, will be home to a women's entrepreneurship centre, levelling the playing field for access to mentors, venture capital and markets, as well as the Ottawa Health Innovation Hub. Our students and researchers will work alongside mentors, and investors alike—breaking barriers to move knowledge from bench to bedside faster.

Here, start-up companies like biotechnology firms PanTHERA Cryosolutions and Virica Biotech will have a springboard from which to expand and grow, generating jobs and revenue.

But innovation at uOttawa is not defined by one new building or program. Innovation is entrenched in the way we operate.

The urgency of that innovation mission is also the reason our Telfer Centre for Executive Leadership co-founded the Ontario Inclusive Innovation Action Strategy.

In critical areas such as digital transformation and enabling life-long health and wellness, we are creating globally competitive centres of excellence. Our researchers are grappling with real-world problems, whether harnessing artificial intelligence to animate self-driving vehicles, or developing vaccines that boost immune responses against cancer and COVID-19.

Global leaders in innovation like IBM Canada are lining up to work with us. This week, the uOttawa-IBM Cyber Range opens in our CyberHub, poised to become a forum of experiential learning for our city and region. Our students and researchers will explore state-of-the-art software, simulations, and security technology to explore new frontiers in cybersecurity—and in both official languages!

Across the city at our Kanata North campus, in the heart of Canada's largest tech park, students work with close to 20 industry partners at our Smart Connected Vehicles Innovation Centre. They solve problems and accelerate the development of the algorithms, data analysis and machine-learning models critical to the success of autonomous vehicles.

Our unique model exposes the companies we work with to the quality of our students and provides students with the technology and business experience required to jump into careers as innovation leaders. As a result, numerous patent applications have been made and more and more of our students are going to work for industry partners.

Building on that success, we plan to pursue research tackling industry-relevant priorities such as 5G telecom applications, cybersecurity, and digital enterprise.

The University of Ottawa is on a *#MissionInnovation*; join us as we drive boldly into the future.

Guy Levesque is the associate vice-president, Innovation, Partnerships, and Entrepreneurship at the University of Ottawa.

The Hill Times

Make Canada wilder.

Let’s restore the
biodiversity our
nation is famous for.

Wilder
INSTITUTE

WilderInstitute.org

Canada can ensure its research granting agencies have the proper resources to fund more major discovery-oriented projects, and that stipends for graduate students and post-doctoral fellows are competitive, writes Philip Landon. *Image courtesy of Pixabay*

Canada losing ground in race for top research talent

Our research talent has been taken for granted. It is critical the government ensures we have the domestic research capacity needed to fuel discovery and train the next generation of talent for a knowledge-driven economy.

Philip Landon

Opinion

Canada is losing ground in our ability to compete for the top research talent we need. Building up our domestic research capacity is not only necessary to ensure we don't lose out on new discoveries, but also to train the next generation of highly qualified talent.

According to RBC, by 2030, roughly 13 per cent of all new jobs created in Canada will require enhanced skillsets necessary to meet our net-zero goals. This is in addition to the overall increased demand for highly skilled talent we will see across industries as the nature and scale of the global economy becomes more complex and knowledge-driven.

The key to delivering a high-quality university education requires skilled faculty and robust opportunities for advanced research training. For generations, Canada's university system has been a national asset, attracting the brightest minds from around the world to live, work, conduct their research, and train the next generation of talent in Canada. But now, that talent pool is drying up. While we rightly boast of our highly educated population, that success is mostly attributable to the high number of students with short-cycle tertiary degrees (26 per cent) and bachelor's degrees (24 per cent).

Put simply, the high-demand fields of the future need the full spectrum of talent, including people with advanced graduate research training. But only 11 per cent of Canada's population has completed a master's or doctoral degree, well below the OECD average. That's a real problem if we want to ensure we have a pipeline of talent for Canadian industry, not only in the trades, but also in engineering, science, clean technology, business, management, law, social services, and more.

While it is a problem, it's no real surprise that too few Canadians are pursuing graduate research training. Despite the benefits that accrue, it has never been a more difficult financial proposition for most students. As the Government of Canada's own Advisory Panel on the Federal Research Support System (the Bouchard report) concluded, years of under-investment and neglect of our research ecosystem have led to a breaking point where we risk a significant brain drain of young scientists and researchers to countries that offer better support.

We are falling behind as a country at a time when we desperately need to compete and move forward.

For more than 20 years, Canada's talent programs for graduate students and post-doctoral fellowships have stagnated, losing more than 50 per cent of their real value, and falling behind comparable programs in peer countries.

Basic research funding streams through the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council, and the Canadian Institutes for Health Research (CIHR) are also on the decline.

CIHR's investigator-initiated funding stream will fund $829-million in health research in 2025, $20-million less than current expenditures. At NSERC, the decline is even steeper. The flagship Discovery Grants will fund $745-million in basic scientific research in 2025—a $100-million decline from current levels. This means fewer major research endeavours will receive federal funding in 2025 than this year. This decline makes an already bad situation even worse. As it stands, a Discovery Grant is often not enough to provide competitive stipends to research assistants or post-doctoral fellows, making Canadian-funded researchers less competitive for research positions in labs or on major projects than those in Europe or the United States.

On top of the funding cliff that Canada's research ecosystem is facing, inflation has eaten away at the value of research dollars.

Canada has taken its research talent for granted for too long. Now, as the government spends tens of billions of dollars to attract investment across value chains in manufacturing and clean technology, it is critical they ensure we have the domestic research capacity we need to fuel discovery and train the next generation of talent for a knowledge-driven economy.

It's not too late to reverse these trends. We can rebuild our domestic research capacity, and continue leading the world in research excellence. As a first step, Canada can ensure its research granting agencies have the proper resources to fund more major discovery-oriented projects and that stipends for graduate students and post-doctoral fellows are competitive.

Philip Landon is interim president and CEO at Universities Canada.

The Hill Times

Innovation Minister François-Philippe Champagne, right, and Competition Commissioner Matthew Boswell greet each other at Canada's Competition Summit in Ottawa on Oct 5, 2023. *The Hill Times photograph by Andrew Meade*

Canada's innovation policy framework needs a new paradigm and a major reboot

Between the pandemic's legacy, the soaring costs of climate change, and the deteriorating indicators of social well-being, innovation goals must now be directly aligned with Canadians' social and environmental needs.

Andrea Nemtin & Tim Draimin

Opinion

The most common themes about Canada's growth-oriented innovation system are that it is unwieldy, expensive, and underperforming. The latest WIPO 2023 report notes that our innovation inputs dramatically exceed the outputs. But these critiques miss the mark.

Innovation is traditionally understood as science and technological advances resulting in the development and commercialization of improved products and services. It thrives on efficiency, competition and market-driven solutions. Think of Silicon Valley's tech giants, continuously pushing the boundaries of what's possible with gadgets and software—smartphones, electric vehicles and the internet—transforming the ways we live and work.

Success is measured in economic growth which can create much-needed jobs. Too often, however, innovation fails to create prosperity for Canadians, or it fails to drive social or environmental outcomes.

Our innovation policy framework needs a new paradigm, and a fundamental reboot.

Increasingly, governments are identifying the need to apply innovation to social and environmental challenges through what is known variously as social innovation, inclusive innovation, mission innovation, or, most recently, transformation innovation. These terms all mean innovation that tackles societal challenges with creative solutions that aim to improve the well-being of communities, people, and the environment.

Social innovation seeks to address issues like poverty, healthcare access, climate change, education inequality, and affordable housing. It works to fix the root causes of complex challenges with a portfolio of solutions that together create systemic change. Social innovation fosters positive social and environmental outcomes that drive local economic growth.

While both traditional innovation and social innovation aim to drive progress, understanding the nuances between the two forms is crucial, as it not only helps us appreciate their roles in society, but also sheds light on the imperative for prioritizing social innovation.

So, what do we need to do to make social innovation a reality?

In an era of polycrises, social innovation offers Canada the potential for transformation, but it will require policy shifts to get us there. The recent publication from the Brookfield Institutes, *Canada's Moonshot, Solving Grand Challenges Through Transformational Innovation*, categorically states: "Canada's innovation policy framework does not sufficiently align innovation with solving the most pressing social, economic, and environmental problems that Canada and the world face today."

The report identifies five basic principles for designing enabling policy for transformative innovations or "moonshots." We would do well to heed them:

1. Select "grand challenges" that have clear, bold, measurable and time-limited goals that are sector-, discipline-, and technology-agnostic and that align with top government priorities;
2. Seek a lean, agile, and independent governance structure;
3. Coordinate end-to-end support using a wide range of policy instruments to help scale the most promising ideas and help them reach their intended markets;
4. Create meaningful engagement with willing stakeholders, including existing innovation ecosystem actors, leading industry and research experts, communities and the wider public; and
5. Use a portfolio approach to managing risk, a high tolerance for failure, and an evaluation framework focused on learning and adaptation.

The resulting policies should address needs that are unmet and of little interest to public or private investment due to their complexity or because there's no profit to be made. The policies also create the environment for collaboration between different actors—from academia, industry, government, communities, or civil society (NGOs or non-profit organizations).

Mariana Mazzucato recently published *Inclusive and Sustainable British Columbia: A Mission-Oriented Approach to a Renewed Economy* which identifies a complementary approach to the development of enabling an innovative policy framework based on four questions:

1. Overall objectives: do the overall aims of innovation policy involve more than economic growth?
2. Direction of innovation: whose needs are being met?
3. Participation in innovation: who participates in innovation? and
4. Governance of innovation: who sets priorities and how are the outcomes of innovation managed?

Bringing these questions to bear on Canada's innovation policy would be highly disruptive—and necessary.

Between the legacy of a still-smoldering pandemic, the dramatically rising costs of climate change, and the deteriorating indicators of social well-being (mental health, housing, income inequality, etc.), innovation goals must now be directly aligned with the social and environmental needs of Canadians.

By prioritizing social innovation, we can create a more equitable, and sustainable future for all.

Andrea Nemtin is currently the CEO of Social Innovation Canada. Tim Draimin is senior fellow at Community Foundations of Canada and board member of Social Innovation Canada, Trico Charitable Foundation and Green Economy Canada.

The Hill Times

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UNIVERSITY AND COLLEGE RESEARCH

Cost of living crisis is increasing need for university research supports, says NDP science critic

Canada's investment in research and development in 2020 amounted to about 1.8 per cent of its GDP—less than the 2.7 per cent average for OECD countries.

BY JESSE CNOCKAERT

On Aug. 29, Employment Minister Randy Boissonault announced investments of more than $960-million through grants, scholarships, and programs, towards more than 4,700 researchers and research projects across Canada. *The Hill Times photograph by Andrew Meade*

Canada's affordability crisis is making it more difficult for graduates and post-doctoral scholars in the country to keep a roof over their heads, exacerbating the years-long problem of stagnating investments in research, say science policy advocates, and the NDP's science and research critic.

"The obvious place where Canada falls down … is for supports for the people that do the research," NDP MP Richard Cannings (South Okanagan-West Kootenay, B.C) told *The Hill Times*. "These people are basically forced to live in poverty, and they're our country's future—the future innovators of Canada. Innovation is what drives the economies around the world these days, and Canada is risking falling farther behind in that regard."

Canada's investment in research and development in 2020 amounted to about 1.8 per cent of its GDP—less than the 2.7 per cent average for member countries of the Organisation for Economic Co-operation and Development (OECD), according to OECD data. Some of the top investor countries include Israel, which invested 5.4 per cent of its GDP in research and development in 2020, and the United States, which invested 3.45 per cent of its GDP that year.

Cannings said he considers greater investments in research to be "very low-hanging fruit" for the federal government to tackle, but the 2023 budget did not include any new support in research funding for universities. Cannings argued that without greater investments in scholarships and grants, researchers and students will be tempted to do their studies abroad.

"In the last year with inflation [and] with the housing crisis, that has really altered things. The other thing that's changed over the last 20 years, I would say, is the increase in tuition," said Cannings. "We want our young researchers to live in dignity and be able to afford to find a place to live and feed themselves, but also just to make sure that they aren't pulled away to other countries."

To support Canada's research ecosystem, Employment Minister Randy Boissonault (Edmonton Centre, Alta.), on behalf of Innovation Minister François-Philippe Champagne (Saint-Maurice-Champlain, Que.), announced on Aug. 29 investments of more than $960-million through grants, scholarships, and programs towards more than 4,700 researchers and research projects across Canada. This includes $514-million to support more than 3,500 recipients through the Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Research Program.

"Our government is funding the top-tier researchers and scientists whose work makes Canada a world leader in research and innovation. These projects—from reimagining teacher education with Indigenous wisdom traditions to creating equity in mental health care to researching the impacts of space radiation and weather on Earth's climate—will help transform today's ideas into tomorrow's solutions," said Boissonnault in a departmental press release.

Bob Lemieux, a professor of chemistry and former dean of science at the University of Waterloo in Ontario, argued that federal government investments in research, such as the August announcement, represent "a fair bit of money," but when considering the percentage of Canada's GDP that is invested in research, "we're not doing that well."

As an example, he pointed to the changes in research and development investment between Canada and South Korea over the last 20 years. In 2000, South Korea invested 2.1 per cent of its GDP into research and development, compared to Canada, which was close behind at about 1.9 per cent, according to OECD data. However, that gap has since widened, with South Korea investing 4.8 per cent of its GDP in research and development in 2020, while Canada's percentage of investment has stayed nearly the same.

"There's been an incredible increase in investment in some of our competitor countries. The challenge here is that our economy is transitioning from being primarily a resource economy to being more and more an innovation economy," said Lemieux. "The problem is that in order to have an innovation economy you need to have a very robust research and development infrastructure

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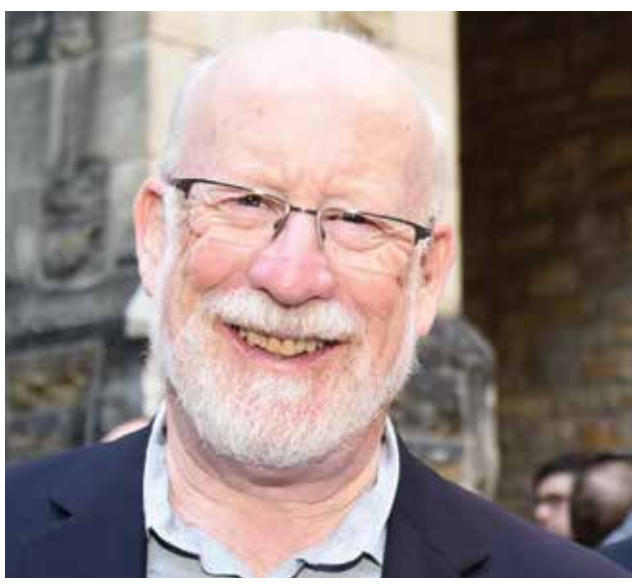

NDP MP Richard Cannings says 'we want our young researchers to live in dignity and be able to afford to find a place to live and feed themselves, but also just to make sure that they aren't pulled away to other countries.' *The Hill Times photograph by Cynthia Münster*

University of Waterloo professor Bob Lemieux says 'in order to have an innovation economy, you need to have a very robust research and development infrastructure and ecosystem, and the funding for [research and development] in Canada has just not kept up with this transition.' *Photograph courtesy of Bob Lemieux*

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Cost of living crisis is increasing need for university research supports, says NDP science critic

Continued from page 16

and ecosystem, and the funding for [research and development] in Canada has just not kept up with this transition."

Lemieux told *The Hill Times* that the erosion in funding for research in Canada has reached a breaking point, citing increased living and housing costs as problems for graduate students and post-doctoral researchers.

"The stipends that grad students and postdocs are paid comes, in part, from research grants. If there is a stagnation in the amount of money that researchers are given, then it's becoming increasingly difficult to adjust these stipends to account for the increase in cost of living, and the housing cost is particularly problematic," said Lemieux. "It's both the grants and scholarships that are underfunded, and that are limiting us from hiring graduate students and postdocs. I think the real problem here is that we're going to be losing a lot of these students to countries like the U.S., like Germany, like [South] Korea … who are investing increasingly large amounts of money into their [research and development] systems."

Support Our Science, an organization that advocates for increased pay for graduate students and post-doctoral scholars, argued that "Canada's federal graduate scholarships and post-doctoral fellowships are not competitive," in a Sept. 22 post on X (formerly known as Twitter). As an example, the post-doctoral fellowship from the National Science Foundation in the U.S. is valued at $106,000, compared to fellowships offered by NSERC, the Canadian Institutes of Health Research (CIHR), and the Social Sciences and Humanities Research Council (SSHRC)—collectively known as the Tri-Agencies—valued at $45,000, as noted in the post.

ISG Senator Stan Kutcher (Nova Scotia) shared the Support Our Science post on his own X account on Sept. 23, adding: "We can't treat our young scientists who will discover the cures of tomorrow and drive the knowledge based economy of the future as if they were not worthy of our support. We can and must do better."

Support Our Science held an advocacy week Sept. 25-29, during which supporters across Canada were encouraged to engage in actions including holding demonstrations at universities, marches to MP offices, and sending letters to political leaders. The goal was to apply pressure on Finance Minister Chrystia Freeland (University–Rosedale, Ont.) to include an increase in funding to graduate students and post-doctoral scholars through federal scholarships, fellowships, and grants in the upcoming fall economic statement, or in the 2024 federal budget, according to the organization's website.

U15 Group of Canadian Research Universities CEO Chad Gaffield says Canada is falling behind globally when it comes to investments in research and development, and 'we can't just think about moving the furniture around or changing the structures a bit.' *Photograph courtesy of U15 Group*

In October 2022, the Liberal government launched an advisory panel on the federal research support system, with the goal of providing advice on how to modernize the federal funding ecosystem. The panel released a report this past March, which argued that funding for research and talent should be a top priority, citing "staggering investments" in other countries compared to stagnating investment levels in Canada.

The report, among other things, recommended an increase of at least 10 per cent annually for five years to the total base budgets of NSERC, CIHR, and SSHRC for their core grant programming.

To support innovation and scientific discoveries in Canada, Champagne announced a $1.4-billion investment through the Canada First Research Excellence Fund on April 28 to support 11 research initiatives at universities across the country. This includes $199-million for the University of Toronto to support work on "self-driving labs" that combine artificial intelligence, robotics, and computing to discover new materials and molecules, and $165-million to Quebec's McGill University for research related to genomic-based RNA therapeutics.

Chad Gaffield, CEO of the U15 Group of Canadian Research Universities, told *The Hill Times* that, more than ever, Canada needs to cultivate and develop highly-qualified talent because of the new "knowledge economy" of the 21st century.

"Canada's falling behind globally, and we can't just think about moving the furniture around or changing the structures a bit, we really have to think about the kinds of major reinvestments. That's key," said Gaffield. "All the leading countries in the world are really embracing science and research as the way in which they are going to build a sustainable, resilient … [and] prosperous society going forward. And in Canada, in the last couple of years, we have lost focus on that."

Gaffield argued that Canada is already facing a brain drain of students leaving for countries with better scholarships and grant supports.

"Certainly, this is not to say there are no investments on our campuses. Of course not. I think we have the legacy of a quarter century of serious investments. But, just like with a garden, you can't say, 'Oh, well, we worked on it, previously, [and] it was really beautiful, so now we don't have to worry about it anymore,'" he said. "We're asking the rising generation to basically stay in Canada with a far less viable financial situation, and that's not reasonable."

Charmaine Dean, vice-president for research at the University of Waterloo, told *The Hill Times* in a Sept. 24 emailed statement that increasing funding for research and development at the federal level, and better leveraging industry partnerships, are important for boosting productivity and innovation in Canada. Tools such as the Canada Innovation Corporation (CIC), a national agency intended to support businesses across all sectors in innovating and commercializing intellectual property, could be useful in closing the productivity and innovation gap, but only if they are well-funded, said Dean.

Earlier this year, on Feb. 16, Freeland and Champagne released a blueprint intended to guide the CIC's operations. The organization, which has an initial budget of $2.6-billion over four years, is expected to begin its operations in 2023.

"We need much higher industry partnership levels. Universities like the University of Waterloo are working closely with industry in very many ways, and always searching out ways to amplify this activity or reshape to suit the needs of the various communities we serve," said Dean in the emailed statement. "Having greater leadership on the partnership file nationally to substantially activate activity would be a key driver."

In the emailed statement, Dean said the underfunding of graduate students and post-doctoral scholars "remains a serious impediment" to the preservation of Canada's reputation for research excellence.

Stagnant funding for graduate students and post-doctoral scholarships in Canada has been happening for too long, and stagnant funding is effectively the same as cutting funding in an environment of high inflation and high interest rates, according to Dean.

"Students in Canada are also facing considerable headwinds for basic living costs, including food and housing, further eroding our competitive edge. We need to increase funding for graduate scholarships, doctoral and post-doctoral fellowships by 50 per cent and double of the number of graduate scholarships, indexed to inflation. Simply put, without greater investments in scholarships and grants Canada will struggle to attract and retain precisely the people needed to build and support the economy that the government envisions," said Dean in the email. "Talent is just so critical for our industries and organizations to succeed. Talent is the key spark that will keep Canada at the forefront of innovation."

jcnockaert@hilltimes.com
The Hill Times

Canada's investments in research and development

- Canada's gross domestic expenditures on research and development (R&D) rose 3.1 per cent from 2019 to $41.9-billion ($37.9-billion in 2012 constant prices) in 2020. This marks the fifth consecutive year that research and development spending in Canada has increased.
- Early estimates show that R&D expenditures in 2021 increased to $42.6-billion, led by increased spending by the business enterprise sector. Spending intentions for 2022 indicate a slight increase to $43.2-billion.
- R&D expenditures are categorized into two fields of science: natural sciences and engineering, and social sciences, humanities, and the arts. Compared with the previous year, spending on natural sciences and engineering increased $1.1-billion to $37.5-billion in 2020, mainly as a result of increased funding by the federal government (+$1.1-billion to $7.1-billion) and business enterprise sectors (+$338-million to $18.1-billion). Over the same period, spending on social sciences, humanities, and the arts rose $124-million to $4.3-billion, led by federal government funding (+$138 million to $1.1-billion) and higher education funding (+$76 million to $2.6-billion).
- On an international scale, Canada's R&D intensity ratio of 1.8 remained below the OECD average of 2.7—although Canada's position rose by two spots to 17th in 2020. Similarly, within the Group of Seven countries, Canada was below the 2.6 average and remained fifth overall out of the six countries for which data are available.

Source: Gross domestic expenditures on research and development, 2020 (final), 2021 (preliminary) and 2022 (intentions), Statistics Canada, released Jan. 27, 2023.

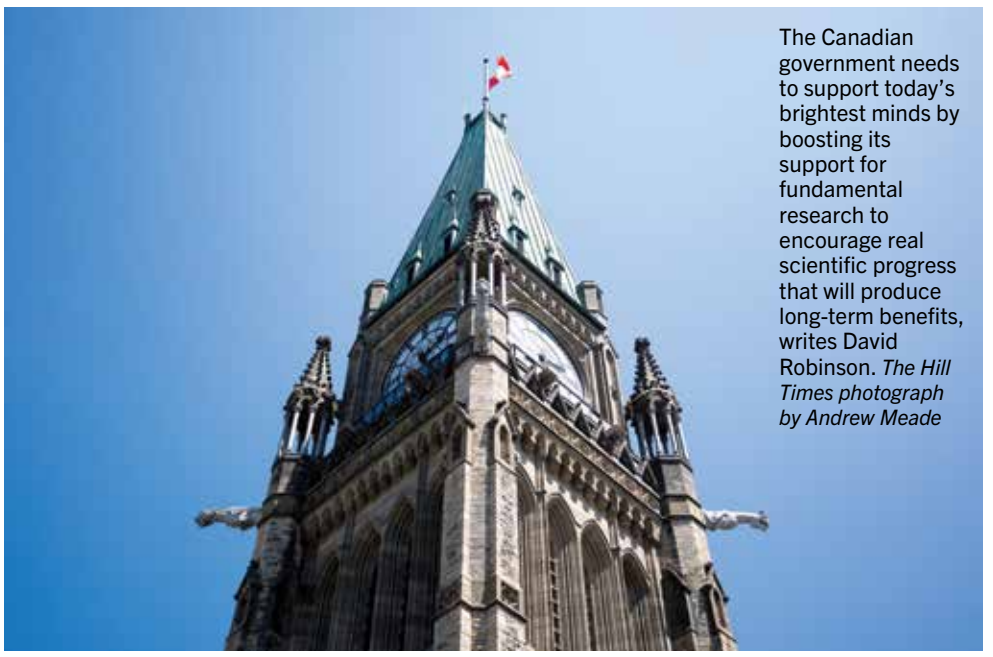
OECD research and development statistics

- R&D expenditure among OECD member countries grew in 2021 by 4.7 per cent in inflation-adjusted terms, marking a return to pre-COVID trends after it had slowed down to two per cent growth in 2020.
- Since the 2009 global financial crisis and up until the COVID-19 pandemic, businesses have seen their share of total expenditure on R&D performance in the OECD area increase to well over three quarters, and have been leading R&D growth among member countries. After trailing other sectors in terms of R&D expenditure growth in 2020, R&D expenditures in the business sector grew by 6.3 per cent while R&D in the higher education and government sector barely increased at 0.4 per cent and 0.5 per cent, respectively.
- Pervasive growth in inflation-adjusted R&D expenditure in the OECD area in 2021 was led by intensified R&D growth in the United States at 5.6 per cent and Korea at 7.1 per cent, supported by a noteworthy recovery in countries like France, Germany and Japan, where R&D expenditures grew by close to three per cent after negative growth in 2020.

Source: OECD Main Science and Technology Indicators, released on March 31, 2023

Feds need to fund 'blue skies' research

Major scientific discoveries most often emerge from what scientists believe are important questions to explore no matter how trivial or irrelevant they may seem, rather than from the goals and directives set by other outside interests.



The Canadian government needs to support today's brightest minds by boosting its support for fundamental research to encourage real scientific progress that will produce long-term benefits, writes David Robinson. *The Hill Times photograph by Andrew Meade*

David Robinson

Opinion

In 1869, the famed Irish physicist John Tyndall posed a basic, but surprisingly elusive, scientific question: why is the sky blue?

In searching for an explanation, Tyndall discovered that light is scattered in the atmosphere by dust and large air molecules in a way that causes the eye to see the colour blue. His discovery of these properties of light eventually led to the later development of several important—but wholly unanticipated—innovations, including lasers and fibre optics.

Today, "blue-sky research" is a term often used to describe basic scientific inquiry. It reflects the critical lesson learned from Tyndall. Major scientific discoveries most often emerge from what scientists believe are important questions to explore no matter how trivial or irrelevant they may seem, rather than from the goals and directives set by governments, industry, or other outside interests. Basic scientific research routinely challenges accepted thinking, leading to fundamental paradigm shifts and unexpected innovations of great importance. From the discovery of X-rays and nylon to superconductivity, medical imaging, computers, and mRNA vaccines, major scientific progress is driven by basic research without specific commercial outcomes or applications in mind.

That's why public funding of basic research is critical, and why the federal government needs to take a stronger lead. After years of stagnant support for blue-sky research under Stephen Harper's Conservative government, the Liberals provided significant boosts to the core operating grants of the three federal research councils. While the amount fell short of what was recommended by the government's own expert panel, it nevertheless represented a major increase to basic discovery-driven research at Canada's universities and colleges.

Today, that funding is winding down and what is left is being eroded by high inflation. A recent advisory panel established by the government to review the research support system reported earlier this year that there is a pressing need for a significant increase to the base budgets of the granting councils. The so-called Bouchard report found that while Canada's researchers have been highly successful,

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Lessons from COVID-19: we need long-term investment in research

Our universities build Canada's capacity and develop the skilled workforce needed for emergency response.

Vivek Goel

Opinion

Finance Minister Chrystia Freeland speaks to reporters in the West Block on Sept. 19. We have seen several successive federal budgets without any significant investments in science and research capacity, writes Vivek Goel. *The Hill Times photograph by Andrew Meade*

As we head into this fall season, for most people, lockdowns and gathering restrictions seem a distant memory. We're more at ease with the knowledge of how to manage COVID-19 and the availability of vaccines specific to circulating variants. However, we cannot take for granted our current sense of ease—and we must not be quick to forget the lessons we learned from the pandemic.

One vital lesson is that our capacity to deal with emergencies includes having a strong, well-funded research infrastructure. COVID-19 showed us what long-term investment in research does for us, and how much we depend on university researchers to future-proof our country.

The role of fundamental science contributing to the development of mRNA vaccines has been well described. Research in many diverse areas over many decades was necessary. For example, in the 1980s, Dr. Pieter Cullis and colleagues at the University of British Columbia were conducting work to understand the nature of lipids. Subsequently, lipid nanoparticles were developed and became the basis for protecting RNA for delivery into our bodies. No one could have foreseen such a distant application of the fundamental research being conducted 40 years ago.

The many other ways our science and academic activity contributed to the pandemic response on a daily basis are less well described.

Governments across the country activated existing and new advisory groups, task forces, and committees to advise on the response, from the National Advisory Committee on Immunization, to the Vaccine Task Force. Moreover, most of the individuals mobilized came from universities, research hospitals, and research institutes, and many other graduate students and post-doctoral fellows also pivoted their research activity in order to support the pandemic emergency response.

In fact, a great many of our graduate students delayed their graduation or paused their studies to focus on supporting pandemic working groups, committees, or new research programs.

A good example of the role of academic institutions in the direct response is the case of wastewater testing. For years, the potential of wastewater testing for public health surveillance was primarily restricted to research projects. As COVID-19 spread, researchers were able to demonstrate the utility of such testing to detect changes in community activity as fast as or faster than other indicators. Researchers and labs in many different areas—such as infectious disease, genomics, and sanitation—came together to provide this public service.

It's not just the obvious areas of science that need funding to give us the resilience we need as a nation. We need investment across all disciplines.

Humanities scholars and social scientists are also a critical part of future-proofing the country. Historians who had studied responses to the Spanish flu in 1918 helped to understand societal reactions to COVID. Psychologists and communications experts helped us understand the spread of misinformation and disinformation about vaccines. Sociologists and anthropologists helped to identify why some communities might be hesitant to accept vaccines or treatments.

The lesson here is that nobody can predict what knowledge will become critical to helping us navigate our next challenges. Nor can they claim to know exactly in which disciplines we should invest our tax dollars to guarantee a return on our investment.

To tackle these unknowns, we need sustained, long-term investment across the board in research, and particularly greater investment in our graduate students.

In the pandemic, we got used to seeing the role of public health officers, health-care workers, statisticians, epidemiologists, and many others on a regular basis. Virtually all of these individuals were educated and prepared for their roles in university-based programs. If our educational programs are not adequately funded, where will our first responders come from in the next emergency? Who will be our innovators?

And this isn't a situation where we can just maintain the status quo. According to a recent Organisation for Economic Co-operation and Development report, Canada is falling behind our peers in graduate student enrolments. Governments and the private sector need to step up and invest in research and innovation, and create opportunities for graduate students to succeed.

In Canada, we have seen several successive federal budgets without any significant investments in science and research capacity. As a public health physician, I am seeing the same patterns with science investment that we have seen with public health. Every few years, such as after SARS, there is an investment in public health, which quickly wanes as the event is forgotten. The need for science investment seems to now be permanently forgotten.

We don't know what emergency is coming next. It could be another pandemic, or a cybersecurity threat, not to mention our ongoing challenges such as climate adaptation and the current housing crisis. We need broad investment in our science capacity to ensure we are prepared for the next major emergency—whatever it may be.

Dr. Vivek Goel is president and vice-chancellor of the University of Waterloo.

The Hill Times

Feds need to fund 'blue skies' research

Continued from page 19

research-funding levels have not kept pace with demand and evolving needs. Failing to address this gap, the report warns, will reverse the progress that has been made.

Admittedly, funding blue-sky research can be tough to sell to governments. Like Tyndall's investigation into the colour of the sky, the benefits of these research projects are not necessarily clear at the outset. They also often involve long time horizons that stretch beyond an election cycle. That's why governments are often tempted to target research funding to specific projects that, at first glance, might hold the promise of fostering short-term commercial innovations.

But this thinking distorts the focus of scientific research, and impedes the development of new knowledge and solutions to pressing social problems. In the area of medical research, for instance, the obsession with commercial outcomes can encourage an emphasis on minor modifications to existing drugs and devices, rather than fundamental explorations of the causes of illness and methods of prevention. As John Polanyi, Canada's most prominent Nobel laureate, has put it, when governments try to direct scientific inquiry or pick research "winners" rather than allowing the scientific community to do so through its rigorous peer-review system, our scientific horizons shrink.

The Canadian government needs to support today's Tyndalls by boosting its support for fundamental research to encourage real scientific progress that will produce long-term benefits. The Bouchard report recommends that, as an initial step, the government should commit to an increase of at least 10 per cent annually for five years to the federal research councils' total base budgets for their core grant programming. It's a significant commitment, but a necessary one. As the report rightly notes, societies that invest in their research enterprise thrive while those that do not falter.

David Robinson is the executive director of the Canadian Association of University Teachers.

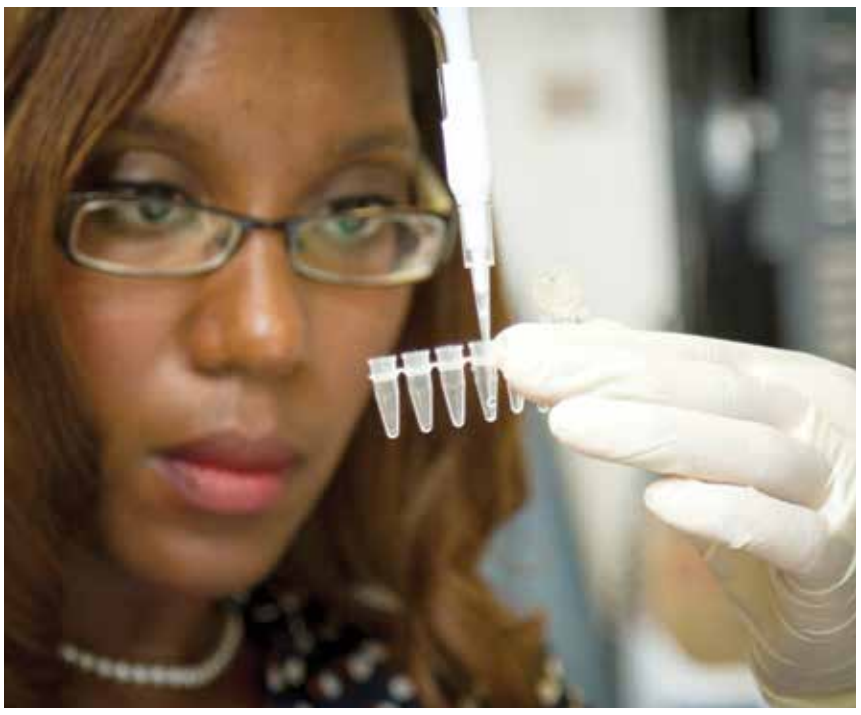
The Hill Times

Time to fix the inequity in Canadian research council grants

The federal government should overhaul Canada's granting agencies with an equity lens for a healthier and more robust research ecosystem that would benefit everyone.

Janet Mantler, Ivy Lynn Bourgeault & Nicole Power

Opinion



Scholars—many of whom are women, Indigenous, and people of colour—with new and innovative research or research at the boundaries are often overlooked, write Janet Mantler, Ivy Bourgeault, and Nicole Power. *Photograph courtesy of Unsplash*

Researchers can tell you that grant proposals take a long time to develop. Primary investigators are advised to allocate at least 120 hours to prepare an application, but it often takes much longer. Other researchers on the proposal will also work many days, and community partners write letters of support. Many universities offer significant support staff to review and vet proposals.

Imagine working for months on an outstanding proposal for an 80 per cent chance of failure (the current rejection rate for Canadian Institutes of Health Research grants, for example).

That's the reality in Canada today. We have no shortage of research talent, but we squander it in this vicious cycle of preparing grants year after year, resulting in months of foregoing research progress. It's not only the lack of overall research funding that's the problem, but also the systemic barriers and biases built into the funding process itself.

The federal government has a role to play in revamping how our federal research agencies allocate research funding.

Researchers with long-established programs of research tend to have higher success rates with the Canadian granting councils. At issue, scholars—many of whom are women, Indigenous, and people of colour—with new and innovative research or research at the boundaries are often overlooked. Early-career grant disparity can impede early-career research, negatively affecting their entire career, hampering the potential for groundbreaking research.

The Canadian government's three research council agencies—the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Social Sciences and Humanities Research Council—fund Canadian researchers to enable them to produce high-quality research. In 2019, researchers from the University of British Columbia found that women had systematically received fewer grants from NSERC, and, for those who did receive a grant, they received lower award amounts, particularly for those early in their career.

In addition to the quality and feasibility of a research project, grant proposals are heavily weighted by the researcher's publication record in scholarly journals, the academic impact of those publications, and major prizes and awards. Service tends to be acknowledged when it is service to the discipline, such as sitting on editorial boards, rather than service within a university or in non-academic organizations, supervising students, or teaching courses.

Women and racialized researchers tend to have more university service requests and more student supervisions, colloquially known as a "culture tax," as they are expected to represent their group.

Such academic service work takes a lot of time away from research and seldom receives credit or acknowledgement, and does not contribute to grant successes, yet is essential as we create a more diverse research stream in Canada.

It doesn't have to be this way. The federal government should overhaul Canada's granting agencies with an equity lens. Proactive equity policies stemming from the federal government will fast track this process. The result would be a healthier and more robust research ecosystem that would benefit everyone.

Over the past few years, Canadian universities have successfully hired more diverse scholars. Now we need to ensure these scholars are supported in a way they can be successful, particularly in producing novel and useful research.

Since 2019, NSERC has made a concerted effort to mitigate bias in their system, and the success rates for men and women are more closely aligned. Such efforts need to be taken at all three research councils for women and for all equity-seeking groups.

There are ways of reducing bias that can make the current funding go further.

- The Tri-Agency granting bodies already ask applicants for their equity information; more can be done using these data to make inequities more transparent. This information could be used to develop new ways of awarding and developing scholars;
- Reviewers of grant proposals need to value scholarship that is untraditional or unconventional and to value teaching and academic service work by including these categories in the adjudication process;
- Set funding allocations specifically for all equity-seeking groups. Affirmative action policies work; and
- Granting agencies could develop a novel system of non-competitive grant allocations whereby researchers submit proposals, but instead of the complex and costly adjudication process, all high-quality applications are equally funded. Researchers would need to be accountable for the funds they receive and demonstrate they are undertaking their proposed work. The grants may be smaller but the stable and predictable funding would enable more innovative research.

Canada is looking for research innovation. We should start first with how we give out research grants. We could unleash enormous new research potential if we'd simply give equity-seeking groups a chance at the funding.

Janet Mantler is an associate professor in the psychology of work at Carleton University. Ivy Bourgeault is a University of Ottawa Research Chair in Gender, Diversity, and the Professions. Nicole Power is a full professor in the department of sociology at Memorial University.

The Hill Times

Universities are a critical piece of the climate-change puzzle

Researchers are tracking climate change impacts on our systems and infrastructure, and developing projections to help communities prepare for increases in temperature and extreme weather events.

Meric Gertler

Opinion

From forest fires to heat waves, flooding to extreme storms, the impacts of climate change were all too real for Canadians this summer. While the fight to prevent and mitigate the effects of our warming climate may seem unwinnable, Canada's universities are playing a critical role in helping the country address the climate crisis and find solutions.

Canada's universities include more than 70 research centres and institutes, and thousands of researchers and graduate students exploring ways to mitigate and adapt to the impacts of climate change. At centres across the country, researchers are tracking climate change impacts on our systems and infrastructure, and developing projections to help communities prepare for increases in temperature and extreme weather events.

The University of Toronto, for example, hosts the Climate Positive Energy Initiative, a centre for interdisciplinary clean energy research. There, experts in science, social science, engineering, economics, and policy put their heads together to transform our energy systems. Some of the projects underway involve leveraging artificial intelligence to optimize energy efficiency in buildings, analyzing impacts of policies such as the carbon tax, and exploring how bacteria can help consume or recycle waste.

Such research centres exist across Canada, from the University of Victoria's Pacific Climate Impacts Consortium in the West to the University of Prince Edward Island's Canadian Centre for Climate Change and Adaptation in the East.

Universities are also key partners in supporting resiliency and adaptation efforts in their local communities. Many are working closely with municipal governments, local industry, community organizations, and with each other to handle climate-related emergencies and help mitigate the impacts of future crises.

The Concordia University-led UNIVER/CITY 2030 initiative, for instance, brings together the City of Montreal and Montreal-based universities to map climate research capacity, develop a common research and development agenda, develop a climate data centre, create a local school for hands-on learning related to climate action, and foster other forms of municipal-level systems change.

Schools, such as the University of Calgary and the University of Saskatchewan, are making an impact on climate by transforming their campuses into living labs. This type of research, conducted in practical, everyday conditions, accelerates the response to climate change by bringing together industry, scientists, students, and other stakeholders to co-develop, test, and assess sustainable technologies and practises.

For example, at Queen's University, academic experts are working with industry partners to reduce emissions from concrete production, one of the highest carbon dioxide-producing industries. The team is developing a low-environmental-impact structure to be used in future classrooms as a living lab to educate students.

Such living-lab projects provide the next generation of students and researchers with the skills to succeed in a greener, low carbon economy. And they complement universities' important initiatives to reduce the carbon footprint of their own operations. For example, U of T's Project LEAP will reduce greenhouse gas emissions on our St. George campus by 60 per cent before the end of this decade.

Universities are playing a critical role in addressing and preparing for the impacts of climate change, but it is clear more needs to be done. To support this work, Universities Canada, the national association representing 97 universities across the country, recently launched its new initiative, Canada's Universities: Action for Net Zero. This brings a co-ordinated, national approach to universities' climate work.

Canada's universities are doing critical work to address the climate crisis. But to move the needle further, the federal government must make significant investments in university climate research and action, and ensure that universities are eligible for funding programs that help them accelerate their own emissions reductions. Canada's universities are deploying their research talent and expertise to meet the climate crisis head-on

Meric Gertler is the chair of Universities Canada's board of directors.

The Hill Times

More than a sleepy bureaucratic town, Ottawa is shaping up to be a vibrant life sciences research hub

Ottawa's post-secondary institutions and hospital-affiliated research institutes employ more than 6,500 researchers and clinicians, attracting more than $380-million in research funding each year.

Sylvain Charbonneau

Opinion

On Sept. 28, the University of Ottawa will mark the official opening of its new life sciences complex, a home for the faculty of health sciences. The $130-million smart facility, with its cutting-edge laboratories and experiential simulation centres, will support life-changing discovery and smarter, more collaborative care.

The inauguration also marks the next milestone in uOttawa's new era as a health research powerhouse—one that will reap benefits for Canada and the world.

Ottawa has a reputation for being a sleepy bureaucratic town, but our National Capital Region is actually home to a thriving life sciences ecosystem, and the University of Ottawa is determined to build on it.

Our city's health sciences ecosystem, which is too often overlooked, represents more than 6,000 people employed in more than 140 companies in the life and health sciences, including the biotech-pharma, digital health, and medtech sectors. Ottawa's post-secondary institutions and hospital-affiliated research institutes employ more than 6,500 researchers and clinicians, attracting more than $380-million in research funding each year. Altogether, the economic impact of the health sector is more than $2-billion annually.

As anyone who has visited an emergency room knows—and as the Canadian Association of Emergency Physicians recently made clear to the deputy ministers of health—Canada needs more "innovative, integrated and effective approaches to healthcare delivery."

The University of Ottawa's life sciences research community is ready to meet that challenge.

Already, the university is among the top five research-intensive schools in the country. Our faculty of medicine ranks among the top three nationally for research intensity, and Ottawa is the fourth-largest hub for clinical trials in Canada.

Now, with the new cutting-edge facilities at Health Sciences Pavilion that promote an environment for interdisciplinary research, students and researchers will have everything they need to break down the silos that permeate today's health-care culture.

Last spring, the federal government recognized uOttawa's commitment to biomedical research by investing $109-million in the Brain-Heart Interconnectome. This initiative explores the intimate connections between the heart and the brain, helping researchers discover how conditions like heart failure and memory loss are intertwined, but treatable. That's one more way we're breaking down those silos.

In the coming months, the university will break ground on the Advanced Medical Research Centre (AMRC), which will anchor the Brain-Heart Interconnectome and the Canadian Pandemic Preparedness Hub, two major pan-Canadian research initiatives.

It will also house the Ottawa Health Innovation Hub, which will facilitate access to venture capital, incubate entrepreneurs and accelerate commercialization to better patient care.

The AMRC—considered the largest single investment in the university's history—will attract and retain the best and brightest leaders in biomedical research, and support their spinoff companies. It will also support uOttawa's expansion of clinical trials and vaccine manufacturing capacity, a hole in our healthcare system that the global pandemic viscerally underscored.

With the research and development carried out by the Centre for Infection, Immunity and Inflammation, and the Coronavirus Variants Rapid Response Network—also led from the new centre—Canada will be better prepared to respond to future pandemics.

It's not hard to imagine the incalculable gains for individuals and families from these investments if our researchers are successful in developing vaccines that prevent death and chronic illness from new variants of the SARS-CoV-2 virus or if they reverse the memory loss of a parent who suffered a heart attack.

These major investments demonstrate uOttawa's fierce commitment to advancing research and innovation in the life sciences. As we build momentum for this new era of life sciences research in Ottawa, we invite private and public partners to join us in our commitment to research excellence that saves lives.

Sylvain Charbonneau is the vice-president of research and innovation at the University of Ottawa.

The Hill Times

International-mobility experiences ensure students learn global skills before they enter the workforce. Yet Canadian students are statistically less likely than their G7 peers to participate, writes Denise Amyot. *Photograph courtesy of Unsplash*

Closing Canada's skills gaps starts at the post-secondary level

As the nature of work changes, learning experiences outside the classroom—and outside the country—are now more relevant than ever.

Denise Amyot

Opinion

Planning for and responding to skills needs across an economy as diverse and broad as Canada's is a difficult task. As much as we need qualified tradespeople and health-care workers, we also need early childhood educators, software developers, and entrepreneurs to help our economy grow in the face of change. To add to the challenge, the global nature of the world makes our national skills map increasingly complex. Canadian employers now need workers with the right mix of job-related and global skills more than ever.

Colleges and institutes have always focused on employer-driven skills training. In fact, they offer more than 10,000 programs, each developed with direct input from industry to ensure that learning objectives align with employer expectations.

Study- and work-abroad experiences complete the other half of the equation. When we talk about global skills, we mean skills that are common across professionals, like the ability to communicate well, collaborate with others, and adapt to changing circumstances. International-mobility experiences ensure students learn these skills before they enter the workforce. Yet Canadian students are statistically less likely than their G7 peers to participate. In a global world, that puts them at a disadvantage. Programs like Global Skills Opportunity (GSO) can fill the gap.

Funded by Employment and Social Development Canada and administered jointly by Colleges and Institutes Canada and Universities Canada, GSO makes international-learning experiences more accessible to Canadian post-secondary students. Through the program, colleges, institutes, and universities organize and implement study- and work-abroad opportunities that ensure their students acquire the global skills employers want and the Canadian economy needs.

For example, International Mobility Supporting Indigenous Entrepreneurs, a GSO-funded project from Sault College in Ontario, gives Indigenous students the opportunity to enhance technical and analytical skills, and apply their knowledge in a practical ecosystem with Indigenous students and entrepreneurs in the Yucatan region of Mexico. The skills potential of such an opportunity is incalculable—especially for groups that are traditionally underrepresented in the Canadian workforce and in postsecondary education.

GSO leverages the strength of a network of more than 250 post-secondary institutions to ensure that up to 11,000 Canadian students over four years—especially those for whom such experiences have traditionally been less accessible—aren't left behind in a global competitive workforce.

So far, more than 5,000 students—75 per cent of whom identify as a member of a traditionally underrepresented group—have completed a GSO-funded international study or work experience in one of more than 100 countries. Of that group, 64 per cent identify as a low-income student, 18 per cent as a student with a disability, and 13 per cent as an Indigenous student.

Addressing labour market challenges starts with post-secondary institutions. It always has. But as the nature of work changes, education must change with it. Learning experiences outside the classroom—and outside the country—are now more relevant than ever.

Study- and work-abroad experiences, like those made possible with funding from Global Skills Opportunity, expose students to new environments, challenges, and ways of thinking, helping them learn the skills, confidence, and an appreciation for diversity. They are also a key component of the Government of Canada's International Education Strategy.

In fact, when asked to assess the skills they gained during GSO-funded experiences, students identified adaptability, collaboration, networking, problem-solving, language capacity, and communication among the top—all of which align with the federal government's Skills for Success, a framework that identifies nine skills needed to participate and thrive in learning, work, and life.

Canada needs a permanent stream of globally competitive talent. That means permanent funding for programs like GSO that not only benefit students and employers, but also help learning institutions increase their capacity to deliver safe, enriching, and accessible international study- and work-abroad opportunities now and in the future.

With funding to ensure sustainability and growth, GSO can continue its success and equip more workers for success and deepen person-to-person global ties. The more Canadians engage around the world, they more they bring new skills home. The vitality of our workforce depends on it.

Denise Amyot has served as president and CEO of Colleges and Institutes Canada since 2013. She currently sits on two international boards (Qatar Foundation and World Federation of Colleges and Polytechnics), and on three national boards. She also previously served on the Government of Canada's Future of Skills Council.

The Hill Times

AI is not intelligent and needs regulation now

The iterative nature of artificial intelligence means that without meaningful regulation, it will become easier for the average person to have the power to cause very serious public harm, should they so wish.

Rhonda McEwen

Opinion

The word "intelligence" has no place in what we now ubiquitously refer to as "artificial intelligence."

The term was coined in the 1950s, at a time when we were only beginning to explore whether one could distinguish between human interaction with another human or with a computer. This describes the basic tenants of Alan Turing's test, and it became both an idea and a challenge for scientists. The use of the word "intelligence" was a provocation or a simplification; however, it has had a lasting effect on the field. Today, when presented with information from an AI-generated tool, it is often noted that machines are doing what humans can do. True, yet at the moment, it is less about intelligence and more about fast pattern recognition: computation using predictions of what best follows the pattern based on millions of examples. It does correctly indicate that humans are mostly predictable. Mostly.

And this is where the benign ends. These tools are reaching a sophistication that can make what we see and hear online hard to perceive. If you have seen the deepfakes of former American secretary of state Hillary Clinton, a Democrat, endorsing Republican Florida Governor Ron DeSantis, or the one of Ukrainian President Volodymyr Zelenskyy surrendering, you will appreciate that while low-level pattern recognition is not intelligence, it can be damaging. With the increase in claims of foreign interference and election manipulation, there

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While the issues around housing are complex, it's clear that any resolution will need to include creating more housing, and McMaster is already contributing significantly, write Steve Hranilovic, Bonny Ibhawoh, and Sean Van Koughnett. *The Hill Times photograph by Andrew Meade*

Curbing international students not the answer to Canada's housing crisis

It would be harmful to address the housing shortage by curtailing the number of international scholars studying at our universities, especially when they contribute so much to our society.

Steve Hranilovic, Bonny Ibhawoh & Sean Van Koughnett

Opinion

Some believe that welcoming international students to study at Canadian universities is contributing significantly to Canada's housing crisis.

It is not.

The shortage of affordable housing—while certainly a serious concern—is a complex societal problem, and it certainly isn't limited to communities with universities.

It's critical for everyone to understand it would be harmful to address this problem by curtailing the number of international scholars studying at our universities, especially when they contribute so much to our society, and when institutions such as McMaster University are busy doing their part by creating more living spaces for domestic and international students.

The international educational landscape and global quest for top talent is increasingly competitive, and it is vital for Canada and our future prosperity that we continue to make it clear that our country is a welcoming destination for highly qualified international students.

Both domestic and international students are vital to McMaster and other universities. Students who come from other countries make our communities and campuses richer, and what they learn here in Canada helps them make positive contributions both here and abroad.

International students bring diverse perspectives that enrich the classroom experiences of all students, and they strengthen our world-class research.

More concretely, they contribute meaningfully to Canada's innovation output, boosting our economies and industries, which helps all of us.

International students also contribute directly to our communities through placements in hospitals and other health-care settings, and in public institutions and private companies, developing next-generation technologies and conducting community-based research that improves life for everyone here.

It's also critical to differentiate between public universities, such as McMaster, and other types of institutions, whose mandates and priorities are different.

Canadian universities are global institutions that both contribute to and benefit from international scholarship and research. Finding solutions to global challenges such as the climate crisis and pandemics requires international collaboration.

Just as McMaster and other Canadian universities welcome students from abroad, we also help to place students in countries all over the world through our exchange programs, which allows them to learn and do research internationally. If we want other countries to continue welcoming Canadian students, Canada also needs to welcome international students.

International students who come here are highly motivated to do well and to contribute to our communities. What they learn at our universities benefits not only Canada, but for those who return to their home countries, it also helps the communities where they live and work after graduating.

While the issues around housing are complex, it's clear that any resolution will need to include creating more housing, and McMaster is already contributing significantly.

In a time of unprecedented demand for high-quality education, our university has been busy developing new housing to make it easier for both our domestic and international students to find the accommodation they need, and for McMaster to be able to guarantee residence spaces for all first-year students who want them.

Our university already guarantees housing for all first-year international students.

At the same time, we're also responding to the demand for spaces for graduate students. Earlier this month, McMaster opened a family-friendly graduate residence that will feature space for 644 people in total, including international graduate students.

On campus, we are eager to begin construction on our largest residence project to date: Lincoln Alexander Hall, where nearly 1,400 more students will live starting in 2026.

With 500 new beds for undergrads in the Peter George Centre for Living and Learning, which opened on campus in 2019, in the space of seven years, McMaster will have created 2,500 new residence spaces—all of them open to international and domestic students alike.

This makes McMaster a leader among Canadian universities in creating new housing for students, and we will continue to make new housing a priority as we move into the future.

Though these initiatives are significant, it's important to remember that the total number of international students studying at McMaster is still relatively small, especially when considered as part of Hamilton, Ont.'s overall population of about 600,000.

McMaster's 6,400 international students are part of a total student body of 37,000.

Our international students have had an opportunity to choose anywhere in the world to study, and we are proud they have chosen McMaster, just as other universities are proud to welcome international students to their campuses.

We hope all Canadians continue to welcome them to our great country.

Steve Hranilovic is vice-provost and dean of graduate studies at McMaster University, where he is also a professor of electrical and computer engineering. Bonny Ibhawoh is vice-provost, international affairs, at McMaster University, where he is also a professor of history and global human rights. Sean Van Koughnett is associate vice-president (students and learning) and dean of students at McMaster University.

The Hill Times

Are Canadians suffering a crisis of trust?

We need to come together and create innovative policies and practices to ensure that existing and new technologies don't come with unintended harms, writes Mary Wells. *Unsplash photograph by Arif Riyanto*

A new scholarly network will explore how engineers, scientists, and researchers can find ways of embedding trust into the technologies they are currently building.

Mary Wells

Opinion

The rising trend of "fake news" came to prominence over the course of the COVID-19 pandemic as people turned to social media channels to read and distribute information that often fell far short of offering reliable information or verifiable data. The unchecked spread of misinformation led to serious harm for many individuals, especially those who decided to forgo scientifically proven treatments to combat the novel coronavirus.

It's time we find ways to combat the growing tide of disinformation. We need governments, the research community, private industry, and citizens to come together and create innovative policies and practices to ensure that existing and new technologies don't come with unintended harms.

I doubt the engineers who first built those social media platforms were aware of how their products could one day be weaponized in campaigns of damaging—and deadly—misinformation. We need to find a way to bridge the gap between the people who design and build new technologies, and the public who are the users of those technologies.

At the University of Waterloo, we looked at several surveys that measured how Canadians' trust in science, academia, health, technology, and government has changed over the years. While there have been relatively few surveys measuring trust in science, the most consistent trend we've found is that trust in most individuals and institutions—especially the government—rose during the beginning of the pandemic, but has since waned back to near pre-pandemic levels.

A report published in January by the Council of Canadian Academies, an Ottawa-based independent research organization, found that misinformation related to the spread of COVID-19 resulted in the loss of at least 2,800 lives, and led to $300-million in hospital expenses over nine months of the pandemic.

Are Canadians suffering a crisis of trust across institutions? The data is troubling enough to spur me and some of my colleagues into action.

We cannot afford to sit on the sidelines and let the trust that Canadians have in science and academic institutions continue to erode. That's why we created the Trust in Research Undertaken in Science and Technology Scholarly Network (TRuST), alongside my Waterloo colleagues, Nobel laureate Donna Strickland and Canada Research Chair Ashley Mehlenbacher.

TRuST is the first multidisciplinary research network of its kind in Canada, and aims to combat the growing trend of disinformation to better understand why some people deny, doubt, or resist scientific findings and explanations.

TRuST will explore how engineers, scientists, and researchers can find ways of embedding trust into the technologies they are currently building. We hope this can lead to further considerations of the intended, as well as the unintended, consequences of what those technologies can do.

It won't be easy, but researchers and governments need to work together and think about how policy can help shape how we consider future technologies and online tools to prevent the spread of damaging misinformation.

New pharmaceuticals have to undergo rigorous study and clinical trials before they are brought to market. This is a measured approach that could be adopted when considering introducing new technologies into the wild. Before a company launches a new technological product into the marketplace, it could undergo a series of trials with a small group of people to identify whether any unintended issues come to light that could be addressed before allowing it to be expanded to more people.

Another approach could be for governments—in partnership with industry, non-profits, and academia—to introduce a series of ethical standards to which all technology companies would have to adhere if they want to make their products available to the public. This method builds upon the work that Waterloo professor and founding director of the Critical Media Lab, Marcel O'Gorman, has done, alongside the innovation hub Communitech and the Rideau Hall Foundation, to create a set of guiding principles that advises governments, businesses, and organizations to use technology for the good of humanity.

While these suggestions may appear to go against the grain of conventional thinking, we need to begin—and continue—this conversation of how to regain trust across science and technology.

We have already seen how the risks of avoiding this direct approach have created an environment of distrust toward researchers, scientists, and policymakers in this post-pandemic period. Tackling this challenge now is critical to ensure that future ideas and technological advances won't suffer a similar fate.

Mary Wells is the dean of engineering at the University of Waterloo.

The Hill Times

AI is not intelligent and needs regulation now

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are dangerous implications for our world as these technologies mature. AI is destabilizing the foundation of the trust we rely on to secure societies built on democratic values and human rights.

Researchers and scientists are saying that the time has come and is indeed overdue to legislatively regulate AI to halt the further erosion of foundational principles in our world. Many will bristle and suggest that legislation will limit the creative potential of the technology or limit free speech; however, the Canadian Radio-television and Telecommunications Commission is an example of how impactful regulation can protect against public harm from what can often feel like the Wild West. My warnings join a chorus of voices, many of whom, like me, work in Canadian universities focused on harnessing this technology for benevolent purposes.

Like AI, human intelligence is iterative, and is built on data inputs: information. However, the human brain processes the data in a way that also reflects understandings of context, subtext, and perspective—features that AI lacks. The absence of context, and therefore moral frameworks, in AI make it a very efficient tool in the hands of those who want to cause harm, curb human rights and democracies, and commit crimes. While in the early 1990s the drive for internet innovation led to a choice to forego regulation and tread lightly on policy—the opposite of how we managed radio, television, journalism, and film media—even the more reticent among us are saying that it is time to revisit this choice.

Canadian political and bureaucratic leaders can rely on our leading academics focused in this area to help create a regulatory framework that not only serves as a beacon globally, but also as a catalyst for meaningful change. It may seem daunting in a world where global leaders regularly use AI to suppress and abuse their own citizens, but this is an area in which Canadians are well equipped to make a difference through well-established and highly respected diplomatic channels.

The risk of not acting now is, as leading academics have already noted, taking us on a very precarious path across the broad spectrum of human life. The iterative nature of AI means that without meaningful regulation, it will become easier for the average person to have the power to cause very serious public harm, should they so wish.

In keeping with early global leadership in the development of AI and machine learning, Canadian universities are advancing the application of AI in areas such as health care, basic science, computational analytics, manufacturing, and financial services that will have a transformational impact, driving innovation and economic growth. However, regulation in these promising areas will ensure that that the hoped-for outcomes are fulfilled. History has shown us that some of the most promising discoveries and innovations can cause harm in the absence of regulation.

Dr. Rhonda N. McEwen is the president of Victoria University in the University of Toronto, and Canada Research Chair in Tactile Interfaces, Communication, and Cognition. McEwen is an expert on emerging technologies, and is co-editor and contributing author of the recently published SAGE Handbook of Human-Machine Communication.

The Hill Times

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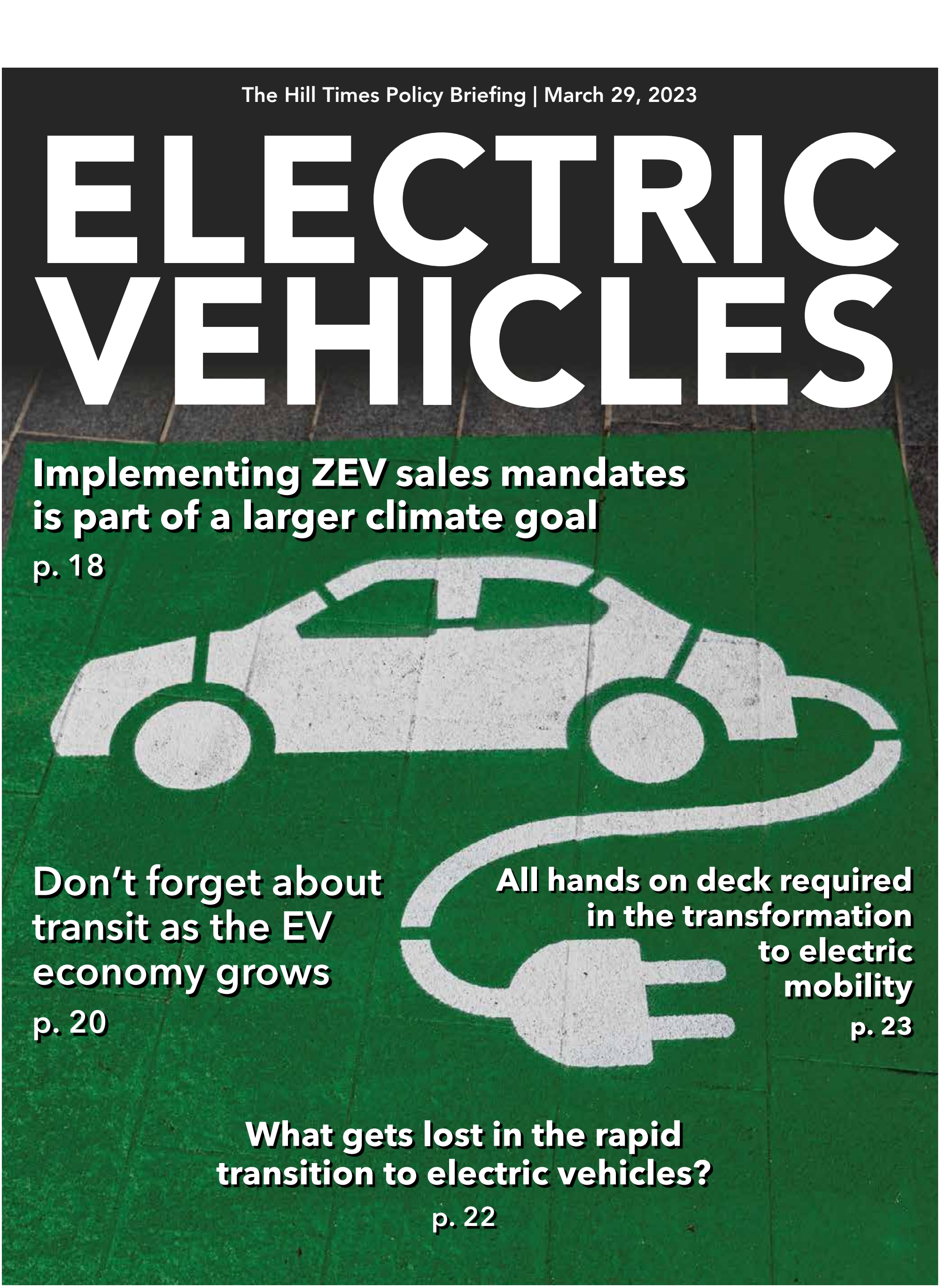
ELECTRIC VEHICLES



Implementing ZEV sales mandates is part of a larger climate goal

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All hands on deck required in the transformation to electric mobility

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Demand for critical minerals in EV batteries requires faster mining project approvals: stakeholders

A typical electric car requires six times the mineral inputs of a conventional car, and the energy sector's overall needs for critical minerals could increase by as much as six times by 2040, according to the International Energy Agency.

Natural Resources Minister Jonathan Wilkinson says the federal government is 'all in' when it comes to critical minerals. *The Hill Times photograph by Andrew Meade*

BY JESSE CNOCKAERT

Canada faces a looming deadline for excavating needed critical minerals to meet the growing demand for electric vehicle batteries, which will require the federal government to pick up the pace on mining project approvals, according to business and mining industry advocates.

To help reduce greenhouse gas emissions, Ottawa announced on Dec. 21, 2022, a requirement that at least 20 per cent of new vehicles sold in Canada must be zero emission by 2026, at least 60 per cent by 2030, and 100 per cent by 2035.

"In our thinking, which we're explaining to governments, particularly around critical minerals in the regulatory reform space, is that we really need to get creative and identify some solutions that will allow us to build more mines more quickly," said Michael Gullo, vice-president of policy for the Business Council of Canada (BCC). "Canada's market share is healthy, but it has very significant competitors.

Michael Gullo, vice-president of policy for the Business Council of Canada, says 'the status quo of a mine taking 12 to 15 years [from exploration to production] is unacceptable, and we need to move forward faster.' *Photograph courtesy of Michael Gullo*

The U.S. is moving very quickly in this space. They're opening up new mines at an unprecedented rate. The revenues that they're collecting through their mining is really a competitive risk that Canadian firms need to be able to respond to."

The global demand for critical minerals is set to soar in the coming years as world governments pursue goals related to net-zero emissions, according to a press release from the International Energy Agency (IEA) issued on May 5, 2021. A typical electric car requires six times the mineral inputs of a conventional vehicle, and the energy sector's overall needs for critical minerals could increase by as much as six times by 2040, depending on how rapidly governments act to reduce emissions, according to the IEA press release.

Gullo said he is optimistic about Canada flourishing in the transition to a low-carbon economy, but greater policy clarity will be required in order for the country to achieve its targets.

In a roadmap for Canada's energy transition, released March 2, the BCC argued that the federal government should work with the provinces to create a national strategy to develop the infrastructure to support mines and processing facilities in remote locations, and a commitment to fast-track project approvals.

"This idea of moving with speed and scale, I think, is really important, so that we don't see these commercial opportunities either move south of the border or see capital flow outside of Canada to other jurisdictions," he said. "This is something that we need to sort out and we need to sort it out quickly, because … the status quo of a mine taking 12 to 15 years [from exploration to production] is unacceptable, and we need to move forward faster."

Shortened timelines for approvals should be available for mining projects that meet specific criteria, according to the BCC's roadmap. Examples of that criteria could be if the proposed project increases Canada's contribution to global energy security, or is Indigenous-led or has an Indigenous ownership component.

"If we can come to an agreement on the criteria for identifying the projects that we want to do in Canada, then we can move into the project approval space with a lot more speed and efficiency, because we already know that we want to do the projects," said Gullo. "This is a time of urgency. This is a time where we really need to be moving with speed and scale, or we're going to miss out on opportunities. We can't afford to do that as a country. We can't afford to do that to our critical resource sectors, like the mining sector."

Canada's $3.8-billion Critical Minerals Strategy was launched by Natural Resources Minister Jonathan Wilkinson (North Vancouver, B.C.) on Dec. 9, 2022. The strategy is intended to help advance the development of critical mineral resources in Canada to power the green and digital economy domestically and around the world, according to a discussion paper released prior to the strategy on June 14, 2022.

Wilkinson announced more than $344-million under the Critical Minerals Strategy towards five new programs and initiatives during an appearance at the annual Prospectors and Developers Association of Canada (PDAC) convention held in Toronto on March 8. The funding announcement includes $144.4-million for the research, development, demonstration, commercialization, and adoption of new technologies and processes that support sustainable growth in Canada's critical minerals value chains and associated innovation ecosystems; and $79.2-million to enhance the quality and availability of data and digital technologies to support geoscience and mapping.

"Critical minerals represent a generational economic opportunity for Canada. Canada is building on its global leadership in the mining industry to seize this opportunity, and the federal government is all in," said Wilkinson in a Natural Resources Canada press release on March 8.

This year's PDAC conference drew nearly 24,000 attendees for networking opportunities, and discussions about best practices and investment in the mineral exploration and mining industry, according to a PDAC press release.

"There's never been a more critical time for our industry to gather, share, and learn as we drive progress, tackle global challenges and seize opportunities for a better future," said Alex Christopher, PDAC's president, in the press release. "And the energy and optimism witnessed during PDAC 2023 was palpable—it is clear the mineral exploration and mining industry has entered a period of great transformation and growth."

Jeff Kileen, PDAC's director of policy and programs, told *The Hill Times* that ensuring a thriving mineral industry in Canada will require access to land, workers, and capital. The Critical Minerals Strategy lays out opportunities for the minerals industry, but action must come along with the strategy to be successful, according to Kileen.

"We're still waiting to see the bulk of the $1.5-billion committed in federal budget 2022 for critical mineral infrastructure investments to start to flow out to accelerate development of new deposits, or add to the upstream portion of the mineral supply chain here in Canada," he said. "Without development of new deposits, we're certainly at risk of falling short in meeting our demands for mid- and downstream manufacturing sectors and missing our targets towards net zero as well."

To support the minerals industry, Kileen said that there needs to be greater collaboration between

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PDAC's Jeff Kileen says the mining industry is 'still waiting to see the bulk of the $1.5-billion committed in federal budget 2022 for critical mineral infrastructure investments.' *Photograph courtesy of Smithcom*

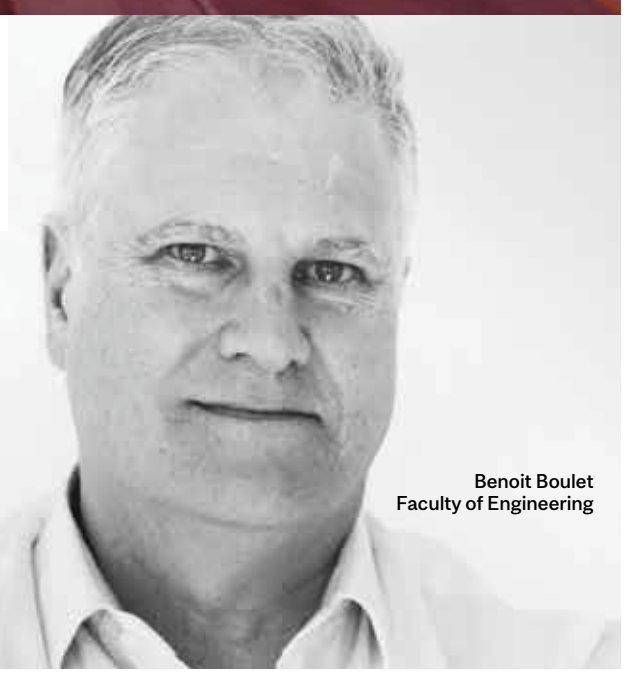
Canada minerals and metals statistics

- In 2021, Canada produced more than 60 minerals and metals worth $44-billion. Metals represented more than two-thirds of total production.
- The minerals sector, which includes mining, primary processing, and metal product manufacturing, directly employed 377,000 individuals in 2021.
- Indigenous people accounted for 12 per cent of the mining industry's labour force in the 2016 census, up from eight per cent in 2011.
- Domestic exports of mineral and metal products reached $103-billion in 2021, accounting for 21 per cent of Canada's total merchandise exports.
- In 2021, $2.1-billion was invested in mineral exploration in Canada. Precious metals (mainly gold) were the most sought-after commodities, accounting for 65 per cent of the spending.

—Source: Natural Resources Canada

Our vision:

A clean and profitable transport sector



Benoit Boulet
Faculty of Engineering

Benoit Boulet believes that electrifying Canada's transport sector will create a healthier environment—and economy. His team is working with industry partners to electrify the heaviest transport trucks on the road, making them more efficient and affordable than ever.

McGill's researchers are driven by their vision of a sustainable future. Collaborating across disciplines and with partners, they are accelerating solutions for a greener, more prosperous world.

McGill

Discover the project:

Demand for critical minerals in EV batteries requires faster mining project approvals: stakeholders

Continued from page 16

government departments, such as Natural Resources Canada, the National Research Council of Canada, and Environment Canada.

The federal government set a goal of conserving 30 per cent of Canada's land and water by 2030, which was announced on Dec. 9, 2022. Kileen argued that the goal of protecting 30 per cent of Canada's land must be done in co-ordination with land development plans to ensure that potential mining sites don't fall under protected lands.

"A lot of these critical mineral deposits are likely to exist in terrains that have been underexplored," said Kileen. "Provinces and territories need to be able to do comprehensive mineral assessments using that public geoscience information to understand where could that next lithium mine potentially be."

PDAC recommended that the federal government expand the funding provided to the Geological Survey of Canada to accelerate development of a Pan-Canadian Geoscience Strategy in the organization's pre-federal budget submission in October 2022. It also called for the feds to co-fund provincial and territorial geoscience organizations to collaboratively develop comprehensive, regional-level mineral and energy potential models for application in land management and conservation planning.

"An industrial strategy is something that we don't have in Canada. That's maybe something where Minister Wilkinson … and other parts of government should direct some effort into the future. But the bottom line is, if we're trying to protect lands while still develop[ing] lands at the same time, it needs to be done in a co-ordinated fashion. Otherwise, we're at risk of protecting lands that will be important to us for development in the future."

To help ensure that mineral exploration and excavation is conducted in an environmentally conscious way, Canada and other G7 countries launched a Sustainable Critical Minerals Alliance to compel mining companies to adopt more environmentally sustainable and socially responsible standards. Wilkinson announced the alliance on Dec. 12, 2022, during the COP15 biodiversity talks in Montreal. Through the alliance, member countries voluntarily encourage or collaborate on industry practices that prevent biodiversity loss, protect species at risk, and minimize pollution.

Senator Michèle Audette says that Indigenous people must be involved in mining projects on Indigenous land, from 'right at the beginning when the page is white, until the last paragraph.' *Photograph courtesy of the Senate of Canada*

Photinie Koutsavlis, vice-president of economic affairs and climate change for the Mining Association of Canada, told *The Hill Times* that the Critical Minerals Strategy is well-written and aggressive, but Canada will need to start moving forward on the "almost shovel-ready projects." She said it shouldn't be taken as a given that Canada is a mining powerhouse country.

"There has been permitting delays through the impact assessment process and the environmental assessment process, where you've heard even the government admit to the fact that taking 10 to 15 years to be able to permit and have a mine go into production is far too long," said Koutsavlis. "We need to be able to have the similar type of incentives that have been granted to the downstream portion of the value chain, whether it's taxation, [or] whether it's support for specific projects. Essentially, what are the things that need to be done to unlock the shovel-ready projects? Those are the projects that will be coming into production in the near-term, as opposed to a project that is still in the mineral discovery stage, which could be the better part of a decade."

Progressive Senator Michèle Audette (De Salaberry, Que.) told *The Hill Times* that she looks at the Critical Minerals Strategy through her lens as an Innu person. Audette comes from the Innu community of Uashat mak Mani-Utenam in Quebec, and spent some of her childhood in Schefferville, Que., which has a history of mining.

She said it will be important that the rights of Indigenous people are respected as Canada moves forward with mining projects.

Indigenous Peoples hold constitutionally recognized rights and title over some of Canada's most mineral-rich lands. For example, a region in British Columbia and Alberta, referred to as the Golden Triangle because of its vast deposits of gold, silver, and copper, rests on the territory of the Tahltan, Gitanyow, and Nisga'a nations.

"With or without us, they're going to do it. And do I agree with that? Of course no. Some of us will challenge in court. Some of us will slow down the traffic to remind you that there's Indigenous Peoples on those lands. Some of us will sit down with them and say, change this article, [or] change that in that agreement to improve it and we will go ahead," she said. "When there's policy like that, or strategies, we need to be there right at the beginning when the page is white, until the last paragraph."

jcnockaert@hilltimes.com
The Hill Times

Implementing ZEV sales mandates is part of a larger climate goal

The goal of reducing emissions should not eclipse other environmental considerations that are just as important for nature and Canadians.

Independent Senator Rosa Galvez

Opinion

Since it first formed in 2015, our current federal government has been touting the benefits of aligning the economy with the environment. Sensing such an opportunity as the world moves toward decarbonization, the 2022 federal budget extended the zero-emission vehicles (ZEV) incentives program until 2025 and expanded it to include more vehicle models. It also made the development of ZEV-related supply chain infrastructure a staple commitment.

On their own, subsidies and incentives might not move the needle fast enough and are typically only accessible to Canadians with a higher income who can afford the upfront cost of a more expensive vehicle. That is why it is absolutely necessary to take a comprehensive approach that focuses on targeted actions, one of these being ZEV sales mandates.

Throughout the past two years, the federal government has made announcements setting a mandatory target for all new light-duty cars and passenger trucks sales to be zero-emission by 2035, with interim targets of 20 per cent by 2026 and 60 per cent by 2030. The intent of these targets is to increase supply so more Canadians can buy ZEVs.

While increasing what's on offer, sales mandates also put pressure on automakers to continue innovation to address remaining concerns about ZEV adoption. While a majority of Canadians—71 per cent according to a 2022 KPMG poll—are considering a ZEV as their next vehicle purchase, most are still concerned about battery range, reliability in Canadian winters, and charging time. For the sales mandate to be in line with Canadian demand, automakers will need to continue improving ZEV performance and convince Canadians that making the switch will not only be economical, but also efficient.

From a manufacturing standpoint, tiered targets over the next 12 years provide a gradual and predictable production increase for automakers, allowing them to plan for increased capacity and develop the necessary partnerships with critical mineral extractors for battery production. Meanwhile, automakers also have to comply with similar 2035 targets from other major international jurisdictions including the European Union, the United Kingdom, and California.

From a climate perspective, ZEV sales mandates are an essential tool to reduce emissions from the transportation sector, which accounted for 24 per cent of Canada's total national emissions in 2020—the second largest source of greenhouse gas emissions (GHG) in the country. However, the goal of reducing emissions should not eclipse other environmental considerations that are just as important for nature and Canadians.

Although deploying impressive society-wide measures to switch from internal combustion engines to ZEVs will dramatically reduce our national GHG emissions, it will do nothing to improve Canada's public transit systems still struggling from ridership loss since the pandemic. Solely focusing on single passenger vehicles will not reduce traffic congestion and long commutes. The government must increase efforts to provide affordable and emissions-free public transit nationwide.

Furthermore, our increasing demand for critical minerals for batteries is expanding the destruction of natural habitats and ecosystems due to growing mining operations. The world is increasingly aware of the need to protect our land, water, and biodiversity to ensure a healthy and prosperous future for humanity. Our societal shift should include more stringent environmental regulation of the mining sector in order to ensure absolute rehabilitation of ecosystems after mine closures.

Finally, our transition to emissions-free vehicles will inevitably be accompanied by a changing workforce demand, from battery production to energy generation. It is imperative that all governments rapidly address the fair and just transition of workers toward growing fields and sectors. Without it, automakers will not be able to adequately reduce the current month-long wait times to deliver ZEVs to their customers.

The transition presents an obvious opportunity for economic growth in Canada while reducing our carbon footprint, but the government is short on time to enact all these measures to ensure a smooth transition to 100 per cent adoption of zero-emissions vehicles. Canadians, however, appear to be on board with the change and that should give the federal government motivation to be bold.

Rosa Galvez is an environmental engineer, a former professor at Laval University, an Independent Senator for the province of Quebec, and president of the ParlAmericas' Parliamentary Network on Climate Change. She is currently the chair of the Senate Standing Committee on Energy, the Environment and Natural Resources and a member of the Standing Senate Committee on National Finance.
The Hill Times

Designing the future of inclusive transportation

An older adult. A recent newcomer.
A person with a disability.

Each of these individuals face unique barriers to safe, efficient and accessible travel. And many of the current transportation systems fail each one of them.

But it doesn't have to be that way.

Our researchers at the McMaster Automotive Resource Centre, led by Ali Emadi, are building a more inclusive transportation system that is safer, equitable and more sustainable.

With expertise in artificial intelligence and a commitment to inclusivity, this team is doing so much more than just changing the way we travel.

They're revolutionizing the way we think about the future of transportation systems.

Ali Emadi
Canada Research Chair in
Transportation Electrification and
Smart Mobility

MARC McMaster Automotive Resource Centre

BRIGHTER WORLD | McMaster University

Treasury Board President Mona Fortier makes an announcement about zero-emission public transit infrastructure for the OC Transpo fleet in Ottawa on Jan. 19. *The Hill Times photograph by Andrew Meade*

Don't forget about transit as the EV economy grows

Due to global supply chain and workforce problems, the whole bus-production process is slowing down across North America.

Josipa Petrunić

Opinion

The Government of Canada has a target of 5,000 zero-emissions buses (ZEB) on the road by 2026. Based on the Canadian Urban Transit Research and Innovation Consortium's (CUTRIC) national ZEB database and current trajectories, the nation isn't far off. If we include commitments made so far to buy battery-electric, hydrogen fuel cell, and compressed natural gas vehicles powered by renewable natural gas in pipelines, the country could hit 4,996 buses by 2026. But if we remove natural gas, the number drops to about half.

No question, there's work to be done, and that work just got harder because of global supply chain issues that threaten to significantly obstruct the government's decarbonization of transit objectives.

A concoction of constraints caused by offshored and globalized supply chains that we, as Canadians, happily supported over the years of liberalization from the 1990s to today has affected everything from batteries and powertrain components to the steel for body frames and mechanical devices used in bus doors. Those delays in manufacturing abroad, shipping overseas, and arrivals to the North America doorstep—combined with workforce shortages across international supply chains—have caused a spike in prices as well, due in part to overtime payouts among the workers who are available.

The cost of basic commodities, which affect the entire supply chain, has increased up to 80 per cent, compared to the five-year average. The Producer Price Index change from December 2020 to today is 25.69 per cent, and the rolling 12-month average from today is 17 per cent. By the estimations of one major bus manufacturer in Canada, bus batteries and their software management systems have gone up 16 per cent and steel has gone up a whopping 46 per cent—even the wheelchair ramps are up by 28 per cent.

On average, CUTRIC is seeing price increases of about 30 per cent across the board—that means an electric bus that cost $1-million last year, costs about $1.3 million this year.

This also means that the $2.75-billion the federal government committed to in its landmark Zero Emission Transit Fund launched during the pandemic—which was supposed to buy 5,000 ZEBs and infrastructure to support it—will simply buy 30 per cent fewer ZEBs and 30 per cent less infrastructure, assuming prices don't increase any more and supply chains open up to allow deliveries on time, both of which are already unlikely.

Canada isn't alone in this dizzying array of trying to decarbonize while paying dearly for it. The United States' historic Infrastructure Investment and Jobs Act launched by the Biden administration aims to completely overhaul transit and transportation, and drive all agencies to zero-emissions transit solutions through $1.66-billion in grants to transit agencies, territories and states, as part of America's goal to meet net-zero emissions by 2050.

Because of supply chain backlogs globally, and workforce problems layered on top, the whole bus-production process is slowing down across North America.

Manufacturers are making fewer buses than we need them to because they can't get the parts or the workers to show up in the numbers required in time to meet procurement and funding targets set by governments and transit agencies. And delivery delays are arising across the transit network because manufacturers are unable to begin production of new buses without parts, oftentimes affecting hundreds of employees in the transit manufacturing landscape.

Add to this the problem of money. Money is committed in government funds, but the "pay on delivery model" isn't working—manufacturers like New Flyer Industries are saddled with upfront costs amounting to more than US$250-million since the beginning of the pandemic to the end of 2022. And it's getting harder and harder to find financiers willing to foot those bills among private sector manufacturers, while governments sit on the funds intended to support decarbonization.

To solve the problem across Canada and the U.S., manufacturers in the transit industry will need transit agencies to have access to mobilization payment options and contingency pricing as part of their procurement tools.

To solve—or at least relieve—some of the problems facing a critical industry that is already working to decarbonize aggressively with municipal, community, and provincial partners that already support it, too, we recommend the creation of a temporary federal task force focused on the ZEB manufacturing and supply chain for transit decarbonization. This would help open a dialogue specific to domestic financing for zero-emissions transit in a constrained, yet globalized, supply chain environment. The task force should focus on relieving pressure on manufacturers trying to fill orders on time and on price by facilitating nouveau payment models with transit agencies and city partners. Global trade and foreign affairs mechanisms—like free trade mechanisms already in place—could be leveraged to help the bus and transit manufacturing supply chain move products to, through, and from Canada as rapidly and as efficiently as possible.

Dr. Josipa Petrunić is president and CEO of the Canadian Urban Transit Research and Innovation Consortium.

The Hill Times

Policy Briefing **Electric Vehicles**

Electric vehicles: one part of an energy transition to mitigate climate change

Regardless of where decarbonized electricity comes from, our current electricity grids cannot support the electrification of vehicles without major upgrades and increases to electricity supply.

Christina Hoicka

Opinion

While the world is "on thin ice," according to United Nations Secretary-General António Guterres, there is an opportunity to decarbonize in Canada through the electrification of transportation. Although Canada's greenhouse gas emissions have been reducing in some sectors like electricity and heat production, transportation is responsible for a large share of emissions that have been growing. The Government of Canada set a mandatory target for all new passenger trucks and light-duty cars to be zero emission by 2035, while the provinces and territories have their own policies that target the uptake of electric vehicles. Electric vehicles are one part of an energy transition to mitigate climate change.

Due to the increasingly prevalent impacts of climate change, electricity grids now need to be more resilient to extreme storms, heat waves, and other major weather events. Grid blackouts (no power) and brownouts (low power) result in economic losses to local communities, skepticism over grid resilience and reliability, and sometimes deaths of the most vulnerable people in our communities. Without grid upgrades, as climate change progresses, investments to improve grid reliability to support local economies are inevitable.

Within this context, electric vehicles can solve some problems and create new challenges. As a technology that can provide electricity storage, electric vehicles can offer an avenue for private investment into resilient grid infrastructure. Electric vehicles can provide services for grid resilience during the times that they are charging, storing, and discharging electricity.

However, as the market share of electric vehicles grows, they would bring with them a much larger demand for electricity and infrastructure. According to a study by the National Renewable Energy Laboratory in the United States, substantial decarbonization of transportation there could lead to as much as a 38 per cent increase in electricity demand, requiring new infrastructure, sources of power generation, and grid management technologies.

And Canada is not the only place on North American grids adopting electric vehicles. The American Inflation Reduction Act offers a range of supports to stimulate the mass adoption of electric vehicles across the United States. California has already adopted some of the most stringent vehicle emissions regulations in North America. Other states are following suit. These will dramatically increase the demand for electric vehicles, the rare-earth metals and materials that they are manufactured from, and for electricity supply.

Regardless of whether decarbonized electricity comes from nuclear, large-scale hydroelectricity, small-scale renewable energy, or some combination thereof, our current electricity grids cannot support the electrification of vehicles without major upgrades and increases to electricity supply.

Electric vehicle uptake may create supply constraints in cities and across borders. Much of this demand increase will occur where the cars are: in already electricity supply-constrained areas such as cities. In the Canadian jurisdictions that export electricity to American states or rely on electricity trade, the rising demand for it in the U.S. may put a strain on availability.

There are several implications and potential solutions to the challenges electric vehicles create. First, how will we dramatically increase electricity supply and infrastructure for more populated areas? We need to start planning for an expanded grid, and what that means on the ground across a range of locations in terms of social opposition and acceptance. This means meaningfully addressing community involvement in decision-making around new infrastructures and the distribution of benefits, such as grid resilience, local economic development, jobs, financial revenues, conservation of nature, and health benefits.

Second, can we decarbonize transportation by curbing the use of passenger vehicles? Reducing energy by using available options to get people out of their single-occupant vehicles and onto electrified public transit, electric bicycles, co-operative car shares, and walking.

Third, we need to move electricity from where it can be generated to where it will be used. To do this, we need to address the potential grid congestion into highly populated cities and across borders. How can we target investment into technological and social innovation to get electricity across these constrained areas and bottlenecks in order to avoid supply shortages in certain locations?

Electric vehicles offer an opportunity to decarbonize transportation; however, we need to be prepared for the complex challenges and opportunities that they create for the electricity industry, local communities, and economies.

Dr. Christina E. Hoicka is the Canada Research Chair in Urban Planning for Climate Change and an associate professor of geography and civil engineering at the University of Victoria in British Columbia.

The Hill Times

A recent poll by **Abacus Data** found that

70%

OF CANADIANS

say wait times are making them **less likely** to consider buying an **electric vehicle.**

Illustration by Jake Tobin Garrett

What gets lost in the rapid transition to electric vehicles?

Homeowners shore up sandbags around a Constance Bay, Ont., home on April 30, 2019, amid Ottawa River Valley flooding. Future droughts and floods could potentially create profound challenges for hydropower projects in Canada as well as reductions in the river runoff and evaporation of water in reservoirs, writes Sen. Mary Jane McCallum. *The Hill Times photograph by Andrew Meade*

Renewable energy should be designed to have minimal environmental impacts and place no extra pollution burdens on communities at either end of the transmission line.

Senator Mary Jane McCallum

Opinion

There are many variables that need to be considered in the rapid transition from fossil fuels to electric vehicles (EVs), including the cost of vehicles; charging station proliferation; geography; power required to support the grids; grid integrity; mining and cost of batteries; and retrofitting multi-unit buildings, single homes, and parking facilities. Canada also has unique geographical and climate considerations that will pose additional challenges for a wholesale shift to EV, such as the vastly dispersed population over varying and difficult terrains, extreme weather conditions, climate change (droughts, floods, and their impacts on hydro dams), and the increase in demand for energy systems.

In the rapid transition to EVs, there are critical areas that are not being widely discussed. In the United States, the reality of drought due to climate change already impacts dams in Montana, Nevada, Texas, California, Arkansas, and Oklahoma. Future droughts and floods could potentially create profound challenges for hydropower projects in Canada as well as reductions in the river runoff and evaporation of water in reservoirs.

As Jeff Opperman, the World Wildlife Fund's global freshwater lead scientist, said in a February 2022 release: "Hydropower projects must deal with a range of hydrological risks—ranging from too little water to too much—and these risks are projected to increase in many regions due to climate change. Already we've seen regions, such as the southwestern U.S., southern Africa, and Brazil, where hydropower generation has declined due to falling water levels."

According to KPMG, Natural Resources Canada predicts that by 2025, Canada will need roughly 50,000 public chargers. By 2030, the need for public chargers will grow to between 195,000 and 201,000, and to between 1.8 million and 5.6 million by 2050.

Will Canada need to double the supply of electricity to meet the energy requirements for EVs? How will this affect the cost of electricity? Hydro stakeholders like people to believe that the costs will be relatively inexpensive. However, in 2022, Manitoba Hydro had a debt load of $24-billion. What are the debt loads for other large Canadian hydro projects, such as Muskrat Falls and Site C dams? Where would new dams be built to produce this increased demand in electricity?

The location of hydro dams in Canada has been a problem for the Indigenous populations where these mega-dams are built. The loss of biodiversity, the increase in mercury in reservoirs, and the loss of fish stock have severely affected food security for the Indigenous people who have been forced to exist alongside these large hydro operations. Renewable energy should be designed to have minimal environmental impacts and place no extra pollution burdens on communities at either end of the transmission line.

With regards to current hydro capacity limitations, Richard Webster, legal director at Riverkeeper, stated: "Hydro-Quebec's recently issued Strategic Plan indicates that it will suffer a shortage of energy by 2027 and new energy supplies will be required between 2027 and 2050 to transition Quebec off fossil fuels. … 'Depending on demand growth, new hydropower generating capacity may therefore be required at some point in the future.'" We also know that Ontario and Manitoba are looking at building new hydroelectric projects in their northern regions as demand for power rises there, too.

The costs of hydro operations to provide for this incoming demand are varied. As Catherine Tays stated in a 2021 article, "The true costs of hydroelectric power, now and in the future": "the costs of hydropower are higher than we think—and that could result in a decreased share of the future energy market."

Tays goes on to note the cost overruns that frequently occur in power-generation plants, with projects often running millions of dollars overbudget and years past their original timelines. These overruns mean that an increase in hydropower could negatively impact economy-wide carbon emissions.

A further concern highlighted by Tays is the age of Canada's hydro infrastructure, as some hydro plants in Canada are a century old. With age comes sediment accumulation in reservoirs that decreases power generation while maintenance costs increase. These increased operating costs then make other renewable energy sources competitive.

It is for these reasons that we must proceed with caution when adopting a shift to EVs. The increased reliance on hydro comes with many hidden costs of its own: human, environmental, and financial.

Senator Mary Jane McCallum, who was appointed to the Senate in December 2017, is a Cree woman hailing from Barren Lands First Nation in northern Manitoba. She currently sits as a non-affiliated Senator as she strives to give voice to underrepresented groups in Canada.

The Hill Times

All hands on deck required in the transformation to electric mobility

Rather than pursuing outdated and redundant regulations, Canada needs to address the well-documented barriers to electrification.

Brian Kingston

Opinion

The electric vehicle revolution is well underway with more than 120 electrified models expected in Canada this year.

This is all part of an exciting transformation to electrification underway in the global automotive industry, with automakers ramping up production across North America. It includes massive investments to retool auto manufacturing facilities, new battery plants, and the creation of a critical mineral supply chain. These investments are already showing results with North American zero-emission vehicle (ZEV) production reaching seven per cent of total vehicle production in December 2022, up from 4.7 per cent in December 2021.

Simply put, this is the largest reindustrialization of the automotive industry to take place over the past century. Canada has been a major beneficiary of this transformation with automakers announcing investments of more than $16-billion in just the past three years.

The federal government's proposed ZEV mandate designed to micromanage vehicle supply across Canada is a distraction from the real challenges that governments, utilities, non-governmental organizations, and industry need to be focused on: ensuring the supports are in place to help Canadians make the switch to electric. Mandating vehicle supply amid this transformation is like chasing horses that already left the barn.

Rather than pursuing outdated and redundant regulations, Canada needs to address the well-documented barriers to electrification.

KPMG's third annual consumer auto poll released in February found that of the 70 per cent of Canadians who intend to buy a new vehicle over the next decade, only 28 per cent prefer a battery electric or plug-in hybrid vehicle. Without higher demand levels, achieving the government's 100 per cent ZEV sales target by 2035 simply won't be possible.

The culprits? A lack of robust charging infrastructure across Canada and the costs associated with going electric.

Nearly 70 per cent of Canadians are concerned about the availability and reliability of public ZEV charging stations. Another 83 per cent of respondents said that Canada needs to adopt a ZEV charging uptime standard and regulatory framework for improved reliability. Charger reliability remains a serious challenge in Canada, with no national standards for charging stations unlike in the United States where President Joe Biden has made this a top priority.

More than a quarter (26 per cent) of Canadians said the cost of a ZEV is preventing them from buying one with rising interest rates compounding the affordability challenge. Rising interest rates have put ZEVs out of the price range for 81 per cent of respondents.

KPMG's findings are consistent with Ernst and Young's Electric Vehicle Readiness Index that found Canada has fallen from eighth place in 2021 to 13th in 2022 of the world's top 14 vehicle markets. The main reasons for the poor performance are a lack of ambition on charging infrastructure and consumer incentives.

The growing ZEV charging gap is out of step with the government's ambition to reach 100 per cent ZEV sales by 2035. There are currently only 3,500 operational publicly funded EV charging ports of the 84,500 the government has committed to building. For comparison, California is targeting approximately the same number of ZEVs on the road by 2030 as Canada with double the amount of public charging infrastructure and triple the funding.

When it comes to affordability, Canada's suite of consumer financial incentives does not do enough to make ZEVs accessible for everyone. In fact, Canada falls outside the top 20 countries globally when it comes to helping consumers purchase ZEVs. This is attributable to weak and uneven purchase incentives across Canada and limited or no help for those wanting to install a home charger.

The government's own analysis confirms that regulating vehicle sales will have a disproportionate impact on low-income households due to higher costs of ZEVs and installing charging infrastructure. Rural and northern Canadians will face more difficulties than urban Canadians given a lack of public charging infrastructure and higher electricity prices.

There is a better way.

Instead of developing new and redundant ways to regulate what vehicles Canadians can buy, why not focus on providing the charging infrastructure and incentives Canadians need if they are to make the switch to electric.

Brian Kingston is president and CEO of the Canadian Vehicle Manufacturers' Association.

The Hill Times

The Hill Times Policy Briefing | February 1, 2023

INNOVATION

Quantum innovation depends on diversified startups investments, say experts

The Liberal government unveiled its $360-million National Quantum Strategy on Jan. 13 to support the growth of quantum sciences and technologies in Canada.

BY JESSE CNOCKAERT

To promote innovation in Canada's emerging quantum technology industry, the Liberal government should prioritize smaller funding announcements to help a greater number of start-up companies navigate "the valley of death," according to quantum industry experts.

"[The Liberal government] should be looking at spreading their ability to help many more companies, instead of big, massive amounts to a few big companies," said Bruno Couillard, co-founder, CEO and chief technology officer of cybersecurity company Crypto4A. "I would hope that the implementation and the distribution of the money will be such that instead of helping nine companies with $40-million each, they will go around and spread that money to ensure the small and medium enterprises … all get to partake into this strategy."

The Liberal government unveiled its $360-million National Quantum Strategy on Jan. 13 to support the growth of quantum sciences and technologies in Canada. The strategy commits $141-million for basic and applied research, $45-million to develop and retain expertise in the quantum sector, and $169-million to support commercialization through funding from agencies including the National Research Council, Global Innovation Clusters, and Innovative Solutions Canada.

Couillard said he is happy overall with the strategy, but questions remain about how quantum technology companies will benefit from the available funding.

On Jan. 23, the Liberal government announced an investment of $40-million towards Toronto's Xanadu Quantum Technologies Inc., to build and commercialize a photonic-based quantum computer. In a June 2022 paper published in the research journal *Nature*, Xanadu described how Borealis, the company's latest quantum computer, was capable of providing a series of numbers with a specified range of probability in just 36 millionths of a second—an operation they estimated would take the current most powerful supercomputers in the world more than 9,000 years to match.

Couillard argued that a $40-million investment in Xanadu may make for an impressive headline in a press release, but is not necessarily as beneficial to the quantum sector as $1-million investments spread across 40 startup companies.

Couillard argued that Xanadu "is not in great need of cash," and cited a Nov. 9, 2022, *Globe and Mail* story that said the company raised $100-million from investors—including Canadian private capital firm Georgian and Porsche Automobil Holding SE—following the launch of Borealis.

"Hopefully, this is not going to be the trend, because there's not a lot of money in the pile. They've announced the strategy [and] I think it's a great strategy, but there's not a lot of money," said Couillard. "I'm hoping the government is not going to spend all of their money in these big splashy announcements that, in the end, is not really going to help the ecosystem."

Couillard serves as a board member of Quantum Industry Canada, a consortium of quantum technology companies that includes developers of technologies for quantum computing, quantum communications and cryptography. He is also a member of the Canadian National Quantum Strategy committee.

Xanadu's $178-million quantum computer project is expected to create 530 jobs in the high-tech and quantum computing fields, according to a Jan. 23 government press release.

"Quantum technologies will set the course of the future and thanks to companies like Xanadu, Canada is at the forefront ready to lead. With today's announcement, our government is strengthening Canada's position in quantum technology and helping to create more economic growth and good jobs for Canadians. We'll continue to build this sector through our National Quantum Strategy and support made-in-Canada technology so Canada remains a world leader for decades to come," Innovation Minister François-Philippe Champagne (Saint-Maurice–Champlain, Que.) said in the press release.

Daniel Oblak, an assistant professor for the Institute for Quantum Science and Technology at the University of Calgary, told *The Hill Times* he agrees that smaller funding announcements spread out across a larger number of quantum technology companies might be prudent. He argued that innovation could be best served by funding startup companies that "don't have the whole machinery going."

"Startups and innovators, they need to get through the valley of death," he said. "It's not easy at any level to take things out of a university setting … It becomes a lot of extra work to take on these entrepreneurship and innovation tasks."

Oblak said he has no major issues with the National Quantum Strategy, but it remains to be seen whether the strategy will work as intended. He said the strategy's focus on supporting basic research will potentially help development of quantum technologies that will add value to society over the long term.

"It may not be obvious right now, and not all of [basic research] will lead to those benefits, but this is how you develop things for the long run," he said. "You want Canada to come up with some of the groundbreaking things that will resonate for

Continued on page 18

Innovation Minister François-Philippe Champagne says Canada is 'at the forefront ready to lead' in the quantum technologies sector. *The Hill Times photograph by Andrew Meade*

Crypto4A's Bruno Couillard says the Liberal government should spread investments around in the quantum technologies sector, instead of 'big splashy announcements.' *Photograph courtesy of Bruno Couillard*

Prime Minister Justin Trudeau speaks with reporters after a cabinet meeting in the West Block on Jan. 31. The release of Canada's quantum strategy follows similar quantum strategies that have been announced around the world in recent years. *The Hill Times photograph by Andrew Meade*

An electrified future?

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Quantum innovation depends on diversified startups investments, say experts

Continued from page 16

decades or centuries, as well as making the new gadgets that are going to be sold on the market in the next 10 years."

The release of Canada's quantum strategy follows similar quantum strategies that have been announced around the world in recent years. Europe's 10-year Quantum Technologies Flagship launched on Oct. 29, 2018, and the United States passed its National Quantum Initiative Act on Dec. 21, 2018.

Oblak said that Canada isn't behind other nations when it comes to supporting the quantum industry. The funding for Canada's quantum strategy was announced in the 2021 federal budget, which allowed a head start on investments into quantum technology companies prior to its official release, he said.

"In reality, this funding has already started to trickle into the research area. In that sense, I can see that there was probably a recognition that this is urgent, and we should start funding already," he said. "Lag maybe allowed other places to catch up in the quantum area, but I wouldn't say we're behind. We're still strong. And this will allow us to regain even more of the leadership that we have had for a long time."

Investments under the national quantum strategy include an announcement by Champagne on March 15, 2022, of $137.9-million through the Natural Sciences and Engineering Research Council of Canada's Collaborative Research and Training Experience grants and Alliance grants to help develop the talent pipeline needed to support growth in the quantum sector.

The Hill Times reached out to Conservative MP Rick Perkins (South Shore–St. Margarets, N.S.) and to NDP MP Brian Masse (Windsor West, Ont.), their parties' respective innovation critics, to discuss the National Quantum Strategy, but did not receive a response by deadline.

Nadish de Silva, a Canada Research Chair in the Mathematics of Quantum Computation and an assistant professor in the mathematics department at Simon Fraser University in British Columbia, said that Canada has historically "punched well above its weight in quantum information and technologies and we would be wise to maintain our position."

"There will be greater competition with the rest of the world now. The race is both a sprint and a marathon in the sense that some quantum technologies are near fruition, whereas others will require sustained investment and effort over a longer timeframe," he said in a Jan. 26 emailed statement. "I also wonder with respect to the goals of improving diversity in the talent pool, whether enough attention is being paid to the earliest stages of the pipeline. It may well be outside the scope of the [National Quantum Strategy] to address equitable STEM educational opportunities for pre-university students, but doing so is necessary for achieving the aforementioned goals."

Stephanie Simmons, the founder and chief quantum officer of Photonic, a quantum technologies company based in B.C. and a Canada Research Chair in Quantum Computing at Simon Fraser University, said that Canada is at a turning point when it comes to quantum technologies.

"It's fantastic to move from a grassroots approach towards quantum technologies, because there's still a lot of open questions on how best to implement these things, [and] how best to execute these things," said Simmons, who also serves as a co-chair of Canada's National Quantum Strategy's Quantum Advisory Council. "It's absolutely the right time to move towards a co-ordinated effort where we're all rowing the boat in the same direction and maximizing the opportunity for the country and getting in front of this. A lot of other countries are making that same realization, so we are in good company."

jcnockaert@hilltimes.com
The Hill Times

Canada quantum industry statistics

- According to a study commissioned by the National Research Council of Canada in 2020, the total economic impact of quantum technologies in Canada by 2025, including indirect and induced effects, will be $533-million, with 1,100 jobs and $188.3-million in returns.
- In 2045, quantum is expected to be a $138.9-billion industry, with 209,200 jobs and $42.3-billion in returns.
- Earlier investments by private and public sectors, including more than $1-billion invested by the federal government between 2009 and 2020, has helped to produce a highly skilled research and development community in quantum technologies.
- Canada's quantum sector currently includes more than 100 ecosystem players, including companies, research labs, academic institutions, accelerators and incubators.

Source: National Quantum Strategy Consultations: What We Heard Report, July 18, 2022, Innovation Canada

Global quantum computing information

- Public and private investments in quantum computing globally reached $35.5-billion by 2022 across a range of quantum technologies.
- Private investments for quantum technologies added $3.2-billion in 2021 alone and more than $5.5-billion in the past decade.
- At the beginning of 2022, a total of 46 companies worldwide were actively developing quantum computing hardware.
- The quantum computing sector is experiencing a talent shortage. Globally, more than half of quantum computer companies are currently hiring.
- The fact that quantum technologies are still in their infancy means that most current jobs are highly technical, especially with academic specializations and PhDs. In the past year, however, more diverse profiles, such as marketing and sales roles requiring prior work experience, have begun to appear, showing that the market is maturing

Source: State of Quantum Computing: Building a Quantum Economy, World Economic Forum, Sept. 13, 2022

Our regulatory stagnation is killing innovation

Innovation will never convert into productivity growth unless we constantly modernize our regulations, empowering businesses to implement innovative new practices that also protect consumers.

ISG Senator Colin Deacon

Opinion

Regulatory stagnation can cause harm because technologies, products, and business models are rapidly changing, and our regulatory frameworks are not keeping up. This creates increasing economic and public risks. The response to this stagnation is often to promote deregulation, but this, too, can increase the risk of public harm through unsafe products, underperforming services, or hazardous conditions. How do we overcome regulatory stagnation while still protecting the public and embracing the need for innovation in our economy?

There is a proven solution. I'll get to that in a moment, but first, let's explore the problem.

The Organisation for Economic Co-operation and Development (OECD) measures the degree to which competition and innovation policies are promoted or inhibited within member countries. Their Product Market Regulation Indicators measure and compare economy-wide regulatory and market environments. In terms of regulatory burden, Canada is one of the worst performing countries in the OECD, ranking 35th of 38 member countries.

Another bit of bad news lies within the most recent Global Innovation Index. Despite gradually improving in recent years, Canada is the only G7 country that produces less innovation output relative to its level of investment. In other words, our substantial investments in innovation are not producing commensurate results in terms of improved economic performance.

Despite increasing investments in innovation initiatives, we keep producing lackluster results, in part because of regulatory stagnation. In this ever-changing world, innovation will never convert into productivity growth unless we constantly modernize our regulations, empowering businesses to implement innovative new practices that also protect consumers.

Consider this example. Until last November, Canada's electric metering legislation only allowed electric vehicle charging stations to charge for the amount of time used and not the actual cost of the electricity delivered. As a result, condo and rental property managers, and other potential market participants, were disincentivized from investing in charging stations. Our regulatory stagnation prevented the market from helping to deliver on this top government priority.

This example illustrates the extent to which Canada desperately needs a major, whole-of-government strategy to meaningfully address our OECD-leading legacy of regulatory burden and stagnation. We must create the regulatory agility necessary to protect Canadians, spur innovation, and increase productivity growth.

Treasury Board's current initiatives—the Annual Regulatory Modernization Bill and targeted regulatory reviews—are good steps in the right direction but barely scratch the surface. We need an approach that is far more fit-for-purpose—one that can increasingly create an efficient and modernized regulatory system that is pro-competitive, encourages innovation and investment, and accelerates the growth of business, while still protecting consumers from risks and harms.

Good news: there is a proven solution based on the use of standards. A standard is a set of criteria that is collaboratively agreed to by the stakeholders in a specific industry, including government. Standards differ from regulations in that they are developed through a rigorous and transparent process outside of government and then must be certified. Decades ago, the United Kingdom, European Union, and the United States, among others, created a strategic approach to incorporating standards into their legislative instruments.

In a recent op-ed, Keith Jansa, CEO of the Digital Governance Council, argued for the federal government to institute governor-in-council (GIC) powers to recognize standards, codes of practice, or certification programs that provide equal or greater protections to those required by law. Each departmental minister could then establish an expert advisory panel to carefully review each decision, before being approved by the minister and submitted to GIC.

In short, this approach would enable the adherence to an accredited standard to fulfil the requirements of a current regulation. Two conditions would have to be met: 1) they must be developed by an organization that adheres to best-in-class international practices; and 2) most importantly, they cannot reduce the public's protections from unsafe products, under-performing services, or hazardous conditions.

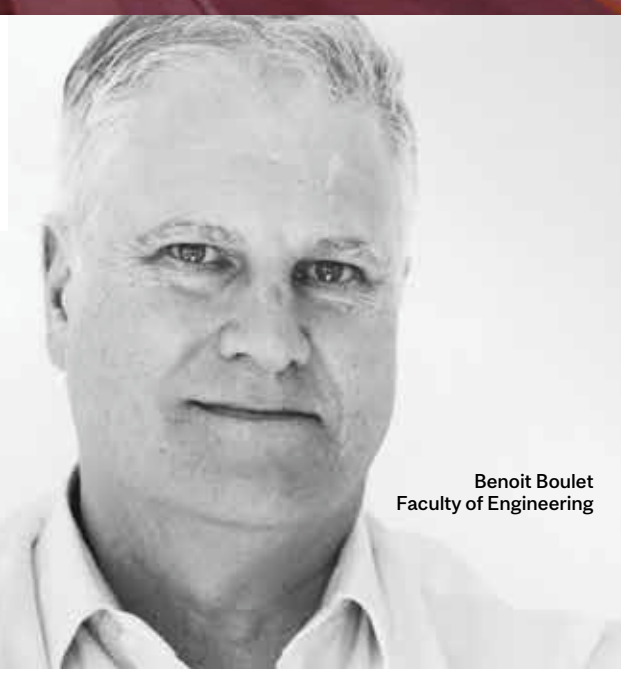
There is an urgent need for ongoing agile regulatory reform across our entire economy. It is critical if we want to encourage businesses—large and small—to innovate, invest, and achieve productivity improvements. Prioritizing regulatory agility is an exceedingly low-cost way for Canada to become a globally competitive market for innovators, while delivering affordability and protection to consumers.

Senator Colin Deacon was appointed to the Senate of Canada as a representative of Nova Scotia in June 2018 and has since been part of the Independent Senators Group. He currently serves as deputy chair of the Standing Senate Committee on Banking, Commerce, and the Economy.

The Hill Times

Our vision:

A clean and profitable transport sector



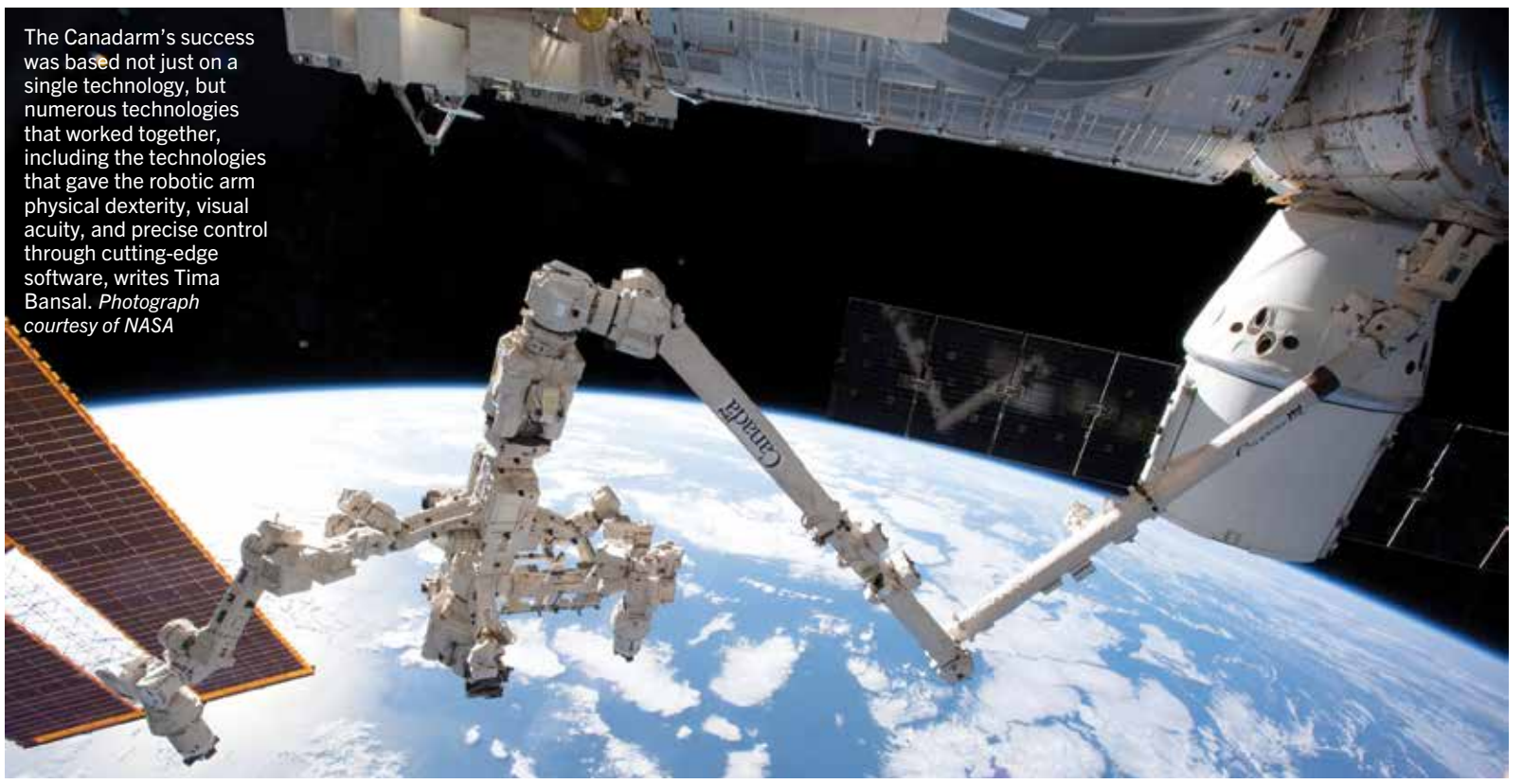
Benoit Boulet
Faculty of Engineering

Benoit Boulet believes that electrifying Canada's transport sector will create a healthier environment—and economy. His team is working with industry partners to electrify the heaviest transport trucks on the road, making them more efficient and affordable than ever.

McGill's researchers are driven by their vision of a sustainable future. Collaborating across disciplines and with partners, they are accelerating solutions for a greener, more prosperous world.

McGill

Discover the project:



The Canadarm's success was based not just on a single technology, but numerous technologies that worked together, including the technologies that gave the robotic arm physical dexterity, visual acuity, and precise control through cutting-edge software, writes Tima Bansal. *Photograph courtesy of NASA*

Corporations need to embrace a made-in-Canada approach to innovation

It is time for Canadian companies to recognize that we shouldn't be looking to Silicon Valley for inspiration, but we need our own brand of innovation that requires collaboration.

Tima Bansal

Opinion

When most Canadians think of the heartland of corporate innovation, they likely think of Silicon Valley. This is the home of creative destruction, failing fast and cheap, open innovation, and chasing moonshots. But, what's good for Silicon Valley is not necessarily good for Canadian business.

Most of Canada's GDP is generated in the extractives and manufacturing industries, which rely on physical capital and heavy industry. This is a far cry from the tech sector, where innovations can be simply bolted onto a platform technology (the internet) and each innovation sits almost independently of others. An improvement in one technology simply catalyzes improvements in another. A failure in one technology rarely affects others.

In Canada's heavy and manufacturing industries, numerous technologies form a complex array that support each other to perform sometimes a single function. And failures are expensive—not just financially, but potentially to human life.

Take the example of the highly successful Canadarm that supported numerous space missions. Its success was based not just on a single technology, but numerous technologies that worked together, including the technologies that gave the robotic arm physical dexterity, visual acuity, and precise control through cutting-edge software. Most companies excel at one of these technologies, not all. For the Canadarm to have succeeded, numerous technologies had to come together to support the overall function.

It is time for Canadian companies to recognize that we shouldn't be looking to Silicon Valley for inspiration, but we need our own brand of innovation—one that embraces the assembly of numerous technologies that require collaboration. These collaborations are not just with the usual suspects, such as suppliers and customers. They are also with competitors, local communities, NGOs, academics and governments.

Canadians are especially good at collaborating and working with others. We embrace diversity in all its forms. We are open to new ideas. And we are smart and creative.

How Canada's corporations will leapfrog Silicon Valley

This kind of systems-based collaborative innovation can be hard for policymakers and corporate leaders to understand. So, let me provide the example of Montreal-based Enerkem, a world leader in converting waste to biofuels and chemical products through an innovative gasification technology.

When Enerkem initially approached Suncor to fund the project, Suncor hesitated. To show the power of the gasification technology, Enerkem had presented Suncor the entire integrated waste-to-biofuels process in a commercial demonstration project. Enerkem had to pull together all the neighbouring technologies to demonstrate the power of their specific innovation. Suncor engineers, whose talents lay in process integration, focused on the flaws in the integrated process, such as potential equipment failures, weak standard operating procedures, and a projected operating capacity that far exceeded the actual capacity. But, when they came back for a second look, they spotted the magic in the machine: gasification.

Suncor saw the power of the potential partnership combining Enerkem's technology with their operational and technical expertise. In 2019, Suncor invested $50-million and worked with Enerkem engineers on process integration. In 2020, more partners jumped on board, including the federal and provincial governments, who collectively invested more than $230-million.

Enerkem is now well placed to scale their gasification technology—which is good for the planet and for its shareholders—on the world stage.

The Canadian approach to innovation needs to be about systems

As the founder and leader of Innovation North at the Ivey Business School, our team is co-creating a made-in-Canada approach to innovation—one that embraces systems innovation. A topflight management research team works with approximately 20 of Canada's leading innovative companies to apply systems thinking to corporate innovation.

At Innovation North, we believe that all corporate innovation needs to fit within a system of technologies, as well as social and ecological systems. We are developing a systems design process that will not only make Canadian corporations more creative, it will also innovate more sustainable products and services that are more profitable in the long run and contribute to more prosperous societies and healthy ecosystems.

Both Suncor and Enerkem understand systems thinking. They understand the importance of integrating technologies to perform a function and support societal and ecological systems. This type of thinking has catalyzed a powerful innovation that will divert waste from landfills and create an alternative to fossil fuels.

Some of the challenges that we at Innovation North are undertaking include partnering with the Co-operators Group to make homes more resilient to climate change-induced weather events; partnering with Neo Exchange and the Royal Bank of Canada to innovate a new financial instrument to stem biodiversity loss; and partnering with the agri-food industry in southwestern Ontario to foster the circular economy.

We believe that systems-based corporate innovation is the key that will unlock Canada's research and development talents. If done successfully, supported by governments and corporate leaders alike, such uniquely homemade innovation can springboard Canada's companies on the world stage.

Dr. Tima Bansal is a professor and Canada Research Chair at the Ivey Business School. She is also the founder and leader of Innovation North—an initiative that is applying systems thinking to corporate innovation—and the founder of the Network for Business Sustainability.

The Hill Times

Achieving Canada's EV mandates requires more money for research and future talent

Federal investment to support a pan-Canadian, academia-industry research consortium will complement the government and industry investments on the manufacturing side and set our country on the path to significant opportunities for EV innovation.

Narayan Kar & Madeline McQueen

Opinion

Last year, the Government of Canada was prompted to introduce an updated emissions reduction plan due to the ever-increasing greenhouse gas emissions. The plan outlines steps for the Canadian economy to achieve emission levels well below that of 2005, by 2030. One of the steps in the plan is implementing "cleantech," technology that aims to improve environmental sustainability, to the largest pollutant emitting industries in the country, including the transportation sector.

Transportation is responsible for 25 per cent of greenhouse emissions in Canada, while 11 per cent is from passenger vehicles alone. To reduce these figures, the government has mandated that 20 per cent of new vehicles sold in Canada must be electric vehicles (EVs) by 2026, 60 per cent by 2030, and 100 per cent by 2035. The automotive industry is responding to these mandates by producing more EVs than ever before. However, many Canadians are still unconvinced by the cost, driving range, and available charging infrastructure, despite the fact the government is providing incentives for the public to make the switch to EVs. Therefore, to overcome the limitations and alleviate the public's concerns, there is a need for further research and innovation to advance EV technology and achieve the government's desired objectives.

Although there have been significant investment in EVs and EV component manufacturing by industry, with supportive investments from governments over the past couple of years, we currently do not have enough of the specific know-how and talent pipeline in most areas of EV technology. A knowledgeable workforce is crucial to the success of new investments and manufacturing facilities. For example, the new Stellantis EV research and development (R&D) facility and LG Energy Solutions' EV battery plant currently being built in Windsor, Ont., will require nearly 3,000 engineers, technicians, and plant operators, necessitating the creation and training of more local technical talent.

Therefore, on top of the investments being made in manufacturing facilities to support the EV mandates, there must be a proportional investment in R&D at universities and colleges. Academic investments create opportunities for innovation, allow for collaboration with industry to advance technology, and most importantly, train future generations of researchers, engineers, and technicians. An example of an academic institution working closely with industry is the Centre for Hybrid Automotive Research and Green Energy (CHARGE) at the University of Windsor. This advanced EV lab collaborates with many automotive industry partners and other academic institutions to train future experts in a hands-on learning environment.

Canada has seen significant investments relating to EV batteries over the last year. In addition to having strong battery and battery component supply chains, improvement in electric motor, power electronics, and control supply chains are also required. Localized supply chains provide great potential for commercialization and economic benefits and will support EV manufacturing. Canada has unique competitive advantages in future EV supply chain development with our 100-plus-year experience in automotive innovation and manufacturing. As well, all minerals and metals required to produce EV components can be found in Canada. However, our future workforce will need to be trained in design and manufacturing of EVs, and in sustainable ways to extract the precious resources needed to produce them.

Industry, government labs, and academic institutions are very keen to produce research breakthroughs in the areas of an electric vehicle's battery, powertrain, and software. These are the most expensive components in an EV and are also the ones in need of the most development, as without them, you don't have an EV. Some specific examples of future innovation in battery and powertrain areas include power or energy density improvement, enhanced thermal management for improved performance and durability, and cost and weight reduction. On the software side, better control and energy efficiency improvement through artificial intelligence and machine learning algorithms are required.

A federal investment to support a pan-Canadian, academia-industry research consortium will complement the government and industry investments on the manufacturing side and set our country on the path to significant opportunities for EV innovation in the future. The consortium can help improve battery longevity, electric motor performance, thermal management, automotive cybersecurity, and develop solutions for EV lightweighting and battery crash safety. This will help Canada become a leader in EV design and manufacturing, while working towards achieving public EV trust and the government's emission reduction goals.

Dr. Narayan Kar is a professor within the electrical and computer engineering department at the University of Windsor, where he also holds Tier 1 Canada Research Chair position in Electrified Vehicles. He is the director of the Centre for Hybrid Automotive Research and Green Energy (CHARGE) Lab at the University of Windsor. Madeline McQueen is the research and development engineer at CHARGE.

The Hill Times

Canada can become the international low-carbon innovator of choice

Canada brings more to the table than natural resources and a peaceable temperament, because its research strengths include the full panoply of needed disciplines.

Martha Crago & Benoit Boulet

Opinion

The war in Ukraine has made energy security top of mind for countries such as Germany. As leaders look for alternatives to Russian oil and gas, many also see an opportunity to accelerate the transition to clean energy and meet commitments to reduce emissions.

This heightened urgency to decarbonize economies is great news for Canada. Our country boasts abundant mineral reserves, needed for a world in which electricity will be king, as well as the environmental and labour standards to extract them ethically. We have a peaceful, trustworthy reputation on the global stage—an asset becoming more and more valuable as countries feel vulnerable.

Realizing the opportunities, the prime minister and the minister of innovation, science, and industry have been making the most of Canada's newfound allure, seeking out strategic new economic partners. The federal and provincial governments have been strengthening economic clusters centred on the energy transition. For example, the Vallée de la transition énergétique in Bécancour, Que., focused on the battery sector, has attracted both multinational giants such as BASF and General Motors, as well as made-in-Quebec enterprises.

As Canada courts investment, we must also think about building our attractiveness as a research and innovation partner—and that is where our universities add substantial value to the innovation ecosystem. In short, we must do more than become a *supplier* of choice; we must also become a global *innovator* of choice across the supply chain needed to build the low-carbon economy.

Canada brings more to the table than natural resources and a peaceable temperament. Its research strengths include the full panoply of needed disciplines: smart grids, microgrids, next-generation batteries and cells, electric vehicle development, new sustainable materials, renewable energy technology, vehicle automation, sustainable mining, battery recycling, and more. For example, McGill engineering professor Jeffrey Bergthorson has been working with Siemens Energy at advancing metal-water reactors, which burn metals to create hydrogen as well as to create heat that could be used to generate cheap, carbon-free electricity.

Canada must build on our strong research foundation and strengthen its capacity to create new international partnerships across the research, development, and innovation (R, D & I) cycle. To do so will require timely, targeted investment.

First, we need to dramatically increase our pool of highly skilled personnel so Canadian companies have the workforce needed for expansion. The government should create internationally competitive stipends to attract and retain more than 500 graduate students in fields related to clean technology, critical minerals, and automotive and battery supply chains. In a red-hot global market for talent, the dollar value of fellowships for students will need to exceed $50,000 net, after tuition is paid. These students would be trained in partnership with industry, preparing them to tackle critical industrial challenges.

Secondly, Canada needs funding to quickly connect researchers from university, industry, and government across the nation in the areas related to the energy transition. The mechanism needs to be selective, to build on existing industry relationships, and to provide adequate funding to enable real advances. Bringing Canada's R, D & I talent together will allow us to respond rapidly to emerging opportunities for international partnerships and strengthen our attractiveness.

Finally, we need the ability to create bilateral large-scale projects involving collaborations between post-secondary institutions and industry in Canada and in like-minded countries, collaborations that address urgent energy transition needs. Funding mechanisms could include a significant expansion of existing programs, new funding programs, or a network of centres of excellence between Canada and its chosen partner. Here, the Nov. 30, 2022, announcement that the government is entering into formal negotiations for close collaborations under Horizon Europe is welcome.

Driven by the war in Ukraine and very public commitments to rapidly lower emissions, countries are developing their low-carbon economies at a breakneck pace. Canada has the assets needed to thrive. But to lead, we must quickly put in place the necessary measures to attract and retain talent and build international R, D & I partnerships.

Martha Crago is the vice-principal, research and innovation, at McGill University and an internationally respected adviser on university research and partnerships. Benoit Boulet is the associate vice-principal, innovation and partnerships, at McGill University and an expert in the design and control of electric vehicles and green energy systems.

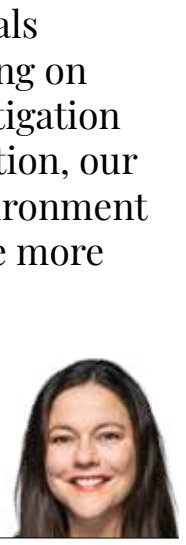
The Hill Times

The effect of climate crisis on Canadian coastal communities is an all-hands-on deck situation, but the Liberals aren't acting

If the Liberals keep delaying on disaster mitigation and prevention, our coastal environment will become more hostile.

NDP MP Lisa Marie Barron

Opinion



Members of the Canadian Armed Forces respond to Nova Scotia's request for assistance with relief efforts in the aftermath of Hurricane Fiona in September 2022. *DND photograph by Corporal Connor Bennett*

We are in a climate emergency and Canadians are already experiencing unprecedented and destructive weather events. In my riding alone, many coastal communities are seeing these devastating effects.

Hurricane Fiona's destruction on the East Coast was a shocking example of the consequences of more frequent and extreme weather events. Homes were dragged out to sea, small craft harbours decimated, and communities left without power.

On the West Coast, people are seeing similar tragedies, with harsh flooding and rising water temperatures.

As a parent, I'm beyond worried about the future we are leaving for our children.

Canada has an opportunity now to rebuild more sustainable weather resistant infrastructure and plan for the future. But advances in the blue economy will depend on good climate resilient infrastructure that meets the needs of coastal communities. The Liberal government needs to be investing in this critical infrastructure instead of dragging its feet on climate protections.

Right now, the Liberals' lack of a plan for disaster mitigation means that people's livelihoods are in jeopardy. The scale of damage caused by Hurricane Fiona is significant, and people are worried harbour repairs won't be completed in time for this year's fishing season. On the West Coast, flooding has caused devastating personal and economic losses because of highway and railway closures.

Coastal and Indigenous communities, workers, and all Canadians are anxious about the future of our marine environments, their jobs, and their safety. This is a situation that will only get worse without disaster funding.

The key is readiness—maintenance, and prevention, which is less expensive than repairing damage. Researchers are already indicating that droughts, floods, and storms could cost Canada more than $100-billion by 2050.

With the current situation, there is a need but also an opportunity for fishers, all levels of government, and industry to innovate together to create real solutions for our changing environment. The Blue Economy Strategy has two critical goals: protecting the natural environment and fostering a stronger business environment. This is an opportunity to do both at once, and it should not be wasted.

Firstly, small craft harbour overhauls and modernization is needed—wharves need to be built higher, breakwaters need to be thicker, and more investments in resilient gear must be made. But beyond this, there is tremendous room for innovation.

Adaptation, research, and development are the way of the future and it's time Canada starts heading in this direction.

As change and innovation happens, we must make sure the government and other stakeholders consult with those who live and work in coastal regions. Communities need clear and timely transition plans, developed with public input. But right now, it seems that the Liberals' involvement or distribution of information to those affected by coastal planning and policy is only an afterthought.

It's time to change this approach and instead listen to fishers and act quickly.

When independent fishers speak, they are doing so with generations of accumulated knowledge on their communities' infrastructure needs. It would be wise to listen.

As with many climate-related avenues, the window open to us now will not last forever. The Liberal government is in a position where it clearly sees what is coming—and an ounce of prevention is worth a pound of cure. If the Liberals keep delaying on disaster mitigation and prevention, our coastal environment will become more hostile.

We can innovate now, in preparation for harder times ahead, or we can attempt to innovate under increased pressure, at a disadvantage, in the middle of those hard times.

The Blue Economy Regulatory Review provides a real opportunity to look at ways that we can encourage growth and innovation in climate preparedness. And now more than ever, the past year has taught us the importance of being prepared. Our coastal communities know that the climate crisis is an all-hands-on-deck situation; it's time to treat it like one.

MP Lisa Marie Barron represents the riding of Nanaimo-Ladysmith, B.C., and is the NDP critic for fisheries, oceans, and the Canadian Coast Guard. Being born on the East Coast, and raising her children on the West Coast, she has a deep appreciation for marine habitats. She values the importance of Canada's blue economy, as well as the need for conservation efforts.

The Hill Times

The Government of Canada is advancing Canada's position as a global leader in innovation

It has become clear that we can't keep doing things the same old way; we need to make sure Canadians benefit from their own ingenuity.

Liberal MP Andy Fillmore

Opinion

Canadians are innovative, taking on challenges and coming up with inventive ways to solve them. Consider insulin, road lines, the paint roller, or the Java programming language: Canadians have great ideas.

It has become clear that we can't keep doing things the same old way; we need to make sure Canadians benefit from their own ingenuity. We know that we have to make a different kind of investment and work with industry in a new, collaborative way. In short, we need to innovate.

That is why our government fundamentally shifted Canada's innovation landscape with the launch of the Global Innovation Clusters and Innovative Solutions Canada. These two programs are reshaping how our nation supports—and benefits from—our own good ideas.

The Global Innovation Clusters are driving innovation across the country in five areas where Canada has a significant competitive advantage: digital technologies, plant-based protein industries, next-generation manufacturing, artificial intelligence and supply chain logistics, and the ocean economy. These clusters are the Government of Canada's co-investment with industry to continue building ecosystems that accelerate innovation and take innovators further, faster through collaboration.

Canada's Ocean Supercluster is a prime example of how this approach generates success, tapping into the combined strengths of the small, medium, and large enterprises operating in Canada's oceans and forming partnerships to develop innovative projects and solutions that enrich the lives of all Canadians. The Ocean Cluster has approved more than 70 projects worth more

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In November 2022, Innovation Minister François-Philippe Champagne announced more than $1 billion in funding to support scientists, researchers, and students, but only about 20 per cent (generously) will get tenure track positions, writes Sarah Lubik. *The Hill Times photograph by Andrew Meade*

The Valley of Never-Having-Lived: Canada's innovation talent problem

In Canada, we celebrate how we support companies, but in reality, our innovation system is structurally and culturally stacked against entrepreneurial scientists from the start.

Sarah Lubik

Opinion

As Canadian policy and investment encourages more innovative startups, we constantly hear about the "valley of death": the point where a startup has some momentum but struggles for market traction. We hang lofty hopes on research-based startups getting past this to solve global challenges and grow into scalable companies. However, focusing on the valley of death will keep us ignoring a valley in even greater need of bridges: The Valley of Never-Having-Lived. This is where potentially world-changing startups and entrepreneurs never get the chance to realize their potential.

In Canada, we boast about the science-based companies that have grown to make substantial impact, including: AbCellera, behind solutions used to treat COVID patients, and STEMCELL Technologies, Canada's largest biotech firm. Such companies usually stay in Canada, create jobs to keep and attract talent, and provide Canadian solutions to pressing global challenges. We celebrate how we supported these companies, but in reality, our innovation system is structurally and culturally stacked against entrepreneurial scientists from the start. This begs the question: *how many transformative ideas never got the chance to live?*

The federal government recently announced investments of more than $1-billion into world-class research, graduate students, and post-doctoral researchers. But of these highly educated people working on transformational research, only about 20 per cent (generously) will get tenure track positions, and yet we train them as though they all will. Consequently, the remaining 80 per cent will pursue other careers, often with limited preparation in how to effectively apply their talents in industry, government, and other organizations, and end up changing careers without support. The failure to fully realize this potential represents a substantial loss of the full impact of that massive investment in talent, and ensures that the ideally placed people to take our research forward don't have the opportunity or skills to do it. Just as tragic, when we lose those highly skilled people from their own fields instead of helping them move into relevant positions in entrepreneurship or industry, we also undermine our national capacity to absorb innovation into industry, further weakening our return on Canada's substantial investment in research.

We need to realize this is a people problem before it's a venture problem. Many of these highly educated graduates have the tenacity, drive, and passion needed to be an entrepreneur or intrapreneur, but are not taught to communicate the potential of their science to broader audiences, or how to create a compelling plan for impact. They are rarely socialized to regard entrepreneurship or industry as an attractive path and, even if they are, they are often juggling their studies and several jobs to make ends meet, so lack the opportunity to focus or even try.

Addressing these challenges requires a bridge over that valley and accessible on-ramps. In the national Mitacs Innovation to Innovation (i2I) program, research graduate students, post-docs, and faculty members from any university in Canada learn to develop an entrepreneurial mindset, learn to translate between science and business, and link into national networks of mentors. During the program, Dr. Ben Britton, co-founder of rapidly growing clean-tech venture Ionomr, learned to explain how their membranes would change the fuel cell industry for partners and investors. NanoSentinel's founder, Dr. Viridiana Perez, like many female scientist-entrepreneurs, didn't realize she was an entrepreneur until i2I. She pursued training first but began to identify as an entrepreneur later. Many others do not get an opportunity to participate or focus where stipends, internships, and post-docs could yield incredible returns. In Simon Fraser University's entrepreneurship Co-op (eCo-op) program, cleantech startup Moment Energy's student founders were given non-dilutive $10,000 awards to spend a few semesters on their venture. With minimal investment, they pivoted into a cleantech company now working with Nissan and Mercedes-Benz.

These experiences show the incredible potential in front of us to catalyze an exponential return on Canada's investment in research and highly educated people by investing in targeted, insightful pathways, programming, and removing barriers for entrepreneurial scientists. With an early focus on people, Canada's innovation ecosystem could ensure that the next transformative science-based venture not only gets the chance to live, it gets set up to thrive.

Dr. Sarah Lubik is an award-winning researcher, ecosystem-builder, and educator focusing on developing the entrepreneurial mindset and supporting science-based innovation. She is the executive and academic director of the Charles Chang Institute for Entrepreneurship at SFU and the academic director of the national Mitacs invention to Innovation (i2I) Skills Training and i2I programming at SFU.

The Hill Times

Canadian innovation lacks forward thinking

If Canada focused more on the merits of the individuals who they are putting in charge and less on giving themselves diversity and climate change scorecards, perhaps we could get back to using the greatest public service I have ever known.

Aman Chahal

Opinion

The challenge with Canada's innovation agenda is that it is all execution and no planning.

Billions of dollars have been deployed through agencies promoting cleantech development and innovation support with nothing meaningful to show for it. While one may want to blame some malicious scheme at the heart of the matter, the truth remains quite simple: the challenges of bias in the workplace compounded by the motivation to gain voters makes the Canadian government incredibly incompetent.

We love hearing the loud, obnoxious, cocky, and incredibly underqualified person in the room set the direction, right?

I have personally sat in rooms where marginalized founders gave the most eloquent of presentations to ask for government funding. They were decorated with degrees and experience, but were told they "just didn't have it."

Meanwhile, people who manage places like Sustainable Development Technology Canada (SDTC) created a "seed" fund that doesn't give out money at the seed stage.

To be honest, I don't really care that those organizations are basically pushing all the money out the door to people who do not deserve it. I also would not care that they could, just as easily, send that money to the marginalized founder and make more of an impact. It does not even matter to me that their bonuses are tied to how much money they spend, not fund performance.

My problem is this: it is just so embarrassing. I could deal with being discriminated against. But if Business Development Canada is going to create the affirmative action "fund" for female entrepreneurs, can they also publish the list of male founders they are funding through all their other funds? The marginalized founders could try to become co-founders at those companies.

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A combination of advances is making 5G a major element in countries' digitalization strategies, upon which their prosperity increasingly depends, writes Martin Cave. *Unsplash photograph by Paul Hanaoka*

The U.K. spectrum policy is keeping wireless prices low—can Canada do the same?

Canada risks an inadequate supply of spectrum that may limit competition for 5G services, drive up both spectrum and 5G service prices, and delay access to a very significant new technology.

Martin Cave

Opinion

A group of economic consultants recently calculated that between 2010 and 2020, average smartphone speeds in advanced countries increased by 100 times, and data consumption per mobile subscriber went up 90 times. Quality-adjusted prices fell by similar amounts. It is thus not surprising that the importance of the mobile sector to economic prosperity is recognized by governments, companies, and households.

In mobile technology, the last decade belonged to 4G. We are now in the era of 5G. In one sense, 5G is just a better version of 4G, based on a new technology which provides faster and cheaper internet access to all mobile users. In a more important sense, it is transformational. Its data capacity is huge; and it is versatile, in that a single network—its operation now largely transferred to the cloud—can be "sliced" to provide a range of different services in terms of speed, latency, and other characteristics. This combination of advances is making 5G a major element in countries' digitalization strategies, upon which their prosperity increasingly depends.

Clearly, the availability of spectrum is a precondition for the development of 5G, and the focus internationally has been on the 3.4-4.2 MHz range. Spectrum is the radio waves on which data travels, and getting this out and used in an efficient way is essential to the development of new services.

The norm for allocating spectrum is to auction it. Best practice is to get it out quickly: the sooner the spectrum is available, the sooner 5G can start. Most advanced countries have done so, starting as far back as 2018.

Another key choice is the amount of spectrum made available. Essentially, where more spectrum is available, the lower the auction clearing price will be. Some governments have restricted the offer in certain auctions to enhance auction revenues. But the alternative spectrum policy of "pile it high and sell it cheap" is likely to confer more benefit on customers and even on the government itself (through higher growth and tax revenues).

I have looked at the release of spectrum for 5G in Canada and the United Kingdom. The U.K. was quick out of the blocks in 2018, auctioning a mid-band (3.4-3.6 GHz) spectrum formerly used by the U.K. Ministry of Defence. After bidding for the 150 MHz of spectrum, all four existing mobile network operators gained between 20 and 50 MHz. With previous holdings, that left each of them with at least 40 MHz: the sole new entrant left empty-handed.

In the second 2021 mid-band (3.6-3.8 MHz) 5G auction, three operators came away with 40 MHz each. This left each operator between 80 and 100 mid-band MHz. Each nearly has the 5G holding recommended by the International Telecommunication Union. The prices per MHz per population have been calculated to be US$0.16 in 2018 and US$0.09 in 2021. Thus, each of the four operators got their hands on a good holding at a low spectrum price, which was consistent with expectations of competitive 5G service prices.

Things have gone differently in Canada, where the only mid-band auction to have taken place so far was not held until July 2021, when 200 MHz of mid-band spectrum were assigned. But 89 MHz of this already sat with three large mobile operators. Of the remaining 111 MHz, 47 MHz were reserved for regional carriers' mobile providers. This left the three national operators competing for 64 MHz. Hardly enough to meet Canada's needs.

This scarcity led to keen competition among them and high prices—US$1.12 per MHz per pop (respectively seven and 12 times higher than the prices which were observed in the U.K.). Such high prices may foreshadow higher service prices when the networks are in place. It is true that more spectrum is on the way, but it won't be available in cities until 2025 or rurally until 2027.

The two countries also differ in their enthusiasm for set-asides, or reserving spectrum at auction for new or smaller operators. Canada has a history going back many years of using set-asides, as described in my co-written 2010 paper for the CD Howe Institute, "Solving Spectrum Gridlock." In my view, international experience shows it is quite difficult to promote entry or growth of small operators via set-asides. The cost in terms of lost opportunities of assigning valuable spectrum to this purpose should be subject to a rigorous risk analysis which takes full account of valuable spectrum being "sterilized" for years in the control of failing smaller operators.

In Canada, there is a risk that an inadequate supply of spectrum may limit competition for 5G services, drive up both spectrum and 5G service prices, and delay Canada's access to a very significant new technology.

Sir Martin Cave is a visiting professor at the Imperial College London. He was an academic co-director at the Centre on Regulation in Europe and is now a member of the board of directors. He is a regulatory economist specializing in competition law and in the network industries, including airports, broadcasting, energy, posts, railways, telecommunications, and water.

The Hill Times

The Government of Canada is advancing Canada's position as a global leader in innovation

The Liberal government fundamentally shifted Canada's innovation landscape with the launch of the Global Innovation Clusters and Innovative Solutions Canada, two programs that are reshaping how our nation supports—and benefits from—our own good ideas, writes Andy Fillmore. *Photograph courtesy of Unsplash*

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than $360-million. These projects are delivering more than 120 new made-in-Canada ocean products, processes, and services to sell to the world. Together, these projects are positioning Canada as a leader in the blue economy and are expected to generate thousands of jobs for Canadians.

Across all five clusters, the numbers tell us that this approach is working. The Global Innovation Clusters have exceeded expectations, approving more than 500 projects worth more than $2.24-billion—$1.4-billion from industry and other partners, which involved almost 2,400 partners, more than half of which are small and medium-sized enterprises (SME). More than 8,000 members can connect with like-minded peers, drawing on expertise and resources, to shape projects that will have an undeniable impact on the everyday lives of Canadians. More than this, the clusters are on track to meet or exceed the overall job creation target of 15,000 direct, indirect, and induced jobs by 2023, and 50,000 by 2028.

To keep building momentum, the government is doubling down with another $750-million over six years for the Global Innovation Clusters, as announced in Budget 2022.

Complementing this, Innovative Solutions Canada is delivering strong results that benefit Canadians. The program is designed to take advantage of the government's capacity as the largest purchaser of goods and services in Canada (roughly $22-billion annually) to support the growth and scale-up of SMEs.

Innovative Solutions Canada supports commercialization through two streams: the Challenge Stream, where companies respond to departmental challenges for their early-stage research and development (R&D) needs, and the Testing Stream, where they can test their last-stage R&D with a department. The program's Pathway to Commercialization gives selected companies the opportunity to sell their innovation directly to the government without further competition.

As of January 2023, Innovative Solutions Canada's Challenge Stream has issued more than 330 awards for funding. And since 2010, its Testing Stream has awarded almost 705 contracts valued at more than $372-million, enabling hundreds of Canadian SMEs to commercialize their innovations and create high-value jobs.

Together, these programs are supporting the advancement of economic outcomes for Canadians. The Global Innovation Clusters are building partnerships and developing technologies that will have applications around the world, opening up big markets for homegrown innovations, while Innovative Solutions Canada is helping Canadian SMEs advance and commercialize their R&D.

Both programs create well-paying jobs for Canadians, help companies scale up, and position Canada as a global innovation leader.

They are also positioning Canada to succeed in the economy of the future and in global markets. All Canadians will benefit from their continued success.

Andy Fillmore is the Member of Parliament for Halifax and parliamentary secretary to the minister of innovation, science, and industry. First elected in 2015, he has held numerous roles in government including parliamentary secretary for Canadian heritage, for democratic institutions, and for infrastructure and communities.

The Hill Times

Canadian innovation lacks forward thinking

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We all have biases about something. But certain biases leave us all paying the price. I would love to see an analysis for how many people left SDTC following its many "restructurings" that shows how many degrees and years of experience walked out that door. If I could venture a guess, you would find people from all walks of life on that list.

Bias operates at every level of the Canadian decision-making agenda.

In 2017, the House Standing Committee on Industry, Science, and Technology chaired by then-Liberal MP Dan Ruimy submitted to the government one of the best-articulated policy papers on intellectual policy. It was a policy masterpiece. That entire report was overruled because in reality, politicians rely more on a handful of biased "industry experts." This shortsightedness has led to a focus on patenting only IP policies in Canada giving rise to organizations such as the Innovation Asset Collective. Granting agencies like SDTC then push companies to pay for ineffective advice from these organizations. No real checks and balances.

If Canada focused more on the merits of the individuals who they are putting in charge and less on giving themselves diversity and climate change scorecards, perhaps we could get back to using the greatest public service I have ever known.

Those of us consulting with the real experts, actual Canadians and the general "non elite," are a bit tired of the political messaging. This mess was made by reactionary execution, not researched public policy. No one cares about the scorecards. You can't actually reduce emissions by projecting greenhouse gases saved. Those technologies must be commercial if we are to save this planet.

How is it even possible that Ottawa is a half-hour flight from Bay Street, but there are zero master of business administration (MBA) programs from the three most finance-focused MBA schools in Canada working to advise on funds? Just because we are giving out a grant does not mean most of your companies are successful, because most of the companies in normal funds fail. Am I the only one who studied at school?

Three things that can be done now to increase efficiency of all government "innovation" funding programs:

1. Create an independent ombudsman that can review complaints about decisions made by granting agencies;
2. Create an independent whistleblower line for all government agencies; and
3. Do a review of which individuals have been "acting" in high-level roles for more than six months.

Make all complaints anonymous and justify why.

Welcome to innovation.

Aman Chahal is the industrial professor for innovation and entrepreneurship at the faculty of mechanical engineering in the University of Alberta. Currently working on building an incubator to promote commercialization of research on campus, her specialization is in identifying commercialization barriers in the cleantech field and finding innovative business models to increase adoption. She worked in Ottawa in the innovation and cleantech field from 2016-2018.

The Hill Times

INNOVATION

Uncertain economic times call for modernized federal SR&ED program, say lobbyists

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Uncertain economic times call for modernized federal SR&ED program, say lobbyists

Innovation advocates eagerly await a review to modernize the federal science research and development program, as promised in the 2022 federal budget

BY JESSE CNOCKAERT

Revised eligibility requirements and a simplified application process are among the big asks by advocates anticipating a review to modernize a major federal tax credit system supporting innovation.

The Liberal government committed to undertaking a review of the government's Scientific Research and Experimental Development (SR&ED) program in the 2022 federal budget released on April 7. A date for commencing the review has not yet been announced.

The SR&ED program, which provides tax credits and refunds to corporations, partnerships or individuals who conduct scientific research or experimental development, is outdated and in need of reform to be more 21st century compatible, according to Nick Schiavo, the director of federal affairs for the Council of Canadian Innovators (CCI), a tech industry lobby organization.

"I think the biggest change that we're really advocating for with SR&ED is to allow the cost of generating and protecting IP, or intellectual property … to be considered for eligibility," he said. "We know that in 2022 … in a very database economy, this is where wealth stems from. As it stands, there isn't the ability for Canadian entrepreneurs to claim this within SR&ED. That is a major weakness, I think, in Canada's innovation pipeline."

Innovation François-Philippe Champagne, pictured Sept. 21, 2022, on the Hill. Revised eligibility requirements and a simplified application process are among the big asks by advocates anticipating a review to modernize a major federal tax credit system supporting innovation. *The Hill Times photograph by Andrew Meade*

To get ahead of a possible review of SR&ED, the CCI released a policy brief on Sept. 21 containing a list of six recommendations for how to improve the program, which were shared with government officials at Finance Canada, the Canada Revenue Agency (CRA), and Innovation, Science and Economic Development Canada, according to Schiavo.

First on CCI's list is a recommendation to broaden the definition of eligible expenditures under the SR&ED related to intellectual property (IP).

To help prevent ideas from being stolen, Canadians innovators may protect their IP through means including trademarks, patents, industrial designs and copyrights. The SR&ED program currently helps companies with the cost of IP protection on technology, but CCI's advice is that the SR&ED expenditure list should provide broader coverage by including the preparation and examination phase of generating patents.

Broadening the eligibility for IP coverage is important because Canadians are facing uncertain economic times, according to Schiavo. The CCI policy brief argued that domestic companies may move projects out of Canada without greater support for the commercialize of new IP.

Schiavo said there is a sense of urgency to help Canadian entrepreneurs to innovate, scale, and to compete globally.

"SR&ED isn't just a tax policy. It's really a vehicle for Canadian companies to expand their offerings, but also generate that wealth that flows to Canadians, [but] only if they have the ability, though, to protect that IP," said Schiavo. "For us, it is critically important to our members and to scaleups across Canada. We've been waiting many years for this. We wanted to really get out of the gate and lay those recommendations in front of government as soon as possible."

The 2022 federal budget stated that the government would consider adopting a "patent box regime" to help encourage the development and retention of IP stemming from research and development. A patent box is a tax regime that provides a lower tax rate for some kinds of income derived from certain forms of IP.

"A patent box regime really, at its core, is ensuring that Canadian companies who are developing innovation are taxed at a lower rate. The idea is to stem IP leakage from leaving the country and enhance Canadian companies to keep their operations here in Canada, instead of offshoring somewhere else," said Schiavo. "I think the real message we're trying to get through there is that we need a dedicated patent box regime or program that's administered by the CRA, with its own dedicated team and its own thought-out process, as opposed to tacking it on to SR&ED as an afterthought."

The SR&ED program is the single largest federal program that supports business research and development in Canada, and provides more than $3-billion in tax incentives to more than 20,000 claimants annually, according to the federal government website.

As the cornerstone of Canada's innovation strategy, the SR&ED program needs to do more to drive business expenditures on research and development, according to the CCI policy brief. Canada's potential to be a leader in innovation "has been stifled" due to low spending on research and development. Canada's business enterprise expenditure on research and development is the lowest among G7 counties,

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Nick Schiavo, director of federal affairs for the Council of Canadian Innovators, says the federal government's SR&ED program is 'a vehicle for Canadian companies to expand their offerings,' but only if they have the ability to protect their intellectual property. *Photograph courtesy of Nick Schiavo*

Robert Asselin, senior vice-president of policy at the Business Council of Canada, says prioritizing larger firms in the federal SR&ED program could result in greater economic benefits. *Photograph courtesy of Robert Asselin*

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Innovation Policy Briefing

Now is the time for Canada to lead in fostering global research collaborations that drive innovative solutions to grand challenges

The COVID-19 pandemic has also brought building domestic resilience to the forefront of many national agendas, writes Ted Hewitt. *Image courtesy of Pixabay*

We must continue to inspire and create new ways of thinking and novel ideas that help us better understand and solve multi-dimensional grand challenges, benefitting not only Canadians, but also citizens worldwide, and cementing Canada's reputation as a preferred and trusted research leader and partner.

Ted Hewitt

Opinion

Countries around the world clearly understand the close connection between strong research, development, and innovation efforts and national economic growth, prosperity, and competitiveness. The COVID-19 pandemic has also brought building domestic resilience to the forefront of many national agendas.

At the same time, however, in the face of climate change, food insecurity, health crises, and international security, many countries recognize the urgent need to strategically pool our efforts and resources globally. We must better understand the many dimensions of these grand challenges before we can develop innovative and effective solutions that benefit us all.

Innovation, after all, very frequently occurs when insights from diverse research disciplines, countries, cultures, political systems, and knowledge systems come together. No country, discipline, or culture has the monopoly on new thinking. More opportunities for novel ideas and approaches can result from a range of collaborations across different and unique actors and areas.

There is a growing recognition that international interdisciplinary research is the key to understanding and developing innovative solutions to grand challenges such as climate change. Insofar as people are at the heart of both the challenges we face and any possible solutions, the social sciences and humanities have a key role to play in this process, as they provide the crucial questions, data and universal insights into human behaviour and societies. They also help us anticipate how collectively we will respond to change in a fast-changing world.

So, how can we encourage and mobilize challenge-focused international multidisciplinary research? Canada is already a leader in creating and investing in innovative research funding mechanisms and global research platforms. The mechanisms offer a variety of support that act as a catalyst for fuelling research ideas and collaborations. Take, for example, the circular economy, an alternative and emerging economic model to support actions for sustainable development in Canada. This topic emerged as an area for significant research potential through various knowledge synthesis grants offered by the Social Sciences and Humanities Research Council beginning in 2016. Grant holders such as Geoff McCarney at the University of Ottawa's Smart Prosperity Institute have leveraged insights from their reports on the circular economy to go on and develop national and international research collaboration by leveraging additional funding through a range of partnership grants.

Canada has also led the global development of the United Nations Research Roadmap for COVID-19 Recovery. The roadmap calls for innovative, interdisciplinary solutions and strengthened global collaboration, acknowledging the interdependence of people and recovery efforts, to achieve transformative change. It emphasizes that gender equity and environmental sustainability must be firmly rooted in all endeavours.

To support projects that directly address the roadmap's research priorities, the Canada Research Coordinating Committee (CRCC) launched a special call through its innovative New Frontiers in Research Fund (NFRF). The $24-million funding opportunity aims to mobilize Canadian-led international research teams in support of a more equitable, sustainable, and resilient post-pandemic reality. The CRCC will announce the results early next year and will share the knowledge generated globally.

In addition, Canada, through the Social Sciences and Humanities Research Council, is a co-founder of the Trans-Atlantic Platform for Social Sciences and Humanities, a consortium of leading research funders across Europe and the Americas focused on supporting international co-operation, enabling interdisciplinary collaboration, and promoting awareness of the crucial role of multidisciplinary research in addressing 21st century challenges. Responding directly to the UN Roadmap, its last joint call on post-pandemic recovery focused on investigating, in depth, the medium-and long-term effects of the pandemic on all aspects of health, social, economic, political, and cultural life.

At SSHRC, we are seeing the results of fostering international research collaboration through a diversity of innovative funding mechanisms. Between 2017 and 2021, some 2,125 Insight and Connection grants featuring 5,914 international co-applicants/collaborators, were awarded, valued at close to $398.5-million. During the same period, 344 projects featuring 1,135 distinct international partners and valued at $225-million were awarded through Partnership Grants. And finally, between 2018-2021, 217 grants, featuring 456 co-applicants and collaborators with an international affiliation, valued at $56.5-million, were awarded through the NFRF program noted above. In total, these investments have supported some 2,683 projects, featuring 7,505 international partners/collaborators/co-applicants, valued at $680.4-million—an important indicator of the potential for Canada's research capacity to lead on the global stage.

Early next year, through the CRCC's NFRF competition, Canada will lead the world once again in supporting further interdisciplinary research on sustainability. In partnership with countries such as South Africa, the United Kingdom, and the United States, NFRF's International Joint Initiative for Research in Climate Change Adaptation and Mitigation will focus on research supporting communities that are most affected by climate change, including Indigenous communities in the North. This initiative will seize the opportunity for the development of mitigation measures, rapid upscaling of adaption approaches and tactics to ensure action and implementation. It will mobilize the full spectrum of Indigenous leadership, participation and knowledge systems.

Led by Canada's research funding agencies and the CRCC, these are just a few examples of Canada's leadership and participation in international research opportunities and platforms. But we know we must do more. We must continue to inspire and create new ways of thinking and novel ideas that help us better understand and solve multi-dimensional grand challenges, benefitting not only Canadians, but also citizens worldwide, and cementing Canada's reputation as a preferred and trusted research leader and partner.

Ted Hewitt is president of Social Sciences and Humanities Research Council.

The Hill Times

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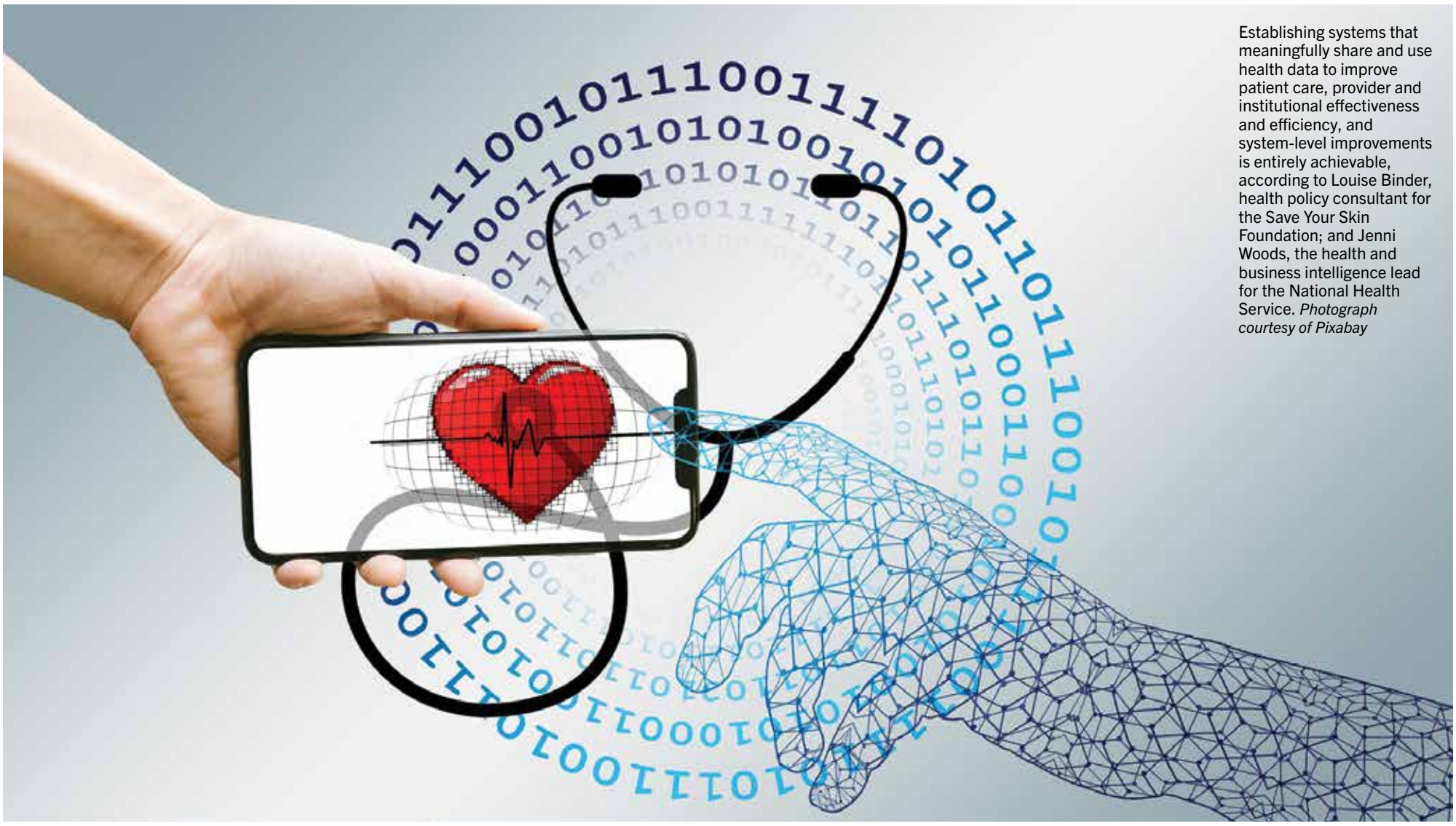

Establishing systems that meaningfully share and use health data to improve patient care, provider and institutional effectiveness and efficiency, and system-level improvements is entirely achievable, according to Louise Binder, health policy consultant for the Save Your Skin Foundation; and Jenni Woods, the health and business intelligence lead for the National Health Service. *Photograph courtesy of Pixabay*

Health data is good medicine for an improved health system

Innovation in Canadian healthcare is inextricably tied to solving long-standing health data challenges.

Louise Binder & Jenni Woods

Opinion

In 2014, the federal government tasked Dr. David Naylor with identifying the five most promising areas of innovation in Canada with potential to sustainably reduce growth in healthcare spending while improving quality and accessibility of care. One key theme from the report, *Unleashing Innovation: Excellent Healthcare for Canada*,was health data.

Innovation in Canadian health care is inextricably tied to solving our long-standing health data challenges. That was true in 2014 and remains true today. Canadian governments have systematically failed to bring Canada's health data infrastructure to world-class standards, with serious repercussions for the health of people living in Canada and of our healthcare system itself.

But it's not too late.

In 1992, the Supreme Court of Canada confirmed patients' right to access their personal health data. But exaggerated and unsupported concerns about privacy legislation and liability have contributed to risk-averse cultures across the healthcare spectrum, impeding patients' access to their data.

Canadian patients routinely experience unreasonable delays or financial charges when seeking access to, and control of, their health data. Unfortunately, these problems are not unique to patients.

Sharing between health-care providers, institutions, researchers, planners and policymakers is impeded by our lack of a coherent, operationalized strategy to ensure shareable health data. This means we are not using all the data available to us whenever a healthcare decision is being made, whether it's a decision about patient care, improving care or improving the system itself.

Accessible health data is the low-hanging fruit of a dramatically improved—and self-improving—health system. So why do our governments continually fail to make them a priority?

These long-standing problems with health data has led a group of patients and caregivers to draft a *Declaration of Personal Health Data Rights in Canada.* It aims to build consensus on health data among patients, the public and groups representing them, create awareness, spur conversations and inform policy decision-making.

The declaration promotes the equal importance of privacy and sharing of personal health data, outlining 11 health data rights that people have, including the right to:

- Be informed
- Consent
- Access, portability and correction
- De-identification
- Benefit ("something that produces good or helpful results or effects or that promotes well-being")
- Object to the processing of their personal health data
- Restrict processing
- A complaint process
- Privacy and security
- Erasure

Establishing systems that meaningfully share and use health data to improve patient care, provider and institutional effectiveness and efficiency, and system-level improvements is entirely achievable.

It's time our governments made it a priority.

Scotland provides a useful example. The Tayside health board covering Dundee, Perth & Kinross and Angus developed a command centre with dashboards providing minute by minute access to information across all its hospitals. Dashboards include capacity issues, staffing, ambulance arrivals, emergency room activity, inpatient analytics and bed status for the hospitals.

The dashboard is expanding to predict seasonal trends and patient admission likelihood that will help administrators manage all aspects of planning and implementation to optimize patient care. By having visibility of information across the entire health board, it has improved patient flow and helped achieve performance targets.

There's no reason Canada could not do this. Imagine each health-care setting across the country having such tools, sharing relevant data and rolling them up into regional and national dashboards to plan for healthcare broadly?

The hard work of creating a realistic roadmap has already been done.

An Expert Advisory Group, struck in 2020, released three reports in support of a pan-Canadian Health Data Strategy to support the effective creation, exchange and use of health data to benefit people in Canada and the health systems on which we rely. The reports lay out how to establish a common foundation for improving Canada's ability to collect, protect and use health data.

Thankfully, the federal, provincial, and territorial privacy commissioners also recently acknowledged the importance of implementing this Strategy.

The Advisory Group provides a systemic blueprint, detailing how Canada can achieve a world class health system through enhanced health data infrastructure. Now governments need to heed the call.

Louise Binder is the health policy consultant for the Save Your Skin Foundation. Jenni Woods is health and business intelligence lead, National Health Service, Tayside, Scotland.

The Hill Times

UNIVERSITY OF TORONTO

Together, we can build the economy of the future.

To solve pressing challenges and compete in the global economy, Canada needs to invest in visionary talent, research, and ideas.

From our earliest days, the University of Toronto has been home to fearless and compassionate thinkers who dare to ask big questions and push the boundaries of what's possible. Our researchers revolutionized the world's understanding of mass media, reimagined artificial intelligence, and improved millions of lives through biomedical breakthroughs with our partner hospitals, such as insulin and new cancer therapies.

That spirit of ingenuity and innovation is more vital than ever at U of T. Over the past decade, our community has launched more than 600 companies that have collectively raised more than $2 billion in investment. This makes us second only to the Massachusetts Institute of Technology for the number of research-based startups produced. Today we are creating future industries by leading the way in artificial intelligence, robotics, advanced materials, regenerative medicine, precision medicine, clean tech, clean energy, quantum computing, and other critical fields.

In a world searching for positive change, our bold talent and ideas are generating new possibilities for greater health, well-being, and prosperity for Canada. Help us build the economy of the future.

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Photo: Researcher Teng Cui holds up a silicon chip used to stress test graphene—a material lighter than paper but 200 times stronger than steel.

DEFY GRAVITY

Innovation Policy Briefing

Innovative post-secondary solutions will help solve Canada's tech-sector skills shortage

As Canada's tech sector navigates the digital economy, universities and colleges must keep their sights on developing and implementing innovative solutions that will help Canadian businesses remain competitive in the global market.

Jane Goodyer

Opinion

Canada is facing a digital skills shortage that, if left unaddressed, will present a major barrier to business growth across all sectors and industries, writes Jane Goodyear. *Image Pixabay*

Canada is facing a digital skills shortage that, if left unaddressed, will present a major barrier to business growth across all sectors and industries. As corporate leaders continue facing difficulties recruiting and retaining tech talent, universities in Canada can play a vital role in leading the development and implementation of innovative post-secondary solutions that address existing human resources gaps.

Exacerbated by the COVID-19 pandemic, the skills shortage in science, technology, engineering and mathematics fields has grown exponentially over the last few years. If our tech companies are to remain competitive in a constantly evolving global digital economy, we must act quickly to respond to existing information and communications technology (ICT) skills gaps or risk falling behind. This means that our efforts to attract talent and upskill the current workforce must keep a pulse on the evolving needs and demands of the sector.

For Canada, scaling up the tech workforce means creating affordable education pathways that will facilitate increased access to digital tech careers. Although Canada has a wealth of untapped tech talent potential, expanding the existing talent pool will require taking bold steps to transform the future of learning and employment in Canada's tech sector.

It was with this goal in mind that our team at York University's Lassonde School of Engineering collaborated with key leaders and experts in the tech sector to create a new work-integrated Bachelor of Applied Science in Digital Technologies program. These partners include Ceridian, CGI, Cinchy Inc., Cisco Canada, Connected, EY Canada, General Motors of Canada Company, IBM Canada, mimik Technology Inc., RBC, Saa Dene Group, Shopify Inc., TELUS Health, Treasury Board of Canada Secretariat, and TribalScale Inc.

Launching next fall, the four-year program will provide learners with the opportunity to earn a competitive salary while dedicating approximately 20 per cent of their work hours to theoretical, in-class learning during five-day block periods every six to seven weeks.

The benefits of our program will be two-fold. By combining a high-quality education with work-integrated learning, students will be able to immediately apply and build on their academic knowledge. Employers, on the other hand, can also

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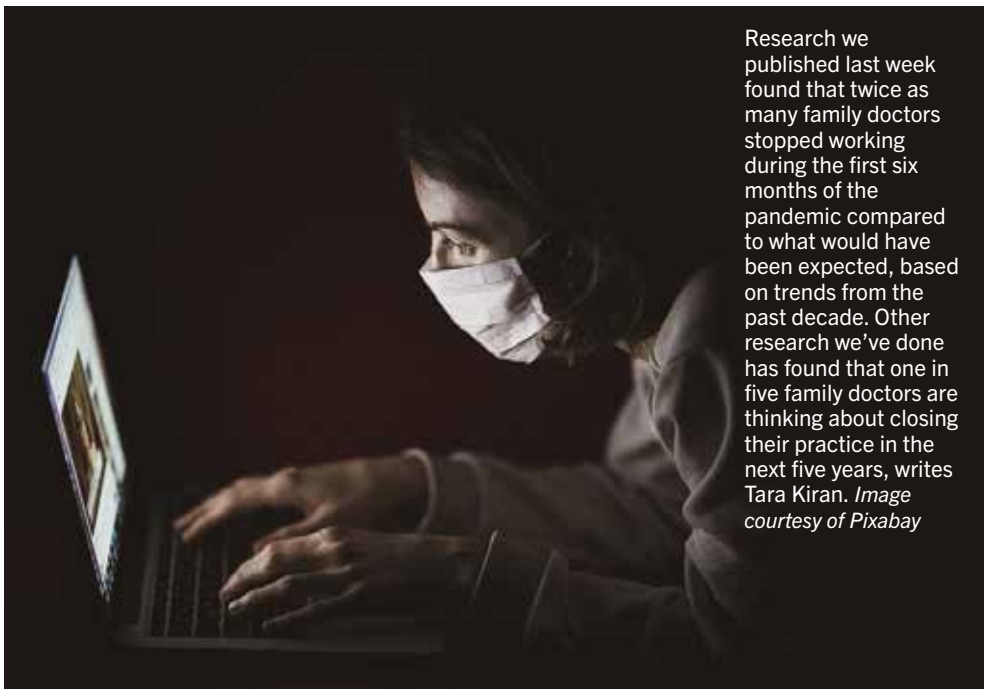
Innovation Policy Briefing

It's time we asked Canadians what kind of family doctor care they want



Research we published last week found that twice as many family doctors stopped working during the first six months of the pandemic compared to what would have been expected, based on trends from the past decade. Other research we've done has found that one in five family doctors are thinking about closing their practice in the next five years, writes Tara Kiran. *Image courtesy of Pixabay*

The pandemic has widened the cracks in our health-care system. But that also means it's opened opportunities for change.

Tara Kiran

Opinion

Family doctors are the front door of our health system. They're where you go when you are sick and they keep you from getting sick in the first place by providing immunizations, screening tests, and care for chronic conditions like diabetes or asthma.

Family doctors connect you to other parts of the health system so you can get extra help when you need it. They know you as a person and can help guide you through tough decisions.

But for too many people in Canada, that front door is now closed.

Even before the pandemic, 4.6 million people in Canada didn't have a family doctor. The pandemic has just made things worse.

Research we published last week found that twice as many family doctors stopped working during the first six months of the pandemic compared to what would have been expected, based on trends from the past decade. Other research we've done has found that one in five family doctors is thinking about closing their practice in the next five years.

At the same time, our population is aging, and fewer medical students are choosing family medicine as a career. Even those who do are more likely to specialize in something afterward rather than open a family practice.

The situation is bleak. But that also means there is momentum for change.

There are many ideas out there to create a better system. But most require investment or trade-offs.

For example, in some jurisdictions around the world, family doctor care is organized like the public school system in Canada. When you move into a new neighbourhood, you have a choice of a few practices that are nearby. Those practices have to accept you. And they are resourced, based on the needs of the community they serve.

But, when you move, you're asked to leave the practice and sign up with one in your new neighbourhood. You can't keep seeing the same family doctor you've come to know.

And you may have less of a relationship with one family doctor and instead see any of the family doctors, nurses or nurse practitioners in the practice. They would all have access to your records, but they may not know you as well personally.

Continued on page 30

Building the Future of Food *on Sustainable Innovation*

Innovation can take on many forms, including something as simple as sliced bread to something as truly transformational and sector-changing as electric vehicles.

Through a collaborative innovation project, Wamame Foods is the developer of a plant-based alternative to Wagyu steak.

> *"[Our consortium] allows us to kind of create products that are going to pave the way for the industry, but it'll also really put Canada on the map in terms of what kind of quality ingredients we have and what kind of quality manufacturing we need to have in order to compete against global competition."*

– Blair Bullus, Wamame Foods' founder

Created with Canadian ingredients, driven by Canadian innovation, and co-invested in by Protein Industries Canada, Wamame Foods' wagyu-inspired plant-based steak is available across Singapore and Hawaii; it is also listed with both Gordon and Sysco Food Services in Canada.

*from 25 analyzed projects

Protein Industries Canada

Innovation Policy Briefing

Uncertain economic times call for modernized federal SR&ED program, say lobbyists

Continued from page 16

according to data released by Statistics Canada on June 24.

Another priority for a review of the SR&ED should be to find a way to simplify the application process, according to Schiavo. He said the current process is so complex that companies hire outside help just to apply.

"What you've actually seen is a cottage industry pop up around SR&ED, of consultants who are earning hundreds of thousands—if not millions—of dollars helping companies navigate this process. That is backwards, right?" he said. "If you are asking for a million dollars from the government, and you have to spend 10 per cent of that, $100,000, on just completing the application with no guarantee that you'll be awarded that money, there's a huge disincentive there. We shouldn't be spending Canadian tax dollars on simply navigating red tape."

Robert Asselin, the senior vice-president of policy at the Business Council of Canada (BCC), said that his biggest criticism of the SR&ED is that it is not focused enough, and argued it has become a basic tax credit favouring small firms over large ones.

Currently, an enhanced investment tax credit rate of 35 per cent is available under SR&ED up to a maximum threshold of $3-million for corporations that are considered Canadian-controlled private corporations by the CRA. A lower credit rate of 15 per cent is available for individuals, partners, and corporations that are not considered Canadian-controlled private corporations.

Private corporations are generally owned by a small number of people, and their shares are not traded publicly on exchanges, as opposed to publicly-held corporations, which tend to have more revenue and a larger number of shareholders.

Alain Francq, director of innovation and technology at the Conference Board of Canada, says Canada has an 'intractable problem with innovation performance.' *Photograph courtesy of Alain Francq*

Asselin argues that the enhanced tax credit rate for corporations that are not considered private means the SR&ED favours R&D provided by small- and medium-sized firms. He argued a tax credit favoring large firms would have a larger economic impact.

"We need to be more focused on people who actually do R&D. That means giving, in my view, preferential rates to larger firms, that are focused on, what I call, advanced industries," he said. "I think that needs to be fixed, because it's clear that when you look at the data, it is large firms who basically perform R&D, and the spillover benefits of that R&D in the economy are mainly driven by larger firms."

Asselin previously served as a senior policy adviser to Prime Minister Justin Trudeau (Papineau, Que.) during his leadership campaign in 2013 and in the 2015 federal election. Between November 2015 and November 2017, Asselin also served as budget and policy director to then-Finance minister Bill Morneau.

A letter with recommendations for reform to the SR&ED program prepared by Asselin was shared with Finance Minister Chrystia Freeland (University-Rosedale, Ont.) on June 22. Asselin argued in the letter that SR&ED should employ a more targeted approach by providing a preferential rate to advanced industries with high concentration of R&D.

A good opportunity for the federal government to provide an update on the pending SR&ED review would be during the fall economic statement, according to Asselin.

Minister of Innovation François-Philippe Champagne announced more than $85-million for 76 grants through the College and Community Innovation program on Oct. 14, with the goal of supporting research and development at post-secondary educational institutions across Canada. *The Hill Times photograph by Sam Garcia*

"I'm not expecting the government to actually move on SR&ED in the short term. It's a big piece. It's the biggest expenditure for innovation in Canada, but I would think that it would be wise to at least state where they are, and what are they leaning towards," he said. "If they made that commitment and it looks like they won't follow through on it, which is possible, then they should at least be honest about it … so that wouldn't give people hope that the next budget would have a real substantive reform of SR&ED."

Alain Francq, director of innovation and technology at the Conference Board of Canada, told *The Hill Times* that Canada is poor when it comes to innovation. The Conference Board of Canada gave Canada a C grade in innovation on its Innovation Report Card, released on June 28, 2021. On the report card, Canada was ranked 11th on a list of countries, behind Japan in 10th place and the Netherlands in ninth. The top ranked country for innovation on the report card was Switzerland, followed by the United States.

"[Canada has] this intractable problem with innovation performance," he said. "We know that we're ranked relatively high on the ability to educate our population … and the level or quality of our research in our post-secondary institutes is very high as well. So, we've ranked quite highly in that area. Where we fail to perform is translating those ideas, and the talent, frankly, into the economy."

According to the report card, the Conference Board of Canada argued that Canada has traditionally enjoyed favourable conditions, such as lack of international competition and generally good trade with the U.S., which meant Canadian businesses haven't needed to innovate as much as other countries. Factors such as volatile resource prices, changing demographics, and increasing economic protectionism are generating pressure for Canada's businesses to become more innovative, according to the report card.

The report card indicated that, at the time of its release, it was still too early to tell whether recent provincial and federal government initiatives intended to support innovation, such as the Innovation Superclusters Initiative or Innovative Solutions Canada, are achieving their intended impacts.

Francq said that the Conference Board of Canada plans to follow up with another report card in early 2023, which will be part of a larger evaluation to be called "How Canada Performs," which will examine Canada's performance across several key sectors.

"We might be doing a little better [in innovation] now. We're going to find out in the analysis shortly. I won't speak to it quite yet, but we are moving a little bit up the performance side, but we're still performing poorly when it comes to innovation," said Francq.

To support R&D in Canada, Minister of Innovation François-Philippe Champagne (Saint-Maurice—Champlain, Que.) announced more than $85-million for 76 grants through the College and Community Innovation program on Oct. 14. The innovation program is managed by the Natural Sciences and Engineering Research Council of Canada (NSERC) in collaboration with the Canadian Institutes of Health Research and the Social Sciences and Humanities Research Council.

Schools supported by the funding announcement include Yukon University, which received $360,000 to research COVID-19 vaccine hesitancy in the Yukon, and Selkirk College in British Columbia which received a $1-million grant to address issues such as climate action, and technology and social innovation in the Kootenay region of B.C.

"Colleges, polytechnics and CEGEPs play a critical role within Canada's world-class research and innovation community. Our next generation of researchers and entrepreneurs need support to help tackle projects that address social, business, health or environmental needs. With the CCI program, we are investing in projects that will have real impacts in local communities and Canada-wide," said Champagne in a NSERC press release.

Jcnockaert@hilltimes.com
The Hill Times

Budget 2022 promises related to innovation

- Establishment of a Canada Growth Fund, initially capitalized at $15-billion over five years, to attract private sector investment.
- Creation of a Canadian Innovation and Investment Agency, with a proposed $1-billion over five years to support initial operations. The agency is intended to invest in innovation, research and development.
- A proposed $750-million over six years to support the further growth and development of Canada's Global Innovation Clusters.
- A proposal to review the Scientific Research and Experimental Development (SR&ED) program, with the goal of ensuring the program is effective in encouraging R&D that benefits Canada, and also to explore how to modernize and simplify it.
- A more gradual phase out of access to the small business tax rate, with access to be fully phased out when taxable capital reaches $50-million, rather than at $15-million
- Up to $1-billion over six years on a cash basis to Innovation, Science and Economic Development Canada for the Strategic Innovation Fund.
- A proposed $17.7-million over five years for the Communications Security Establishment to establish an academic research programs on cutting-edge technologies.
- A proposed $47.8-million over five years, and $20.1-million ongoing, to Innovation to launch a national lab-to-market platform to help graduate students and researchers take their work to market.

Source: Budget 2022, released on April 7, 2022

Research and development in Canadian industry estimates

"At the heart of R&D is the ability to generate new ideas for improved products and processes that in turn drive transformation in society and the economy." –Statistics Canada

- Advanced results indicate that industrial R&D in-house expenditures declined from the revised 2019 estimate of $21.9-billion to $21.3-billion in 2020. Looking ahead, expenditures are expected to bounce back to $21.9-billion in 2021 and to further increase to $22.4-billion in 2022.
- Information, communications and technology (ICT) industries are forecast to account for 45.2 per cent of in-house industrial R&D spending by 2022, compared to accounting for 30.6 per cent in 2014.
- Businesses outsourced $4.3-billion worth of R&D activities in 2020, down from $4.6-billion in 2019. Outsourced R&D expenditures are anticipated to increase to $4.6-billion in 2021 and to reach $5-billion in 2022.
- The ICT sector is anticipated to account for 29.7 per cent of outsourced R&D expenditures by 2022, up from 18 per cent in 2014.

Source: Flash estimates released on April 6, 2022, by Statistics Canada

Innovative medicines can transform lives, **but only if they're available to Canadians**

By **Pamela Fralick**, President, Innovative Medicines Canada

In 2016, Blair Price was diagnosed with a bladder cancer that, over time, metastasized into his lungs. Thanks to his oncologist, Blair had access to innovative immunotherapy and chemotherapy treatments that have proven effective for those living with cancers like his.

As Canadians, we likely read this without any surprise. We assume that yes, of course our health care systems ensure that people like Blair have access to the newest, most innovative life-saving treatments available to patients and health care professionals. For most of my career I have worked on behalf of patients with organizations like the Canadian Cancer Society, the Centre for Addictions and Mental Health (CAMH), and the Health Charities Coalition of Canada, to name a few, and I can tell you that, unfortunately, timely access to innovative medicines is not the case for many patients in Canada.

Consider Biba Tinga's son Ismael, for example. Not long after he was born in Niger, Ismael was diagnosed with Sickle Cell type SS (SCD), which was a death sentence for close to 50 per cent of children born with SCD in that part of the world. Biba and her son Ismael came to Canada when he was 16. Since then, he has had access to treatment options that have contributed to a better quality of life. However, like many other drugs, after prolonged use the primary treatment for SCD can lose its effectiveness while serious side effects increase, leaving patients with few treatment options. As a result, quality of life declines and the life expectancy of patients is much lower than the rest of the population.

Biba, who is the President and Executive Director of the Sickle Cell Disease Association of Canada, notes that the situation is different in the U.S. where, in 2019, the Food and Drug Administration (FDA) approved three new drugs specifically targeted for people with SCD. Even as of today, none of these drugs are available in Canada. As she points out in an interview for our Meet the Patients series, any regulation or delay that prevents SCD patients from accessing these life-changing medicines risks exposing patients to significant health complications and possibly death. Canadians expect and deserve better from our health care system.

According to one recent analysis of IQVIA data, less than 20 per cent of new medicines launched globally are available to Canadian patients on public plans. Of those that are available, patients are waiting on average as much as eight times as long as a US patient, over three times as long as a patient in Germany, and approximately twice as long as a Japanese patient. Overall, Canada ranks last in the G7 and 19th out of 20 peer OECD countries for access to new medicines on our public plans.

As the examples of Blair and Ismael demonstrate, this is more than an abstract regulatory or policy challenge - it has a tangible impact on the health, well-being, and quality of life of patients and their loved ones. The impact is felt beyond the individuals and their families too. Delayed access to life-changing new medicines has possible implications for overall health care costs, economic productivity, and Canada's ability to attract investment and much-needed labour talent.

There's no denying that science and innovation play a critical role in overcoming serious disease and in enhancing our quality of life. But it requires hard work and significant investment. While patient access to a new drug can take nearly two years in Canada, the path from a drug's discovery to clinical trials and regulatory approval takes much longer. For example, a new drug can take more than a decade and up to $2.6 billion to develop and then deliver to patients. Of the 5,000 to 10,000 compounds that are screened for their potential, only five will ultimately make it to the clinical trials phase.

Given the human, social, and economic cost of disease, the tremendous financial and intellectual effort required to develop new medicines, and the power of the innovation underpinning them to improve quality of life and help drive economic growth, we owe it to Canadians to do what is necessary to improve availability and access to new drugs.

To improve access for Canadians, governments should take a holistic view of delays across the entire approval process at both the federal and provincial level, as delays in any part of the process negate efficiencies gained elsewhere. For example, while pending improvements to Health Canada's drug approval process are likely to be beneficial, their impact will be undermined by adverse Patented Medicine Prices Review Board (PMPRB) Guidelines changes, health technology assessment recommendations, and finally by prolonged drug negotiation and listing processes. Canadian governments need to work collaboratively with industry and other stakeholders to accelerate patient access to new medicines and vaccines.

In Canada, it takes an average 732 days from the time a new medicine is approved by Health Canada to it being covered on a public plan. If we were able even to cut that time in half, it would bring us in line with the G7 average and peer OECD median. More important, though, is the tremendous impact it would have on the lives of patients like Blair and Ismael, and their families. Let's commit to working together to ensure more Canadians enjoy the benefits access to these life-saving medicines offers, while doing more to support the innovation and investment in the pharmaceutical sector that fuels their discovery.

INNOVATIVE MEDICINES CANADA

Canada's ability to attract and retain international talent is crucial to creating business success

For Canada to be a global cybersecurity leader, and one of the most secure and innovative nations on the planet, in close collaboration with industry, government policy needs to move at a faster pace. Only this will allow Canada to keep up with both the challenges and opportunities before us—and the speed at which they develop and unfold.

Increased spending in the 2002 federal budget on government cybersecurity infrastructure was a useful step, but Ottawa needs to think more boldly and beyond Canada's borders, according to Ulrike Bahr-Gedalia, the senior director of digital economy, technology and innovation at the Canadian Chamber of Commerce. *Photograph courtesy of Pixabay*

Ulrike Bahr-Gedalia

Opinion

Canada's small- and medium-sized businesses (SMBs) face an average of 11 cyber attacks per device daily, but nearly half have made no investment in cybersecurity protection. These SMBs, along with municipalities, Indigenous communities, healthcare providers, and critical infrastructure providers have borne the brunt of the impact from cyber attacks, particularly in the form of ransomware. There is a pressing need for dedicated federal funding to help these organizations quickly modernize their IT environments as well as to ensure that they deploy advanced defences that prevent breaches and improve their cybersecurity posture. In many cases, the major problem is not a lack of SMB awareness or desire to address shortcomings—it can often boil down to the difficulty that SMBs face competing for cyber talent.

This presents a precarious two-fold challenge for Canadians. First, SMBs are exposed to an ever-increasing number of cyber attacks. Second, SMBs can't compete with larger businesses for the cyber talent needed to help them protect their systems and devices from attacks. For Canada's SMBs to feel truly secure, they need access to the best cyber technologies and talent.

Since the inception of the *Cyber. Right. Now.* campaign, the Canadian Chamber of Commerce has been advocating the federal government help boost Canada's cybersecurity skill set and career opportunities by making cybersecurity education, talent development, and retention a national priority. Investing in or creating programs that diversify and expand the cyber workforce pipeline, including international talent, have been chief among our recommendations that would help Canadian tech and non-tech companies lead the global cybersecurity future. Yet, Budget 2022 showed no signs of acknowledgment of these top priorities for businesses.

While increased spending in the 2022 federal budget on government cybersecurity infrastructure was a useful step, Ottawa needs to think more boldly and beyond Canada's borders.

Canadian organizations rightly have global aspirations—and every Canadian should want to see our homegrown businesses scale-up and thrive. Their multifaceted solutions, increased commercialization, diversification in products features and markets all quite naturally depend on the attraction and retention of a globally educated workforce and international talent. Global aspirations and international talent often go hand in hand as they provide ample opportunity for diversification in approaches, different perspectives, new solutions, a variation of best practices, and critical thinking methods based on their education and background. If we want to broaden our range, scope, horizon, and overall growth potential we need to think big and bold and embrace a journey that other nations have long been undertaking.

There are a few specific actions the federal government can undertake to support the development, attraction, and retention of top cyber talent in Canada.

First, Ottawa can provide grants for cyber education and awareness programs at all levels of our education system (kindergarten to post-secondary) to support the development of cybersecurity curricula, educator training, standardized cybersecurity certification programs. This will help create the next generation of cybersecurity leaders right here in Canada.

Second, Ottawa can develop programs and provide grants to organizations that are dedicated to advancing the training, recruitment, retraining and retention of women and under-represented groups in cybersecurity. Increasing the size of the potential talent pool is an important part of increasing the overall numbers of talented tech workers.

Third, the federal government can support cyber talent recruitment and retention programs that help businesses in Canada attract and retain cybersecurity resources throughout the lifecycle of their careers and develop inclusive and diverse workplace cultures where all can thrive. This can include addressing regulatory barriers and credential recognition hang-ups as a starting point.

For Canada to be a global cybersecurity leader, and one of the most secure and innovative nations on the planet, in close collaboration with industry, government policy needs to move at a faster pace. Only this will allow Canada to keep up with both the challenges and opportunities before us—and the speed at which they develop and unfold.

Ulrike Bahr-Gedalia is the senior director of Digital Economy, Technology & Innovation at the Canadian Chamber of Commerce. Bahr-Gedalia is also the lead for the Cyber. Right. Now. campaign, a joint effort led by the Canadian Chamber and supported by a broad range of two dozen leading cyber, tech, and businesses organizations of all sizes from across Canada, raising awareness and proposing solutions to government to empower Canada to lead the global cybersecurity future. Learn more: CyberRightNow.ca

The Hill Times

Policy Briefing **Innovation**

Countering the innovation brain drain

Steady access to skilled talent and supporting local entrepreneurs and innovators is imperative for Canada.

Alexandra Cutean

Opinion

Canada's immigration backlog hovers over the one million mark, and the pull of high salaries continue to make working for a U.S. company an attractive option for Canadian STEM talent, according to Alexandra Cutean, the Chief Research Officer at the Information and Communications Technology Council. *Photograph courtesy of Pixabay*

Steady access to skilled talent is an imperative for Canada, as is supporting local entrepreneurs and innovators. Despite inflationary pressures and a looming recession, the Canadian unemployment rate steadied at 5.2 per cent in September 2022. Many sectors continue to face labour shortages, and other factors like growing digital adoption, changing consumer trends, and demographic shifts—including recent "record retirements"—put added pressure on businesses to scale, while sourcing and retaining talent. By 2025, the digital economy alone will see a demand for 250,000 additional workers.

Despite persistent and perpetual talent needs, Canada's immigration backlog hovers over the one million mark, and the pull of high salaries continue to make working for a U.S. company an attractive option for Canadian STEM talent, including from the comfort of their own (Canadian) home. Curbing "brain drain" and attracting skilled international talent inevitably contributes to the innovation ecosystem, including creating Canadian companies that can scale on a global level. Tackling these complementary factors requires focus on three core pillars: sustainability, innovation, and prosperity.

Sustainability is priority for Canadians at large. A recent poll by Angus Reid found that most Canadians believe that Canada should prioritize sustainability and environmental well-being, at times, over economic growth. Essential to environmental protection are recent investments made by federal and provincial governments to reduce emissions, boost the production of clean energy, build sustainable infrastructure including for electric vehicles, and support the growth of green jobs. They must be complemented with initiatives that focus on addressing the longer-term by-products of climate change, like food security, sustainable supply chains, and climate migration. Bringing these to forefront can help attract and retain talent, while encouraging Canadian entrepreneurs to develop innovative solutions that address pressing global environmental needs.

Innovation and productivity are closely tied. Although Canadian labour productivity lags OECD peers, a renewed policy focus on innovation can help reverse this trend. Introduction to the workplace during study is key to retaining STEM grads; work-integrated learning programs expose students to a range of Canadian employers and work cultures. Government-driven R&D is also crucial to spur job growth, while simultaneously supporting entrepreneurs. However, worsening global economic conditions require more direct and immediately impactful interventions. Essentially an IP regime, a patent box encourages entrepreneurs to develop intellectual property (IP) by offering tax rebates on income earned from that IP. Jurisdictions that have used these structures have been effective at attracting talent and supporting innovators down the commercialization pipeline. In the United Kingdom, the patent box is associated with an increase in the probability of success of patents. In Australia, the patent box spurs innovation and helps businesses attract and retain top talent needed to compete on a global scale. Quebec recently introduced a similar regime for R&D conducted in the province. While patents are not necessarily a predictor of business success, they are an indicator of technology innovation, and can be a core component to product commercialization.

Prosperity and equity should not be mutually exclusive concepts. Put otherwise, future "growth" must balance economic goals with real-life societal and consumer needs. Government R&D is key to support early-stage start-ups on their quest to develop and test products that can eventually go to market; these interventions are increasingly complemented with innovative measures aiming to engage everyday investors, like the introduction of green bonds. However, building Canadian businesses that can scale globally and attract and retain skilled talent requires both expanding the pool of entrepreneurs and mobilizing other forms of capital. A recent ISED report finds that tier one investments in Canadian start-ups are largely dominated by U.S.-based investors. At the same time, women entrepreneurs receive just four per cent of venture capital funding. Like greater workforce diversity can lead to greater profitability, actively enabling a more diverse pool of entrepreneurs—including through innovative methods of sourcing capital like flow-through shares and crowdfunding—is essential to create world-class Canadian companies with the pull factors that attract and retain skilled talent.

Alexandra Cutean is the chief research officer at the Information and Communications Technology Council.

The Hill Times

Innovative post-secondary solutions will help solve Canada's tech-sector skills shortage

Continued from page 22

expect to benefit from the model which will help them fill skills gaps within their companies by giving them access to a stream of highly skilled workers.

A first for Canada, this model has been used widely across the United Kingdom and has proven to be a powerful vehicle for social mobility. In a 2021 Impact Report, Manchester Metropolitan University, one of our key partners and the leading provider of this type of program in the U.K., reported that 78 per cent of their graduates received a pay raise and 64 per cent received a promotion during their program. A survey of their first cohort of digital and technology solutions graduates shows a 46 per cent higher salary than the average U.K. computing graduate.

By bringing this fully work-integrated model to Canada, our goal is to open the doors for learners who may not have the time and/or money to pursue a degree and provide them with the necessary supports to build meaningful networks as they grow in their fields.

What's more, there has been a sharp increase in demand for more experiential learning opportunities over the last few years, a direct result of the pandemic. Corporate leaders know that remaining competitive within this new normal will require keeping pace with the changing nature of both working and learning.

An innovative post-secondary response to the skills shortage in the ICT sector can help affected businesses train, recruit and retain skilled digital technology specialists. As Canada's tech sector navigates the digital economy, universities and colleges must keep their sights on developing and implementing innovative solutions that will help Canadian businesses remain competitive in the global market.

Jane Goodyer is the dean of the Lassonde School of Engineering at York University.

The Hill Times

It's time we asked Canadians what kind of family doctor care they want

Continued from page 24

This is just one example of how we could reimagine our system and how that reimagining might involve trade-offs.

Ultimately, those trade-offs need to be informed by patients and the public.

That's why our research team has launched OurCare/NosSoins—what we believe to be the largest ever initiative to engage the public about the future of primary care in Canada.

We think a better system is possible.

There are many innovations that could be adopted, spread, and scaled-up to improve how primary care works. These include expansion of interprofessional teams, changing how doctors are paid and using information technology to make care more efficient and effective.

There are several European countries where more than 95 per cent of the population has access to a family doctor or primary care practice. We can learn from their innovations. We will also need to invest as they do. On average, OECD countries spend eight per cent of total health spending on primary care while Canada spends only five per cent. We have some catch-up to do.

Ultimately, better needs to be driven and informed by the values, needs, preferences and priorities of people living in Canada. That's why we've designed a year-long engagement process where we hope to hear not just from the loudest voices, but also those who are most often left behind.

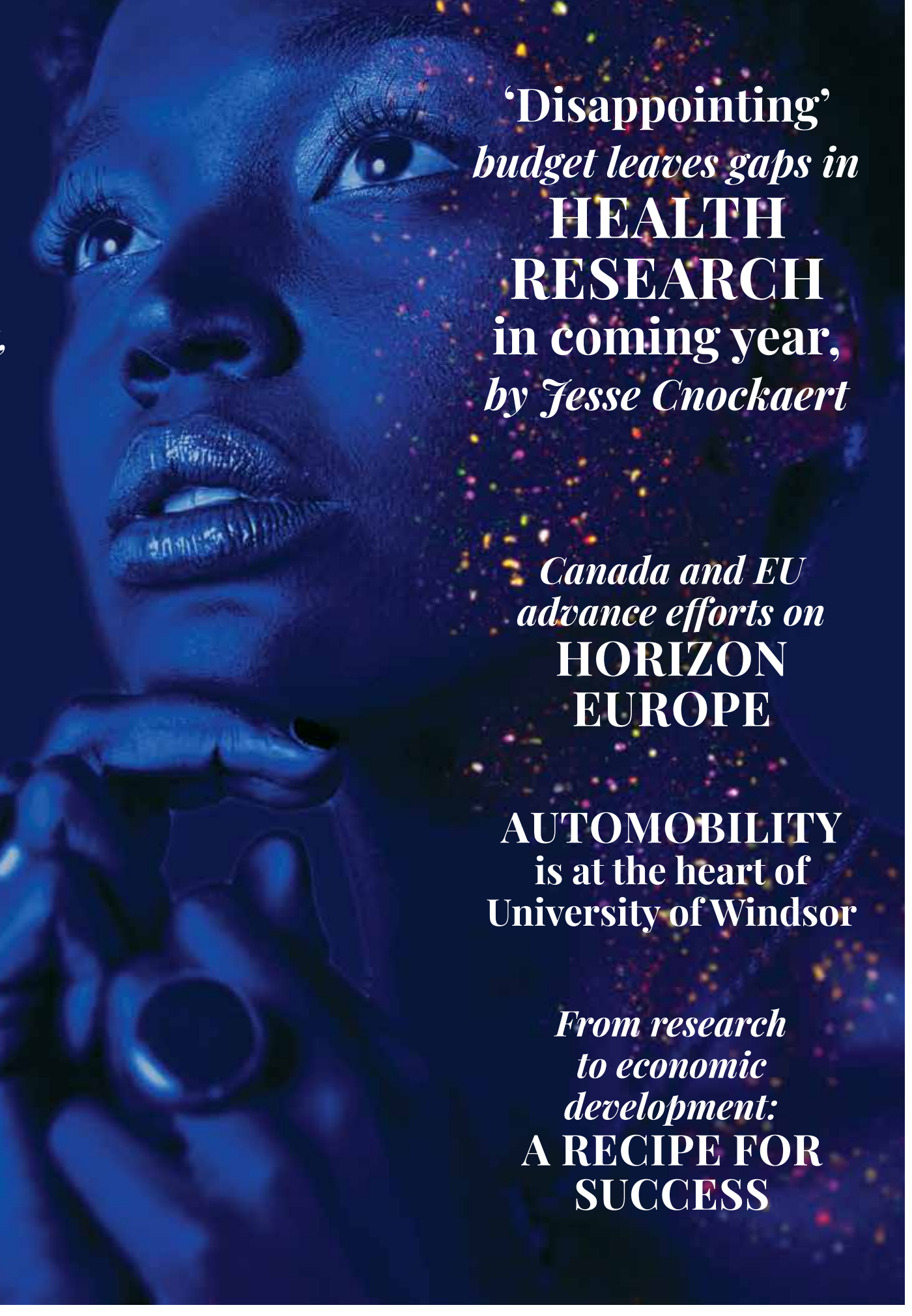
We're starting with a national research survey that explores people's experiences with primary care, what aspects are most important to them and what they want to see in a future system.

The pandemic has widened the cracks in our health-care system. But that also means it's opened opportunities for change. Visit OurCare.ca and tell us how we can make family doctor care better.

Tara Kiran is a family physician and scientist at St. Michael's Hospital, Unity Health Toronto and the Fidani Chair of Improvement and Innovation at the University of Toronto. OurCare.ca wants to hear from you. Take the research survey, part of the OurCare project based at MAP Centre for Urban Health Solutions, Unity Health Toronto. Participation is completely voluntary and anonymous. The survey is open until Oct. 25.

The Hill Times

RESEARCH & INNOVATION



Losing our **COMPETITIVE EDGE**

In the *innovation alphabet,* **'R' COMES BEFORE 'D'**

RAMPING UP *commercialization of Canada's research success*

Cross-training competences to **INTEGRATE** **the human and virtual workplace**

Canada's lack of COMPETITION *and unequal access to technology*

'Disappointing' *budget leaves gaps in* **HEALTH RESEARCH in coming year,** *by Jesse Cnockaert*

Canada and EU advance efforts on **HORIZON EUROPE**

AUTOMOBILITY is at the heart of University of Windsor

From research to economic development: **A RECIPE FOR SUCCESS**

‘Disappointing’ budget leaves gaps in health research in coming year, says health network

Health Minister Jean-Yves Duclos’s recent announcements related to health research include $2-million announced on April 29 to support companies in Quebec and Ontario in developing technology related to organ and tissue donation. *The Hill Times photograph by Andrew Meade*

A lack of increased funding for the Tri-Council in this year’s federal budget ‘will have consequences,’ according to a spokesperson for University Health Network.

BY JESSE CNOCKAERT

Health research in Canada is likely to struggle next year due to the 2022 federal budget prioritizing COVID-19 and the biomanufacturing sector, but not increasing support available for research at post-secondary institutions, according to the executive vice-president of science and research with the University Health Network (UHN).

The UHN is a hospital network in Toronto and the largest health research organization in Canada, employing more than 16,000 people, including more than 1,100 scientists.

“The federal budget just came out, which was a very disappointing budget for research,” said Brad Wouters. “There are a few things in the budget … that will benefit, and they certainly may need funding, but it can’t come at the expense of investment in the Tri-Council. This is the fundamental component of Canada’s health research system, and it was ignored this year. That will have consequences.”

The Tri-Council refers to the three federal agencies that serve as major sources of research funding for post-secondary institutions across Canada: the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council (SSHRC).

This year’s federal budget did not include an increase in funding for the CIHR, which previously was a feature of almost every budget since the organization was formed in 2000, according to Wouters.

The 2022 budget promised to support CIHR with $20-million over five years, specifically to support research related to COVID-19, and another $20-million towards research related to dementia and brain health.

To compare, the 2021 budget promised $250-million over three years to CIHR to increase clinical research capacity, as well as millions in funding to support specific areas of the health sector such as pediatric cancer research, mental health services, and the establishment of a new National Institute for Women’s Health Research.

Brad Wouters, executive vice-president of science and research at the University Health Network, says the Tri-Council ‘was ignored’ in this year’s budget and ‘that will have consequences.’ *Photograph courtesy of Brad Wouters*

“That money can’t buy as much as it could a year ago. Not even keeping up with inflation means that it will be a year-over-year decline in real activity,” said Wouters. “There will be less discovery [and] fundamental science next year because of the lack of even keeping track of inflation. That covers all aspects of health and fundamental discovery research, and that’s where the vast majority of new insight, new knowledge, and new impact comes from.”

“There is an absolute need for us to have a strong pandemic strategy and to be able to make the investments that are going to be needed as part of that future preparation. That does mean investment in antiviral drug design [and] new vaccines,” said Wouters. “But there are huge health-care concerns that need to be addressed outside of that, too, and research is the way to do that.”

Wouters argued that Canada has created too many federal agencies that fund research and innovation, and a review should be conducted to determine which agencies are the most effective. Federal agencies supporting research include the Canada Biomedical Research Fund, the Biosciences Research Infrastructure Fund, the New Frontiers in Research Fund, and the Innovative Superclusters. The Liberal government also promised in its election campaign platform to establish a Canada Advanced Research Projects Agency (CARPA) to support technological innovations in “high-impact areas.”

Wouters described these funding agencies as “disconnected.”

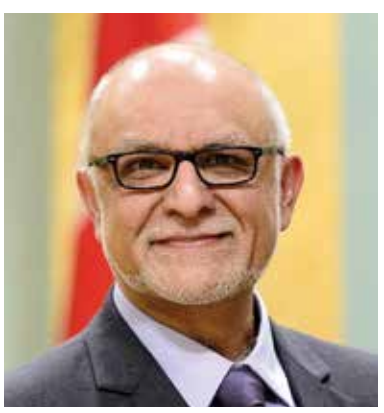
“The fact that new programs keep getting created is a reflection that the government and others are unhappy with what’s being achieved in the old ones,” said Wouters. “We need to have a review of what our approach should be and how many of these programs we need. That’s one of the main issues. We need to reinvest and make significant new investment methods in investigator-initiated research.”

NDP MP Carol Hughes (Algoma-Manitoulin-Kapuskasing, Ont.) told *The Hill Times* that the opioid epidemic in her province is one of several health issues that has “taken a back seat,” to COVID-19, and needs to be urgently addressed. Between March 2020 and September 2021, Ontario saw the suspected opioid overdose rate increase by 57 per cent, and rates of fatal opioid overdoses increase by 60 per cent in Ontario, according to the Ontario COVID-19 Science Advisory Table.

“We know that the opioid overdoses increased across the country, which also increased the strain on our health care services,” said Hughes in an emailed statement to *The Hill Times* on May 5. “We clearly need more for health research funding, and we need to be able to attract and retain top talent who can lead innovation and tackle broader topics. This has been an issue since well before the pandemic and remains a sticking point. Whether it’s for the development of a drug for a rare disorder, or finding better ways to tackle wait times, we need to increase the funding in health research to ensure our health care system is prepared to meet the challenges it throws at us head on.”

Hughes serves as a vice-chair of the Parliamentary Health Research Caucus, a non-partisan forum that engages parliamentarians in reception events and luncheons organized by Research Canada.

ISG Senator Mohamed-Iqbal Ravalia (Newfoundland and Labrador), the senate representative on the Parliamentary Health Research Caucus, told *The Hill Times* that the COVID-19 pandemic dealt “big blows” in Canada to clinical trials and research into other diseases.



ISG Senator Mohamed-Iqbal Ravalia says the COVID-19 pandemic dealt ‘big blows’ to health research in Canada. *Photograph courtesy of Mohamed-Iqbal Ravalia*

“Clinical trial enrollments plummeted because participants did not want to risk trips to hospitals, and infection and research staff were either furloughed, or had to direct their skills to hospitals and COVID-19 treatments,” he said. “Many trials that were well on their way came under heavy risk during the pandemic. Operating rooms and intensive care units were no longer fully functional.”

According to Ravalia, it was understandable during the last two years for resources to shift disproportionately towards pandemic management, but health research also suffered during that time. However, he said that more recently he is seeing a “general sense of a return to normality.”

“In talking to many of my medical colleagues, while there’s still a lot of catching up to do from the research viewpoint, there’s certainly an intent to shift back to what we were doing pre-COVID,” he said. “It’s important to realize that our mandate in the Health Research Caucus during this particular time is to move in the direction of an opportunity to open up research opportunities for individuals across the board.”

Liberal MP Brendan Hanley says broadband connectivity ‘plays a big role in being able to boost our research capacity around the country.’ *Photograph courtesy of Twitter*

To improve the health research environment in Canada, Ravalia argued for the value of improved internet connectivity in rural and remote locations. The 2021 budget included a promise of an additional $1-billion for the Universal Broadband Fund, bringing the total available through the fund to $2.75-billion to improve high-speed internet access across Canada.

“An important part of our mission is to get our message across the country, and not be limited to just urban areas. It’s an important issue for us. When we are discussing research innovations and opportunities, we’re particularly anxious to ensure that our rural constituents and our partners have equal access to the information that we’re sharing,” said Ravalia.

Liberal MP Brendan Hanley (Yukon), chair of the Parliamentary Health Research Caucus, also emphasized the importance of broadband connectivity to help share and co-ordinate health research.

Continued on page 25

Innovation Changes Lives for the Better

A commitment to equitable, diverse and inclusive care

Dr. Christina Pelizon, MD
Country Medical Director,
AbbVie Canada

Quality of life is something we often take for granted. For those living with chronic diseases such as psoriatic arthritis (PsA), rheumatoid arthritis (RA), atopic dermatitis (AD), and hidradenitis suppurativa (HS), it can mean feeling trapped in your own skin with debilitating and often unseen impacts to physical and mental health. Finding the strength to take charge of their life, address concerns, and discover better outcomes is one way we can support patients in their quest, but this won't come without a significant investment into research and development in Canada.

Following the July 2021 announcement of the Biomanufacturing and Life Sciences Strategy, Canada has an opportunity to aim higher and become a destination of choice for investment in health research and innovation. We encourage the federal government to review its policies to ensure growth of the life sciences sector and to ensure timely access to new medications and vaccines.

With AbbVie's work in immunology, we are leveraging scientific innovation, research and expertise to develop next-generation medications in rheumatology, dermatology and gastroenterology. If the COVID-19 pandemic has taught us anything, it's the importance of fostering a strong life sciences sector to support the health of Canadians, the sustainability of our health care system and the innovative economy. We need a predictable regulatory environment that recognizes the value of innovative medicines to encourage investment, drive innovation, and ensure new health technologies reach hospitals, clinics and patients.

abbvie

AbbVie's Commitment to Life Sciences in Canada

We're a company that takes on the toughest health challenges. But we do more than treat diseases – we aim to make a remarkable impact on people's lives.

Our areas of focus: immunology, oncology, neuroscience, eye care, virology, women's health, general medicine and aesthetics.

AbbVie's medications help more than **1 million patients** in Canada every year.

Economic Impact

~1,000 Canadian employees

170 jobs created during the pandemic

Innovative Medicines

44 new medicines and additional indications launched in Canada since 2013

21 new indications expected to launch in Canada by end of 2023

Research and Development (R&D)

100 active clinical trials

580+ Canadian trial sites

4,930+ Canadian patients supporting active clinical trials

Healthcare Sustainability & Community Support

$10 million+ in annual funding provided to Canadian healthcare, education and philanthropic organizations

1:1 corporate matching provided for employee charitable donations

Our commitment to science is a commitment to better our society.
To learn more about AbbVie, visit www.abbvie.ca

Creating a sustainable health system

A sustainable health system starts with prioritizing the toughest health challenges. AbbVie supports our health ecosystem with the discovery, development and delivery of innovative medicines to improve the lives of Canadians. This includes partnerships and collaborations with post-secondary institutions, Canadian scientists and research labs, clinics and hospitals, government and patient associations.

AbbVie is driven by innovative science, which is reflected in our Global $1.5 billion USD investment in adjusted R&D this quarter (April 29, 2022). This investment demonstrates our continued commitment to the future and to discovering and developing new medicines and products.

Equitable, diverse and inclusive dermatological care in Canada

Supporting equitable, diverse and inclusive dermatological care and treatment addresses longstanding gaps and inequities in dermatological research, education and patient care, while allowing for treatment development in areas of high unmet needs.

Recently, AbbVie demonstrated its innovation in dermatology with the development of the AbbVie Chair in Ethnodermatology, in partnership with the University of Toronto's Temerty Faculty of Medicine. The Chair will drive collaborative academic research, provide advanced training to the next generation of dermatological practitioners, and lead outreach programs to better inform equitable, diverse and inclusive dermatological care in Canada and around the world.

Improving patient lives through innovation

More than one million Canadians are treated with an AbbVie medicine every year. This is a direct result of improved patient outcomes powered by innovation. By investing in research, we're able to discover and create products that address patients' most pressing health needs, such as improved Psoriasis Area and Severity Index (PASI) scores and Rheumatoid Arthritis (RA) remission.

Improving patient's lives also comes from personalized services and tools, such as the AbbVie Care and Patients at Heart programs that assist patients in their medication and clinical trial journeys to provide them with support and confidence. Another example is AbbVie's IBD Disk Tool designed for patients with Inflammatory Bowel Disease (IBD) to assess their state of health and the impact of the disease on their everyday life. AbbVie is also a founding and continuing sponsor of the Canadian Rheumatology Ultrasound Society (CRUS), which is dedicated to advancing the use of ultrasonography to optimize clinical decision-making and therapeutic management.

Planning for the next cohort of physicians must also be prioritized to foster research and innovation. In early 2022, AbbVie launched the Collective Effect, a program that educates new physicians on clinical research to foster face-to-face interactions and mentorship opportunities where physicians can learn about clinical research.

All Canadians deserve equal, fair and inclusive disease care, and we have an opportunity to be part of the solution.

I am extremely proud that AbbVie annually provides more than $10 million in funding to Canadian healthcare, educational and community organizations and corporate matching for employee charitable donations. These gestures inspire personal action and make a meaningful difference at local, provincial and national levels.

COVID-19 has shown us what we can accomplish when we work together. Let's continue to discover and deliver innovative medicines and technologies that solve the toughest health challenges to make a remarkable impact on the lives of Canadians.

About AbbVie

AbbVie's mission is to discover and deliver innovative medicines that solve serious health issues today and address the medical challenges of tomorrow across several key therapeutic areas: immunology, oncology, neuroscience, eye care, virology, women's health and gastroenterology, in addition to products and services across its Allergan Aesthetics portfolio. www.abbvie.ca, @abbviecanada on Twitter and Instagram

Our innovation and productivity challenge is much greater than the federal budget's claim

Finance Minister Chrystia Freeland, pictured on Dec. 13, 2021, arriving at a press conference with Governor of the Bank of Canada Tiff Macklem. But does Freeland or anyone at Finance Canada, know how you would determine whether Canada was a world leader in innovation, research, and development, or what it would take to get there? *The Hill Times photograph by Andrew Meade*

It is about building an intangible-rich economy centered in Canadian-controlled businesses that earn the rewards of intangible investments for Canada through exports and wealth creation, as well as good jobs.

David Crane

Canada & the 21st Century

TORONTO—In the 2022 budget, Finance Minister Chrystia Freeland promises a growth agenda to make Canada not only "a world leader in technology and innovation," but "an economic leader for decades to come." As the global economy changes, "Canada has everything we need to thrive," she reiterates. "We can be leaders in the economy of today and tomorrow."

Canada, Freeland insists, "has many of the essential building blocks it needs to be one of the most competitive economies in the world today, and decades to come," boasting, for example, that "our cities are outshining Silicon Valley in creating high-paying technology jobs." And we do have some important strengths—and some world-class companies that show we can be competitive, companies such as CAE, Linamar, Nutrien AG, Canada Goose and Constellation Software.

Nonetheless, these are remarkable words from Freeland, given our poor record in innovation and productivity. The 2022 budget even acknowledges Canada's poor performance, describing it as the "Achilles heel" of the economy. But this is where the budget gets into trouble—where Freeland and Finance, and Industry Canada have got it wrong. And if you define the problem the wrong way, you are unlikely to come up with the right solutions.

"Solving Canada's main innovation challenges—a low rate of investment in research and development, and the update of new technologies—is key to growing our economy and creating good jobs," the 2022 budget says. And it is true that business needs to do much more of both. But the innovation/productivity challenge is much greater than the 2022 budget's claim. It is about building an intangible-rich economy centred in Canadian-controlled businesses that earn the rewards of intangible investments for Canada through exports and wealth creation, as well as good jobs.

Without globally competitive and knowledge-rich Canadian companies we will not reap the benefits from R&D and the resulting intellectual property. Creating a new kind of branch plant economy, as the government is currently doing, will create jobs, but it won't create the economic capacity we need for prosperity.

We can boost R&D spending by encouraging U.S. Big Tech to set up R&D branch plants here, as they are doing; but that new knowledge developed by Canadian talent is not owned in Canada and will not benefit Canada in production and exports. Likewise, we can stimulate the establishment of high-tech start-ups. But if foreign multinationals can buy up these companies and their intellectual property Canada won't be much better off. And we can attract foreign investment, for example, foreign automakers to build electric vehicles here. But unless Canadian companies are part of the high-value end of value chains, the profits will flow out of Canada.

Pointing to Israel's Innovation Authority and Finland's TEKES agency—claiming these have catapulted the two countries into tech leaders—Budget 2022 proposes something similar, though it's not clear what it is that these agencies do that Canada should copy. Nonetheless, the 2022 budget's answer to our poor innovation and productivity is a new Canadian Business Innovation and Investment Agency.

Yet Israel's experience is not much different from Canada. While its Innovation Authority—and its Defence-related R&D programs—have made the country a rich source of start-ups, it has the same problem as Canada. Many of these companies have been scooped up by foreign multinationals so, like Canada, it is failing to turn start-ups into global scale-ups. Likewise, like Canada, much of its high-tech talent is being recruited by foreign multinationals to work in R&D branch plants that create rich intellectual property for the foreign owners.

Yaron Daniely of Israel's aMoon Venture Fund, as I recounted in a September 2020 column, sees this as a major weakness in the Israeli innovation system. He blames this on an "exit culture" in which tech founders and their venture capital/private equity investors are more interested in cashing out early than in building companies controlled in Israel with the scale and scope for global growth. "In the long run, a private sector consisting entirely of small technologically advanced companies chasing an exit strategy" is damaging because "it exports the country's most valuable know-how and hinders the development of large local companies."

The new agency, the 2022 budget says, "will proactively work with new and established Canadian industries and businesses to help them make the investments they need to innovate, grow, and create jobs, and be competitive in the changing global economy." But we already have programs that do some of these things so it is not clear what the proposed agency will add. One suspects Finance Canada hasn't figured that out either. All we know is that it will start out with $1-billion over five years and that the details of how it will work won't be known until late this year. But there is a bold promise: "The government intends to invest in innovation, research and development at the scale required to make Canada a global leader."

But does Freeland or anyone at Finance Canada, know how you would determine whether Canada was a world leader, or what it would take to get there? Moreover, even if the new agency succeeds in strengthening Canadian companies, as long as foreign companies can buy up our most promising companies at will, we will continue creating seed corn for the Big Guys who, with the click of mouse, can then transfer ownership of our intellectual property to their foreign head offices.

Simply helping Canadian companies finance more R&D won't necessarily help build Canadian companies. Perversely, the more we subsidize R&D and innovation in young Canadian companies, the more attractive they become to foreign buyers. So long as Canada is a happy hunting ground for foreign corporations eager to snap up our best ideas and people, we will end up falling short of our aspirations.

Despite its boastful promises, the 2022 budget will not make Canada a global leader in innovation. We require much better thinking and analysis if we are to build the much more successful economy we urgently need. We need to put our best brains to work.

David Crane can be reached at crane@interlog.com.

The Hill Times

Joining forces on global research and innovation: Canada and the EU advance efforts on Horizon Europe

Signe Ratso

Opinion

A few days ago, the European Commission and Innovation, Science and Economic Development Canada (ISED) announced the conclusion of exploratory talks on Canada's potential association with Horizon Europe, the European Union's signature Research and Innovation Framework Programme. This is a milestone achievement.

In the coming months, both parties will start their respective internal processes to seek mandates to negotiate an international agreement that will make this association a reality—potentially in 2023. This would be a historic development and an unprecedented opportunity for joint action related to today's global challenges.

International cooperation in research and innovation is a strategic priority for the European Commission. It enables access to the latest knowledge and the best talent worldwide.

Horizon Europe, which covers the 2021-2027 period, is by far the largest multilateral research and innovation programme globally, with a budget of 95.5 billion euros (approximately $130-billion in Canadian dollars) from the European Union's budget alone. It focuses on nurturing the best talents in Europe and beyond and is widely open to the world.

For the first time in the history of the EU's Research and Innovation Framework Programmes, Horizon Europe provides for the possibility of association of third countries—such as Canada—located beyond Europe's geographical vicinity, an opportunity that the EU's Global Approach to Research and Innovation defines as an expression of its commitment to international openness.

Association is a privileged form of partnership, and the closest form of international cooperation under the program. It allows entities of associated countries, such as universities and companies, to participate in all areas of common interest covered by the association terms.

The EU is particularly glad about the perspective of welcoming Canada, a long-standing political and economic ally, as a privileged partner in terms of association. Reinforcing such an alliance is ever more pertinent now that the EU and Canada stand side by side in the wake of the Russia's aggressive invasion in Ukraine. Ukraine, as a partner in the European Neighbourhood Policy, has been successfully associated with EU research programs since 2015.

Canada's association would build on a solid history of cooperation. Canadian researchers have participated in hundreds of actions under previous EU framework programmes, including almost 400 joint initiatives in the Horizon 2020 Program (2014-2020) alone. The main areas of participation included health, demographic change and wellbeing, as well as aeronautics, marine and Arctic research, and social sciences, food, agriculture and biotechnology.

There have been several remarkable success stories. One can highlight for instance the Université Laval's contribution to studying changes in the Arctic climate and how this affects weather patterns in the broader Northern Hemisphere (Blue-Action project, completed in 2021) and to engineering better risk prediction for prevention, early detection and prognostication of breast cancer (B-CAST project, completed in 2021). Another example of successful Canadian participation has been by the Ontario-based Sernova corporation in developing novel ex vivo cell-based therapy to treat haemophilia (HemAcure project, completed in 2018).

With access to Horizon Europe funding and reinforced capacity to build and even coordinate partnerships, it is expected that Canadian and European collaboration will grow even more. The global challenges of our century are many: climate change, environmental degradation, the digital and technological transition, threats to public health such as COVID-19 and other communicable diseases, but also threats to civil security as well as secure energy supply. Moreover, Horizon Europe has identified five overarching ambitions, known as Missions, to focus on solutions needed in our joint work on the adaptation to climate change; the fight against cancer; restoring our ocean and waters; developing climate-neutral and smart cities; and leading the transition towards healthy soils. Joint research progress in these areas is at the same time a contribution to the UN's Sustainable Development Goals, to competitiveness and growth, and to the creation and dispersion of excellent knowledge and technologies in our societies which further stimulates progress.

Association with Horizon Europe would also help the EU and Canada continue and strengthen their long-standing partnerships in research programmes bolstering collaboration, accelerating result valorization and building new bridges in this already strong relationship.

Signe Ratso is deputy director-general at the European Commission's DG for Research and Innovation. She is the chief negotiator for Horizon Europe Association.

The Hill Times

Research & Innovation Policy Briefing

Canada's lack of competition and unequal access to technology leads to a loss of innovation and to productivity failure, making all of us poorer

While Canada spends significantly on research at the federal level, what has been an ongoing problem for decades is the translation of the breakthroughs into viable and sustainable companies for the long term, writes NDP MP Brian Masse. *Photograph courtesy of Pixabay*

Canada's competition law needs to be reformed and modernized to ensure a competitive market.

NDP MP Brian Masse

Opinion

When the Organization for Economic Co-operation and Development (OECD) released its recent report that Canada's real GDP per capita only increased by a meagre 0.8 per cent a year from 2007 to 2020, ranking us 26th among 38 advanced countries, that was not the worst news. The disaster on the horizon was the OECD predicts Canada will achieve GDP per capita growth of only 0.7 per cent a year over 2020-30, putting us last among the advanced countries. This a failure of productivity.

As the pandemic has demonstrated there are structural problems in the Canadian economy leading to this low productivity. This has been the result of an absence of competition in many sectors, the lack of access to essential technology, and the failure of research to be translated and sustained into innovative successful businesses.

Competition

As the pandemic took hold, the corporate concentration of many important economic sectors led to Canadians being treated far worse, as both consumers and workers, than in other countries.

For example, banks didn't provide consumers with interest free periods on credit cards or other loans which were made available in other jurisdictions. The lack competition in the sector allowed this to happen.

The three large grocery chains made record profits while admitting to a parliamentary committee to communicating with each other on cutting pandemic worker pay. This was legal in Canada because of competition laws, which do not criminalize wage or price fixing, unlike in the United States where such actions would be prosecuted.

As we all notice every month, Canadians pay amongst the highest prices for telecom services anywhere in the world. In fact, Canadian telecom companies make more revenue per gigabyte of data than almost any other company in the world. Twenty-three times more than those in Finland and 70 times more than those in India. Yet this has resulted in lower data use than in almost any other country in the world. Not only does this impact affordability for consumers and reduce spending power it creates barriers for startups and business expansion with additional costs when compared to our trade competitors.

What was galling is that during this public health emergency, the Rogers-Shaw merger was announced which would reduce competition even more in an already highly concentrated sector. Canada's antiquated competition laws were being used by some proponents as a shield, citing the anachronistic "efficiencies defense" which allows firms to merge even if it reduces competition and raises prices for consumers. None of our trade partners have this in their competition/anti-trust laws.

Canada's competition law needs to be reformed and modernized. This is fundamental to ensuring the real competitive market necessary to build the companies that can take advantage of the economic transformations taking place.

Lack of access

During the pandemic the need for accessible and affordable high-speed broadband internet has become obvious to all Canadians. With people sheltering at home and with schools and businesses closed, Canadians needed a fast and reliable internet connection to communicate for work, school, and healthcare online. It is an essential utility and must be treated as one.

Unfortunately, 63 per cent of rural households do not have access to high-speed broadband 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 and 72 per cent of highways and major transport roads do not have access to LTE wireless services. This lowers productivity for economy since many workers and consumers are unable to participate without broadband access.

A national federally funded plan to provide broadband access to all Canadians can be done in four years for $6-billion using some of proceeds from the spectrum auctions. The NDP proposed this plan a year ago.

Innovation loss

While Canada spends significantly on research at the federal level, what has been an ongoing problem for decades is the translation of the breakthroughs into viable and sustainable companies for the long term. Many small innovative startups are forced to leave the country to raise the necessary capital to grow or go to where their customers are due to the lack access to their domestic market. Furthermore, the loss of the intellectual property funded by taxpayers through takeovers or ineffective protections is an ongoing saga.

An example of a company trying to buck the trend is Intellijoint Surgical, one of Canada's leading medical device startups and named the fastest growing new technology company in 2020 by Deloitte. The Kitchener company's navigational tools are used by surgeons in 15,000 procedures annually around the world. It finally made its first sale to a Canadian hospital just a few months ago even though it has had Health Canada approval since 2015. This must change.

Former BlackBerry Ltd. chairman and co-CEO Jim Balsillie, someone who knows about translating innovation into business growth, recommends that Canada stop giving away its intellectual property. Leverage federal research funding by requiring that the rights to any intellectual property must be retained in Canada, so domestic firms can make use of that technology.

Another idea from Balsillie involves "Big Data," where the federal government creates data collectives that can be licensed by private firms, rather than see big foreign tech companies fill that void. As he notes, Canada has used public institutions to build the country's economy in past and should do so again.

Artificial intelligence and quantum computing are research areas where Canada is one of the leaders in the world. We need to ensure that discoveries that have, and will be made, are translated into real innovation and dynamic new companies. The electric vehicle transformation and the opportunity for the country to encompass the entire life cycle, from mining to processing, to batteries to manufacturing/assembly, and to recycling is a once in generation opportunity. To obtain the real productivity gains these endeavours represent we must foster robust competition, eliminate the lack of access to essential technology, and guarantee domestic innovation is retained to generate the economic growth required.

NDP MP Brian Masse was first elected to the House of Commons in 2002 in the riding of Windsor West, Ont. As a Member of Parliament, he has served in several capacities including as NDP critic for industry, automotive, transport, the Canada-U.S. border, international trade, and the Great Lakes. He is the dean of the NDP caucus.

The Hill Times

Cross-training competencies to integrate the human and virtual workplace

Canada needs workers with foundational sector knowledge, who also have the competencies to use technology effectively and keep pace with digital change.

Stephany Laverty

Opinion

While everyone did their best to adjust to the sudden demand for remote work and learning during the pandemic, reports of Zoom fatigue, isolation, burnout and learning delays show that society needs to be better at merging the human and virtual worlds. While governments have provided funding for digital competency development, more thought is needed for how we upskill and reskill competencies so that they can integrate more easily into the rapidly digitalizing workforce.

Government-funded competency initiatives usually focus on building the hard science; the technology, engineering, and math (STEM) skills that tech firms require but not everyone needs to become a data engineer or a machine learning specialist. Canada needs workers with foundational sector knowledge, such as agriculture, construction or design, who also have the competencies to use technology effectively and keep pace of digital change in their sectors. At the same time, we also need technology experts who understand the sector so they know how work within the field is changing and can adapt the technology appropriately.

From discussions with sector representatives, it is clear that new initiatives should focus on cross-training so that those with sector or tech specific knowledge can understand each other, what is needed, and how to integrate the human and virtual. This rapid transformation requires reskill and upskill opportunities that reflect what is necessary across life stages for the extent of a person's life— life-long learning—but also for the various contexts someone may find themselves at any given point—life-wide learning.

Micro-credentials and work-integrated learning could quickly upskill and cross-train tech and sector experts to build these competencies. For example, a technology micro-credential for general construction workers could cover fundamentals, clarify the differences across tech fields, highlight communication strategies and demonstrate the practical application of technology for construction labour. Conversely, a construction sector micro-credential for those in robotics should cover construction concepts, different fields within construction, communication strategies, and identify opportunities for robotics integration, potential barriers, and possible solutions.

Work-integrated learning experiences provide on-the-job opportunities to build essential human competencies, such as communication and other soft skills, while technology specific knowledge could be provided through an appropriate instructional format. A micro-credential can be awarded once a competency-based assessment has determined the individual has both the human and technical skills to reach the threshold of tech or sector-specific understanding required. If competency-based assessments are used, those with these integrated skills would receive the micro-credential without having to complete a training program.

These opportunities are also easily adaptable to change, unlike full degree or diploma programs. As the technology or sector evolves, experts would only update their credentials once they achieved the base level of knowledge in their cross-training area.

Such transformation requires a rethink of the broader workforce development system. Sectoral technology experts are essential to workforce discussions to highlight where technology can be beneficial and identify key competencies required. Labour market information needs to better reflect the integration of technology within sectors and the types of jobs available. Those considering future employment or individuals looking to upskill or reskill need a clear understanding of where their existing knowledge is of benefit and where they need to develop new competencies. It's also critical that broadband access reach communities faster so everyone can keep pace with transformation and not be left behind in the race to build future-fit competencies.

As the world recovers from the pandemic, society is moving toward a larger, digital disruption that will be felt across all sectors. The rush to roll out digital solutions made sense given the crisis, but leaders need to be more thoughtful and strategic for a future which will require a more complex and fulsome integration of technology than occurred over the last two years. It is only through detailed planning that systems, including workforce development, will become resilient and responsive to future disruptions.

Stephany Laverty is a policy analyst at the Canada West Foundation and co-writer of the Future of Work and Learning Brief.

The Hill Times

In the innovation alphabet, R comes before D

Canada has seen welcome increases in research talent at its universities, but we need steady, incremental investment in research grants.

Martha Crago & Philippe Gros

Opinion

At an April 29 press conference at McGill University, Moderna and the governments of Canada and Quebec announced Montreal would be the location of the biotech company's new RNA vaccine production facility and associated research laboratory. As a result, said Innovation Minister François-Philippe Champagne, "we are going to invent the future of vaccines in Canada."

A whole host of activities led up to this historic announcement: some recent, and some a long time ago. Near the beginning of the pandemic, the Government of Canada took a calculated risk, advance ordering Moderna's vaccine, thus helping the company begin manufacturing. But the Canadian contribution to Moderna began much earlier, with McGill professor Nahum Sonenberg's fundamental research on mRNA, which is at the heart of Moderna RNA vaccine technology. The biotech success story is a case study in why R (research) really does come before D (development) in the innovation alphabet.

For more than 40 years, Sonenberg and his team have been untangling various aspects of mRNA biology: how it is made, how it is regulated, and what governs its translation into proteins in different cells. Of particular relevance are the studies by Sonenberg and fellow McGill professor Jerry Pelletier on the structural determinants of mRNA stability and translatability. These advances contributed to Moderna's ability to use mRNA in COVID-19 vaccines and future RNA therapies. Sonenberg served as a consultant for Moderna and Flagship Pioneering, the firm that funded and guided the creation of Moderna. The companies have additional ties to Canada and McGill in particular through Noubar Afeyan, the co-founder and current chair of the board of Moderna and the founder of Flagship, and Avak Kahvejian (Flagship), a graduate of Sonenberg's lab.

Of course, it was not a lone researcher's discoveries, no matter how groundbreaking, that helped attract Moderna to Montreal. It was the city's research ecosystem, with dozens of other RNA researchers and their teams of graduate students and postdoctoral fellows. Montreal's research capacity provides the pipeline of highly trained talent that Moderna needs to create and produce the next generation of therapeutics.

Innovation Minister François-Philippe Champagne, pictured in this file photo, recently declared, 'we are going to invent the future of vaccines in Canada.' The pandemic pointed out cracks in Canada's system, such as a lack of domestic manufacturing capacity for vaccines, which the federal government is remedying, writes Martha Crago and Philippe Gros. *The Hill Times photograph by Andrew Meade*

That research capacity is built on funding for fundamental research. Discoveries stemming from work such as Sonenberg's often take time to reap economic, health or social benefits, which can frustrate governments who want immediate returns. However, investment in foundational research does produce short-term gains: it's people, both the experts who advise innovative companies and the graduates who are employed by them. The vast majority of research funding from Canada's granting councils goes toward supporting graduate students and post-doctoral fellows, the highly qualified personnel that companies are desperately trying to recruit.

Canada has seen welcome increases in research talent at its universities. One indicator of this is the 40 per cent growth between 2007 and 2020 of PhD students, who play an integral role in research. With increases in the number of Canada Research Chairs and the creation of Canada Excellence Research Chairs, the attraction of some the world's best researchers is a success story.

However, for that talent to do their important work, we need steady, incremental investment in research grants: investment that increases with inflation and grows with the numbers of researchers and graduate students. Even with new government investments coming online, inflation-adjusted funding for academic research increased by only eight per cent between 2007 and 2020. Per-capita funding has shrunk. Underfunding leaves potential breakthroughs unrealized.

The pandemic pointed out some cracks in our system, such as the lack of domestic manufacturing capacity for vaccines, which the federal government is remedying. It also revealed opportunities. It brought together people across sectors, building stronger networks and collaborations. The pandemic also revealed the promise of RNA therapies to revolutionize medical treatments for many diseases and unveiled Canada's expertise in this field.

Targeted research funding for priorities such as biomanufacturing, artificial intelligence or sustainable agriculture is crucial for Canada's future. But if we want to attract and retain more companies like Moderna, we also need the talent and discoveries stemming from curiosity-driven research.

Martha Crago is McGill University's Vice-Principal (Research and Innovation) and Chair of the Governing Council of the Social Sciences and Humanities Research Council (SSHRC). Philippe Gros is McGill University's Deputy Vice-Principal (Research and Innovation) and a professor in the Department of Biochemistry.

The Hill Times

Losing our competitive advantage in an increasingly competitive world

Canada lags in research and development spending by the private sector.

Vivek Goel

Opinion

Every day university researchers across Canada and around the world are conducting extraordinary research, but Canada still isn't making the most of these discoveries by turning them into innovative products to sell globally.

Innovation requires momentum. It requires not only concerted effort by researchers pursuing bold and risky ideas, but also deep connections with those who can develop the ideas for application, particularly in industry.

According to the Inclusive Innovation Monitor, Canada ranks in the middle of the pack when it comes to public and private higher-education research and development spending as a percentage of GDP. Although it ranks higher than the United States and the United Kingdom, countries like Denmark, Sweden, and Switzerland spend a third more than Canada.

Successive governments both federally and nationally have recognized the need for investment in research and innovation in post-secondary institutions. These investments have been essential in ensuring we can recruit and retain talented researchers from around the world doing cutting edge work. But Canada lags in research and development spending by the private sector. Put simply, we don't have enough receptors for the great research being done. This results in intellectual property being snapped up by foreign buyers, and our best minds often leaving the country for opportunities to commercialize their research.

University-based incubation programs are doing their part to help bring innovations to market. Initiatives like Velocity, founded by the University of Waterloo, equip and guide students and researchers to build companies that scale. Such programs foster the earliest ideation stages, development of prototypes, protection of intellectual property, assessment of product market fit and preparation of business plans. They help connect entrepreneurs with private investment to sustain growth.

Waterloo's co-operative education program provides significant advantages for innovators. Students in work placements witness firsthand problems that need innovative solutions. They can exchange these experiences with each other and their professors, which informs their research programs. As companies are forming and growing, they can easily access co-op students as a reliable source of talent across a broad range of areas.

Canadian innovation ecosystems, such as the Toronto to Waterloo corridor, can learn from the successes and failures of other regions. Successful ecosystems have the confluence of academia, private sector investment and government support. Until recently, access to capital was a major hindrance for the growth and success of innovative start-ups in Canada. Now the challenge is not getting capital—it is getting Canadian firms and investors to take the risks, particularly at the early and growth stages before companies are profitable. Otherwise, we will continue to see our start-ups raising capital from foreign investors, with the gains flowing out of the country.

In the recently released federal budget, more than $3-billion is earmarked for new funding for innovation. The budget specifically says "we need to make it easier for Canadian businesses to innovate and become global leaders in the industries that will grow our economy and create new jobs."

As an example, the Canada Growth Fund is intended to attract trillions in private sector investment in the areas of climate change mitigation, clean technologies and supply chain resiliency.

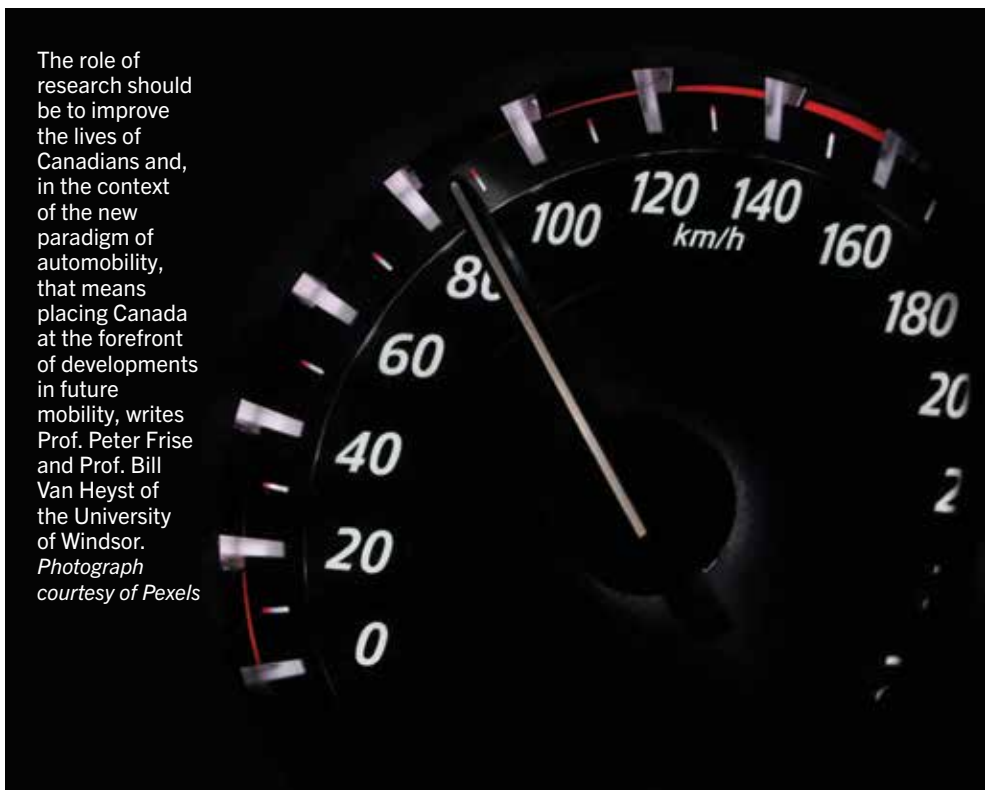
The Canada Growth Fund, and other government investments, need to ensure they create the right conditions and incentives for Canadian private sector investment in Canadian innovators and for Canadian firms to make the investments in research and development necessary to bring Canadian products to global markets. We also must urgently address the challenges in procurement, particularly across the public sector, so Canadian innovators can find first customers here at home.

As we adjust to new and emerging shifts in the world around us, we need to remain nimble and flexible. We can enable business and researchers to succeed by removing barriers at all layers of the process so that innovation gains momentum. Establishing a roadmap that embraces the needs of industry, governments, and universities is integral to Canada's long-term success.

Vivek Goel is president and vice-chancellor of the University of Waterloo.

The Hill Times

From evolution to revolution: automobility at the heart of University of Windsor



The role of research should be to improve the lives of Canadians and, in the context of the new paradigm of automobility, that means placing Canada at the forefront of developments in future mobility, writes Prof. Peter Frise and Prof. Bill Van Heyst of the University of Windsor. *Photograph courtesy of Pexels*

Automobility is the secure, zero-carbon movement of people, goods and services using advanced information technologies.

Peter Frise & Bill Van Heyst

Opinion

The automotive industry has changed a great deal since the University of Windsor (UWindsor) established Canada's first university-level education in Automotive Engineering in 1998.

The major focus of that program was the evolving mechanical and electrical aspects of vehicles including materials, manufacturing, design, and R&D with a concentration on developing highly qualified people (HQP) to meet industry's advancing needs. The strong partnerships with industry fostered by the 1998 program established UWindsor as the leading automotive institution in Canada and led to initiatives such as the AUTO21 NCE (2001-2015) which produced more than 2500 HQP for the auto industry and new industry-academic partnerships that resulted in great innovations and products.

However, that was then—and the shift from the evolutionary climate in the auto industry of 2000-2015 to today's revolutionary environment is much more profound with an accelerated pace as OEMs position themselves to capture their share of an ever-expanding electric vehicle market.

Now, more than 20 years later, the Canadian auto industry must contend with new competition from abroad and an emphasis on products centred around four key themes which collectively define a new idea called automobility and the concepts of the connected, autonomous, secure, and electric (CASE) vehicle development. In the view of the authors, it is essential that Canada's research community collectively join in this response to support our automotive industry as they develop the products needed to bring affordable, sustainable, and safe electric mobility to the market. And hence the need for UWindsor's new research program in Automobility-CASE.

Automobility is the secure, zero-carbon movement of people, goods and services using advanced information technologies. The acronym, CASE, encompasses these goals. CASE has become widely used in the auto industry to unify the ideas of connected and autonomous vehicles that use *secure* information technologies to operate safely and are electrically powered.

In consultation with our industry partners, the new program crosses discipline boundaries to include: power-train development including electric motors, controllers, batteries and fuel cells which incorporate sustainability, new materials and manufacturing technologies to ensure that Canadians and our natural resources play a key role in the future car; cybersecurity and real-time systems for safety critical tasks such as chassis control (steering, braking and suspension), powertrain control, battery operation and health monitoring; advanced modelling techniques including virtual reality to aid in ergonomic design of vehicle interior spaces and factory work-stations and to simulate solutions to safety issues, noise problems and the efficient use of space in future cars; new energy efficient occupant safety and comfort systems such as climate control, illumination and infotainment technologies; socio-economic and environmental aspects of Automobility-CASE such as climate change mitigation, total life cycle design, shared/community mobility, traffic and route planning and optimization, the economics and politics of energy use and the influence of trade and international borders.

The role of research should be to improve the lives of Canadians and, in the context of the new paradigm of automobility, that means placing Canada at the forefront of developments in future mobility.

Public sector investments in research must have multiple objectives that advance the state of knowledge, train new HQP, and drive growth in the domestic economy by developing new products and services which will lead to the creation of new jobs, wealth, and Canada's global competitiveness.

In light of these ideas, we believe that the auto industry has a central role to play in Automobility-CASE research. Industry input helps to leverage public investments but, more importantly, seeking industry input helps ensure that the educational programs and the research work is relevant to the needs of the economy. Industry provides a direct path from the university to the economy through knowledge deployment via the employment of HQP who graduate from the program and through the commercialization of the new knowledge they create in collaboration with industry.

That large-scale, and sustained collaboration with industry is what makes programs such as the German Fraunhofer Institutes and the National Labs program in the United States so successful at propelling innovation in those countries. Canada would do well to adopt the best aspects of those models—and put them to work on problems faced by our country.

Working together with our industry partners, the new Automobility-CASE program will continue the tradition of Canadian innovation that has made Canada an automaking nation for more than a century.

Peter Frise is a professor of engineering at Windsor where he developed Canada's first university program in automotive engineering in 1998 and the AUTO21 NCE in 2001. He has taught elsewhere in Canada and the U.S. and worked in the petroleum and heavy machinery industries prior to coming to academe. Bill Van Heyst is the dean of the faculty of engineering at the University of Windsor and is a professor in environmental engineering. He has spent over 25 years conducting research and analyzing trends in air quality, including the impact of the manufacturing and transport sectors, at two universities as well as a private environmental consulting firm.

The Hill Times

From research to economic development: a recipe for success

The ingredients of success are talent, tools and conditions, and Canada possesses all three.

Roseann O'Reilly Runte

Opinion

Now is the time for Canada to double down and focus on economic growth.

The secret sauce of success is no secret at all. The ingredients are well-known: talent, tools and conditions. Fortunately, Canada possesses all three.

The world is in a race for the first ingredient, talent, but this is one competition that Canada can win hands down. This year, more highly skilled graduates than ever received their diplomas at Canadian universities, polytechnics and colleges. This fact alone represents a tremendous asset for the country. As we see baby boomers leaving the workforce in droves, well-educated graduates will be the prize every company seeks.

Talent, however, is nourished through education and education does not happen overnight. It takes years of hard work and applied study for people to pursue their dreams. It requires long-term investments by families, communities, provinces and the nation. We are fortunate to have strong, vital institutions, dedicated faculty and highly motivated students. We must continue to nurture this resource which has developed over time.

Even still, Canada's talent well is deep and rich. Our population is diverse, and our potential is greatest when we continue to attract talent from around the world who bring their perspective and energy to our communities and places of employment.

Also essential are the tools, including labs, libraries, incubators, experimental farms, research vessels and data banks. Undergraduates, graduates and postdocs need state-of-the-art equipment to acquire the skills they will bring to Canadian companies that are competitive in markets at home and around the world. This year alone, 2,238 postdoctoral fellows and graduate students used research infrastructure funded by the Canada Foundation for Innovation (CFI), and 79 per cent secured employment in Canada, with 67 percent of them in the private sector.

The Microsatellite Science and Technology Centre offers a fine example of how having the right tools leads to collaboration among researchers, students and private enterprise. Located in the University of Toronto's Institute for Aerospace Studies, the centre partners with GHGSat Inc., an international leader in its sector. This company operates a fleet of high-tech satellites that track greenhouse gas emissions from Earth orbit, providing critical information to help solve the challenges of climate change.

And finally, the conditions for success are environments that inspire new ways of thinking, of problem-solving. They are the innovative locations like Toronto Metropolitan University's DMZ Zone that brings together talented faculty and students with entrepreneurs seeking new ideas.

They include environments like the facilities in the institutions that make up the Southern Ontario Network for Advanced Manufacturing Innovation (SONAMI), where small- and medium-sized companies in Ontario collaborate with researchers to turn innovations into commercialized products.

At the University of Calgary, a similar focus on entrepreneurship attracted $504-million in research revenue last year, an increase of over 10 per cent in a single year. This demonstrates how bringing talent, tools and conditions together reaps important results.

We must continue to create spaces where ideas collide, resulting in new possibilities for products and production, unexplored ways of doing business and revitalized communities. Business and industry must be brought into these spaces and researchers into communities. One resource available to help innovators and entrepreneurs connect with research is the CFI's Research Facilities Navigator. Consulted annually an average of 70,000 times, this online database helps locate facilities in some 28 sectors where ideas can be discussed, samples tested and prototypes developed.

Research and innovation have led and continue to lead to the commercialization and development our country needs. Nurturing talent, continuing to provide cutting-edge tools and facilities for learning and experimenting and establishing the conditions that bring together the worlds of research and economic development, are our recipe for success.

Roseann O'Reilly Runte is president and CEO of the Canada Foundation for Innovation (CFI). Connect to the Research Facilities Navigator, an online directory created by the CFI to connect businesses with the research equipment and expertise they need to succeed.

The Hill Times

Ramping up commercialization of Canada's research success will drive economic growth — Increased government, business, and education collaboration will make it happen

To be truly successful, Canada needs to help researchers turn their discoveries and innovations into new products and services.

John Hepburn

Opinion

Canada has no shortage of vision. Our researchers are leaders in discovery and innovation. As a nation, we consistently make key investments in post-secondary research in order to drive excellence and ideation. However, translating that creativity, new knowledge, and invention into economic growth requires commercialization—and that's where we fall short.

Canadian researchers are helping to solve pressing problems facing our country and the world. They are conducting critical research to support sustainability, lay the foundation for a thriving future economy, and encourage long-term prosperity. But to be truly successful, we need to help researchers turn their discoveries and innovations into new products and services.

Unfortunately, many promising ideas and novel approaches are not taken up by industry for commercialization. The landmark Council of Canadian Academies report on the state of R&D in Canada concluded that, "Declining levels of private and public R&D expenditures threaten to erode Canada's research capacity over time."

As budget 2022 identified, Canada's long-term prosperity requires that we better connect post-secondary researchers with businesses that can commercialize high-potential research outcomes. To compete and succeed in the changing global economy, Canada needs to become a world leader in bringing new ideas and inventions to market.

'Innovation intermediaries,' like Mitacs, are part of the solution. We strengthen linkages between education and business, promoting collaboration that includes government partners, and support our next generation of innovators in entering the marketplace. Innovation intermediaries work to bring all parties to the table, based on mutual or complementary interests. We act as innovation brokers, bringing the right external research partners to post-secondary institutions and helping companies inform research programs so they can better meet today's industry needs.

It's about helping Canada transition to a more innovation-based economy. These partnerships apply to the entire innovation continuum—from working with scientists on their original research through to supporting the adoption, use, and export of Canadian innovations. In the process, students and faculty gain greater insights into the needs of businesses, which helps close the gap between the skills needs of industry and the talent coming out of our universities and colleges.

Major investments in innovation, including the creation of the $1-billion Canadian Innovation and Investment Agency, which builds on budget 2021's $708-million investment in Mitacs, can also further bridge the gap.

Dr. Seyyedarash Haddadi is a good example of Canada's top research talent working hard to address challenges. The need to protect people from COVID-19 inspired the postdoctoral researcher in chemical engineering to shift his graphene research from metals to fabrics and find a way to improve the COVID-19 protection offered by masks. He developed a novel, low-cost compound that can be used as part of a coating material for masks, making them 99.99 per cent effective against transmission of COVID-19.

Supported by a Mitacs fellowship, Dr. Haddadi teamed up with Ontario-based company Zentek to bring his innovation to market. After receiving approval from Health Canada in September 2021, Zentek made its first major commercial sale of the novel coating. This year, it hopes to produce up to 800 million coated masks per month at a new manufacturing facility.

This is how the research-to-commercialization journey should work. We need to support more researchers in getting their discoveries to market. There is a lot at risk if we don't get it right, including the potential loss of innovative start-ups to international buyers, an inability to scale up promising new companies, and the risk of losing our top talent to international firms. Such outcomes mean Canada cannot fully benefit from its significant research investments—investments that should lead to increased prosperity and quality of life for all Canadians. In combination with other types of support—such as federal direct funding for research and the commercialization support provided through Canada's Innovation Clusters—innovation intermediaries, like Mitacs, help ensure that Canada's top-tier post-secondary system helps build profitable and job-creating Canadian businesses, and that college and university innovations yield important benefits for all Canadians.

John Hepburn is CEO of Mitacs, a not-for-profit organization that fosters growth and innovation in Canada by solving business challenges with research solutions from academic institutions.

The Hill Times

‘Disappointing’ budget leaves gaps in health research in coming year, says health network

Continued from page 16

In January 2021, the federal government established a Strategy for Patient-Oriented Research (SPOR) Support for People and Patient-Oriented Research and Trials (SUPPORT) Unit in the Yukon. The SPOR SUPPORT Unit, funded through a five-year year operating grant from the CIHR, provides researchers, patients and communities with tools to conduct health research.

“We discussed this in our last research caucus meeting; the need to support research even outside of the urban hubs, so that even jurisdictions like my own in Yukon can participate in contributing to research priorities,” said Hanley. “There you have, in the northwest corner of the country, an emerging health research hub, and that is funded through federal funding. Connectivity plays a big role in being able to boost our research capacity around the country.”

SPOR SUPPORT units are located in every province and territory, with the exception of Nunavut. CIHR is currently working with partners in Nunavut to launch a SUPPORT Unit there, according to CIHR.

Recent federal government actions related to supporting health research in Canada include an announcement on May 3 by Liberal MP Adam van Koeverden (Milton, Ont.), parliamentary secretary to Health Minister Jean-Yves Duclos (Quebec), of $5-million in funding to support development of the Canadian Heart Function Alliance, a new national research network focused on improving the prevention, diagnosis, treatment, and care of heart failure across Canada.

Duclos also made an announcement on April 29 that BI Expertise, based in Quebec, and Ortho BioMed, based in Ontario, would each receive $1-million from Health Canada to develop and test technology that uses artificial intelligence to more accurately match organ donors with recipients.

“Organ and tissue donation saves lives. Our government is investing in the development of organ donation technology because it is critical in helping people in Canada who require lifesaving transplants. The funding announced today will support research which will ultimately lead to improved patient outcomes and efficiency in the health system,” said Dulocs in a press release.

Jcnockaert@hilltimes.com
The Hill Times

Canada 2022 Federal Budget Health Funding Highlights:

- Budget 2022 proposed to provide $20-million over five years for the Canadian Institutes of Health Research (CIHR) to support additional research on the long-term effects of COVID-19 infections on Canadians, as well as the wider impacts of COVID-19 on health and health care systems.
- $20-million proposed over five years for the CIHR to ramp up efforts to learn more about dementia and brain health, to improve treatment and outcomes for persons living with dementia, and to evaluate and address mental health consequences for caregivers and different models of care.
- $5.3-billion over five years, and $1.7 billion ongoing, to Health Canada to provide dental care for Canadians.
- $30-million proposed over three years to the Public Health Agency of Canada, for the Centre for Aging and Brain Health Innovation to help accelerate innovations in brain health and aging.
- $140-million proposed over two years to Health Canada for the Wellness Together Canada portal so it can continue to provide Canadians with tools and services to support their mental health and well-being.
- $100-million proposed over three years to Health Canada for the Substance Use and Addictions Program to support harm reduction, treatment, and prevention at the community level.
- $436.2-million proposed over five years, with $15.5-million in remaining amortization, to the Public Health Agency of Canada, to strengthen key surveillance and risk assessment capacities within the Agency.
- $50 million proposed to the Public Health Agency of Canada to support the operations of the National Emergency Strategic Stockpile, will be used to maintain and diversify medical supply holdings, including personal protective equipment.

Source: 2022 federal budget

Canadian Institutes of Health Research information

- The Canadian Institutes of Health Research (CIHR) is the primary source of federal funding for health research. The CIHR provides funding for biomedical, clinical, health system services and population health research.
- CIHR has discretion over funding for research projects, which consist of investigator-initiated research and priority-driven research identified by the federal government. The organization also provides funding for graduate students and postdoctoral fellows.
- CIHR has funded more than 400 COVID-19-related research projects totalling $250-million since March 2020 to develop diagnostics, treatments, public health measures and communication strategies.
- In 2020-21, the CIHR invested approximately $1.4-billion, which is the largest total since 1999-2000.
- In 2019-2020, the CHIR invested approximately $1.13-billion.

Source: the Library of Parliament

AI & 5G

To take AI to the next **level**, we need a dose **of wisdom**

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Canada's bold AI strategy has been a success— **let's double down**

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How does AI factor into growing **Canada's economy?**

p. 19

Five barriers to the commercialization **of medical AI research**

p. 21

Medical professionals' discomfort with digital tech is stumbling block to spread of AI in health care, say experts

Health Minister Jean-Yves Duclos is pictured speaking at a Jan. 19 press conference in the Sir John A. Macdonald Building. A Health Canada spokesperson says regulatory requirements for adaptive machine learning-enabled medical devices could be launched in 2022 or 2023. *The Hill Times photograph by Andrew Meade*

A culture that divides the IT and medical aspects of health care is a stumbling block to the spread of AI in the medical sector, according to Dr. Ross Mitchell.

BY JESSE CNOCKAERT

Medical professionals' lack of comfort with new digital technologies is a major challenge that will need to be overcome as Health Canada develops the regulatory framework to support the use of artificial intelligence (AI) in medical devices, according to experts.

"In medicine, there's a huge divide between the IT side of the organization and the medical side of the organization, and they don't know where to put AI," said Dr. Ross Mitchell, the Alberta Health Services chair in artificial intelligence in health. "It's more the nature of the technology and the culture in health care. Those are the major stumbling blocks."

Artificial intelligence in medicine is used to mimic the problem-solving and decision-making skills of human medical professionals to increase accuracy and efficiency of patient diagnosis. Machine learning (ML) is a branch of artificial intelligence and computer science that focuses on the use of data and algorithms to imitate the way that humans learn, and gradually improve in accuracy.

There is not yet a regulatory framework for AI in medical devices in Canada, and Health Canada is currently approving submissions for new medical devices that use AI on a case-by-case basis. Since 2018, Health Canada has worked to adapt its regulatory approach to better support digital health technologies. Key areas of focus for this initiative include AI, mobile medical device apps, wireless medical devices, and cybersecurity.

On Oct. 27, 2021, Health Canada released a document containing 10 guiding principles intended to promote safe and effective use of AI and ML in medical devices. The document was jointly published with the U.S. Food and Drug Administration (FDA) and the United Kingdom's Medicines and Healthcare Products Regulatory Agency (MHRA).

Health Canada anticipates the regulatory requirements for adaptive machine learning-enabled medical devices could be launched in 2022 or 2023, following internal and external consultations, said André Gagnon, a Health Canada media relations adviser, in an emailed statement to *The Hill Times* on March 21.

Mitchell told *The Hill Times* that the number of papers published by the academic sector on AI in health care has grown exponentially in recent years, but almost none of that has translated into clinical practice yet. The wide gap between concept and implementation of medical AI can be partly attributed to how open medical organizations are to change, he said.

"Most large health-care organizations proudly declare that they are physician-driven. They're run by physicians and other health-care workers, which is great, but there's a new, emerging class of medical professionals and they are data scientists [and] medical computer scientists," said Mitchell. "This field hasn't been around long enough for these people to ascend into the highest ranks of leadership in medical organizations, and so, consequently, a lot of these decisions are being made by physicians with good intentions, but that simply lack the technical background."

Mitchell currently serves as a professor in the department of medicine at the University of Alberta, and as a fellow of the Alberta Machine Intelligence Institute (Amii), a non-profit organization formed in 2002 that partners with companies to help in the AI and ML fields.

According to Mitchell, another stumbling block to acceptance of AI in medical devices is a fear that the technology will replace human physicians. He said that AI can be useful in performing diagnosis, but human medical experts will always be needed because of their capacity for "incidental findings." As an example, he said that a hypothetical patient could go to a physician for their lungs to be examined, only for a doctor to realize the patient could have an issue in their spleen or heart.

"The AI algorithm that's trained to examine lungs is trained to ignore the heart, right? But a radiologist isn't. They look at the whole picture. Even if they're looking at the lung and they see something and they can't diagnose it, they'll pass it to their buddy who can," said Mitchell. "Incidental findings are a major thing in medicine. Lots of times people go in for some kind of routine scan and something is discovered accidentally."

Mitchell said that electronic health record systems put a lot of burden on health-care providers, and AI can help sort through the complex data. He compared the introduction of AI in health care to the introduction of chainsaws to the logging industry. Chainsaws helped loggers cut down trees more easily, but did not replace loggers, he said.

"Physicians who have 'power tools' to help them with the complexity will be able to perform quicker and at a higher level and enjoy their work more," said Mitchell. "That burden should be put on the power tool and not on the physician. We want to move them away from the hand saw, and get them onto the chainsaw, because what they're really interested in is cutting down trees, not processing logs and putting them on the truck the right way."

The 10 guiding principles released by Health Canada are intended to "lay the foundation for developing good machine learning practice that addresses the unique nature of" AI and ML technologies, according to a press release. The list includes that the technology model should include a "human in the loop" rather than performed in isolation, and that model designs are implemented with attention to the fundamentals of good software engineering practices, data quality assurance, data management, and robust cybersecurity practices.

Mitchell said that new AI technologies should go through a testing process so medical professionals can develop confidence in their effectiveness, similar to how new drugs are put through clinical testing before distribution.

Dr. Ross Mitchell, a fellow of the Alberta Machine Intelligence Institute, says 'there's a huge divide between the IT side of [an] organization and the medical side of [an] organization.' *Photograph courtesy of Amii*

"When you're on the front line, you may not necessarily understand the details of the biochemical properties of how a drug works, but you're confident [and] you have trust in it because of the clinical trial and the research and presentations and conferences," said Mitchell. "There's a whole process of building trust. Because the underlying technology is vastly complex, and busy medical professionals don't have time to become experts in the details of how the drug works, you have to have some trust. The same thing applies in AI."

Dr. Diane Gutiw, vice-president of consulting for CGI, an IT and business consulting services firm headquartered in Quebec, told *The Hill Times* that part of the difficulty with regulating AI in medical devices comes from ensuring the technology has been rigorously tested with sufficient transparency.

"The other big thing that I've been recommending is: make sure that this wasn't designed in silos; that it's not just software developers that have designed it, but you've got health-care clinicians also," she said. "When you're developing software that's giving clinicians direction on how to treat somebody or what a diagnosis is, you need some insight and transparency to make sure that's been done in a way that you're able to trust. Clinicians will not adopt these models if they don't have transparency."

Gutiw said she also has observed fears that AI could replace physicians, both from the public and from within the medical sector.

"I know there's a lot of fear that it's going to replace clinicians, but that's not the direction that it is going. It's really, at this point, providing more information to assist. It's not unassisted machine learning or AI," she said. "Some of the real benefits [of AI] are for diagnostic imaging. You're able to get a very precise or a high-probability answer to what the problem is, [and] you're able to avoid unnecessary surgeries and invasive procedures. You're also able to get a quicker diagnosis. You're able to see what you might not be able to see very quickly with an MRI."

A Health Canada report released on April 15, 2019, said the department is seeing the emergence of machine learning predominantly in image-based health-care applications, such as diagnostic imaging and radiology. The report identified several regulatory challenges facing the implementation of AI and ML in the medical sector, including how to ensure that data sets used during development are reliable and representative, and the question of who would be held accountable for mistakes made by the software.

"Artificial intelligence and machine learning technologies have the potential to transform health care by deriving new and important insights from the vast amount of data generated during the delivery of health care every day," said Gagnon in the emailed statement. "They use software algorithms to learn from real-world use and in some situations may use this information to improve the product's performance. However, they also present unique considerations due to their complexity and the iterative and data-driven nature of their development."

All medical devices in Canada are grouped into four classes with Class 1 devices representing the lowest potential risk (such as a thermometer) and Class 4 devices representing the greatest potential risk (such as pacemakers). All classes above Class 1 require a Medical Device Licence prior to being sold.

Alice Tseng, a partner at intellectual property law firm Smart

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To take AI to the next level, we need a dose of wisdom

It has long been a vision of many in AI to conceive of machines capable of a richer version of a mind than that imagined by data-driven problem solving alone.

Peter Lewis

Opinion

Innovation Minister François-Philippe Champagne is pictured in Ottawa on Sept. 14, 2020, with his then-press secretary Syrine Khoury. We may end up looking back and noticing that the result of the first five years of Canada's AI strategy was, essentially, just picking the next layer of low-hanging fruit, writes Peter Lewis. *The Hill Times photograph by Andrew Meade*

There is no doubt that Canada is a global leader in artificial intelligence. Thanks to the foresight of the 2017 Pan-Canadian AI Strategy, the first of its kind globally, investment has transformed research, enterprise, and the attraction of talent. Yet as talk of another "AI winter" abounds, can Canada uphold its momentum? Or have we reached a plateau?

To answer this, we should probably understand what such a plateau might look like. And what would climbing higher toward the vision of "machines that do the sorts of things minds can do" mean?

We cannot ignore that debate has started to turn. As American scientist Gary Marcus recently articulated, "deep learning is hitting a wall." Marcus argues that because AI is a tool that essentially recognizes patterns, there is a limit to which mental processes we are going to be able to simulate with the technique. We may end up looking back and noticing that the result of the first five years of Canada's AI strategy was, essentially, just picking the next layer of low-hanging fruit.

Another feature of AI based on deep learning is its insatiable need for more data. To even the casual observer of the progress of modern AI technology, it must now seem implausible to conceive of AI tech without big data. The two have become inextricably linked in our minds: more data is better. Is this a problem?

The answer is emphatically "yes" if we want to challenge the emerging doctrines of surveillance and data linkage. Adopting today's data-driven AI creates a commercial and government imperative for widespread and high-frequency connected surveillance, which brings with it not only issues of privacy, but also of power, agency, and identity, with which we are only now beginning to grapple.

Regulation is clearly a crucial part of the picture. Ontario's 2021 consultation on "trustworthy AI" established some important priorities. Yet a common feature of such efforts is the stickiness of trying to define what "counts" as AI. There is a worry that

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Time to capitalize on Canada's big AI advantage

Canada has not reached a plateau in AI research, but is instead a forefront contributor. Slowing those efforts will simply reduce us to a second-class global citizen in critical technology.

Suhayya Abu-Hakima

Opinion

Canada is a global leader in artificial intelligence because of decades of work by world-class luminaries at universities and government labs. Small- and medium-sized enterprises (SMEs) have worked hard to further AI research and development.

I successfully exited two AI startups in Canada and hold 48 patents in AI related to messaging and security. My startups were never venture-backed but benefited from the scientific research and experimental development tax incentive program and Innovative Solutions Canada (ISC), which provided us with a first sale to government and allowed us speedier exports to the U.S. The National Research Council's Industrial Research Assistance Program also funded some research and development and internships.

The successful 2017 Pan-Canadian AI Strategy initially earmarked $125-million, and its renewal in 2021 with $443-million emphasizes AI commercialization, intellectual property protection, talent, and AI ethics. These are good areas of focus, but fostering AI entrepreneurship is also a key area. SMEs are targeted with a slice of the $185-million for commercialization, including AI procurement strategies, "democratic" capital to increase diversity and government equity positions, according to a September 2021 Information and Communications Technology Council report. This is not a bad list—if SMEs can be funded quickly without the typical 30 per cent overhead that reduces direct funding. I also doubt that venture or angel investors would celebrate governments taking SME equity.

Canada has not reached a plateau in AI research, but is instead a forefront contributor. Slowing those efforts will simply reduce us to a second-class global citizen in critical technology.

AI is permeated in everything we do, whether it's data analytics, bioinformatics, automation, communication, or fintech. We have excelled in analytics and there are excellent advances in vision, but to truly advance AI to its promise in science fiction, we need to marry it strongly with robotics and advance in synthetics to get to the point of having AI walking around and assisting people day to day. Japan and the U.S. have advanced considerably, and we need to partner to garner benefits for our aging population. I can envision a day, in the next decade or two, where I will get at least one intelligent synthetic helping me. However, security and privacy are two areas that must be better addressed.

With this innovation comes advances in automated and connected vehicles, including cars, buses, and trucks. Companies like Tesla, Ford, and BMW are making incredible advances in this field, while Google, Apple, and Blackberry have been in a race for some time for automated vehicle software dominance. Canada needs to leverage AI and 5G to connected-vehicle technology and advance its national infrastructure to support connected vehicles, which have been shown to be safer to operate in a hybrid mode than those with only a human operator. This future is here, and Canada's infrastructure needs to adapt fast. We need intelligent highways that work in conjunction with connected and automated vehicles to be standardized quickly. This is where Canadian cities can partner with the carriers to ensure that 5G is rolled out with the needed infrastructure support, with the necessary licensing required by the CRTC.

Wireless carriers in Canada are already deploying 5G. The ENCQOR consortium, which includes large telecom companies in partnership with government, has been an excellent example of fostering SMEs to leverage 5G. This $400-million consortium includes federal, Quebec, and Ontario funding is up for renewal and was successful in getting 1,000 SMEs engaged over the last five years. ENCQOR's second phase should include a major AI track and expand across Canada since more provinces would like to participate—with a simpler application process for SMEs. We need a consortium for artificial intelligence SMEs like ENCQOR. It is not clear to me that Canadian private high-tech consortium Scale AI, with investments of $230-million from the federal government and $53-million from Quebec for large projects, has a strong SME focus. SMEs are the lifeblood of our economy and each of the Scale AI projects should aim to have several SME partnerships. At a minimum, its projects should cross over with ENCQOR.

Dr. Suhayya (Sue) Abu-Hakima is the co-founder and CEO of Alstari Corporation, her third and most recent AI tech startup.

The Hill Times

Finance Minister Chrystia Freeland is pictured on Feb. 17. There has been a lot of investment in AI-related technologies in recent years, starting with a broader move towards digitizing information, managing data, investing in infrastructure such as the cloud, and everything that has led to some firms even being able to deploy AI in a meaningful way, writes Kristina McElheran. *The Hill Times photograph by Andrew Meade*

How does AI factor into growing Canada's economy?

Building the Canadian talent pool will be essential to leveraging this fast-rising technology for growth in the Canadian context.

Kristina McElheran

Opinion

Artificial intelligence (AI) is increasingly seen as one of the most transformative technologies of our era. However, little is known about how widely it is adopted by firms, what sorts of firms are adopting it first or most effectively, nor how they plan to apply it. This lack of reliable information on the use of AI has made it difficult to formulate evidence-based predictions.

This has not stopped people from wondering, and often worrying, about the role of AI in the economy and the future of work. My University of Toronto colleagues, professors Avi Goldfarb, Joshua Gans, and Ajay Agrawal, convened an influential meeting of the National Bureau of Economic Research (NBER) specifically on AI in Toronto in the fall of 2018. Some of the top minds in economics and management were there. We discussed and agreed on a lot of things, but mostly we left with more questions than answers. My main contribution was to raise the alarm about the need to measure AI and how important it is to do this at the very earliest stage of its diffusion. To that end, I have worked with professor Erik Brynjolfsson of Stanford University and researchers with the U.S. Census Bureau to examine this in the U.S. context. Some of our results apply to Canada and elsewhere.

First, we have to recognize that AI is a very flexible technology. In fact, it is actually a *class* of technologies that more practically are discussed with terms like machine learning, natural language processing, voice recognition, and other "down-to-earth" applications. Yet, even these more-distinct applications are still quite broad, and they share a quality that academics think of as being a "general-purpose technology" (GPT). In a nutshell, this means that it is flexible, likely to diffuse quite broadly, and will have potential for high economic impact. Examples of GPTs in the past include the steam engine, electrification, and my personal favourite, the commercial internet.

Yet, the challenge with these flexible technologies is that the firms intending to use them have to do a lot of inventing around them to make them productive. They have to specify how the technology should be applied, and how intensively, and what it should replace or augment. This, in turn requires imagination, innovation, and good old-fashioned execution. Even more daunting, firms often have to reshape the business activities and production processes that will leverage these technologies. It boils down to "it will take investment, time, and co-ordination." In short, there is a gap between when the technology diffuses and when it shows up in the economy.

Where are we on this journey with respect to AI? We know that there has been a lot of investment in AI-related technologies in recent years. Going back a few years, this investment actually starts with a broader move towards digitizing information, managing data, investing in infrastructure such as the cloud, and everything that has led to some firms even being able to deploy AI in a meaningful way. And even with this lead-up, the "hype" far outstrips the actual deployment, in practice.

How do I know this? This has started to be measured in the U.S. A new nationally representative survey, the Annual Business Survey (ABS), addresses this data gap. Brynjolfsson and I collaborated with the Census Bureau on the AI-related elements of that survey. The ABS collects information on the adoption and use of several advanced technologies—including those most closely associated with advances in AI, such as machine learning, machine vision, natural language

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To take AI to the next level, we need a dose of wisdom

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unless this can be narrowed down, almost any automated decision-making or data-driven decision support system could be included, and then the ability to regulate and legislate becomes unwieldy.

Many people tie themselves in knots trying to define "intelligence," hoping that that will lead us to somewhat of a more complete (and, they often say, more helpful) definition of "artificial intelligence." Much of this misses the point, at least when deciding when to delegate to a machine an activity previously done in society by human minds. Once we have taken this step, we have already admitted a certain AI-ness to it.

On the other hand, others have made the decision to stop using the terms "artificial intelligence" and "machine learning" altogether, preferring specifics about the technology and who is responsible for it. AI has become, Emily Tucker argues, "a phrase that now functions in the vernacular primarily to obfuscate, alienate, and glamorize."

There is no doubt that we ought to engineer machines for accountability, or that those who build and operate them are responsible for the machine's actions. But we have already reached the point at which neither full control nor understanding can always be assumed. What then?

This relinquishing of control is not simply a bug with AI; for many it is a necessary feature of what an autonomous mind-like machine would require. Perhaps in some ways we need to shift towards thinking about our relationship with someone else's AI like someone else's dog: cautious, yet holding the owner fully to account if things go wrong. And as Stanford University professors Byron Reeves and Clifford Nass famously found, people routinely and naturally treat machines like people, whether it's being polite to a voice assistant or feeling sympathy for robots.

The question runs deeper: when is AI based on deep learning the kind of AI that we want to delegate to? Or is it missing something else profoundly mind-like? Today's AI technologies contain an unusual imbalance of insight and understanding: new insights arise from the models, while many of the "qualities" that a human mind would have brought are utterly absent. Important aspects of our mental activity are, as yet, nowhere near delegated. There is an important distinction to make here between AI as a simulated or synthetic mind, and "AI" as speech, the marketing term so often used to obscure, divert, or confuse.

So, what ought future Canadian AI strategy strive for? If the answer is more computation, bigger datasets, and better training algorithms, then we will indeed have reached a plateau. The world already knows how to play that game, and "AI" marketing gives us a clue as to where it goes next. If "AI"-as-surveillance is the extent of our modern-day vision of intelligent machines, then we will have failed millions of Canadians, and especially those at the poor end of structural power relationships.

On the other hand, the worry of an "AI winter" only exists if we cannot fathom how to see spring. Perhaps the time has come for a radical rethink of what synthetic minds we want operating within our society. Are these the hyper-rational, data-hungry prediction machines of the late 2010s? Or ought we to expect, and challenge the immense talent within Canada, for more?

It has long been a vision of many in AI to conceive of machines capable of a richer version of a mind than that imagined by data-driven problem solving alone; to include reflection, empathy, pause-for-thought, creativity, sociality, nuance, trust, and judgement, not just prediction. In short, let's challenge ourselves to imagine machines with a dose of wisdom. And let's bring a dose of wisdom to how we approach the use of machines in our society, too.

Dr. Peter Lewis holds a Canada Research Chair in Trustworthy Artificial Intelligence at Ontario Tech University.

The Hill Times

Canada's bold AI strategy has been a success—let's double down

Artificial intelligence will be a foundational element of future economic success. The countries that lead in foundational and applied AI will position themselves to grow and prosper.

Garth Gibson

Opinion

Innovation Minister François-Philippe Champagne is pictured in the West Block on Dec. 1, 2021. Countries around the world are aware of Canada's momentum on AI—but many are also focused on catching up, writes Garth Gibson. *The Hill Times photograph by Andrew Meade*

The upcoming federal budget provides an opportunity not only to identify future priorities, but also to reflect on past decisions, strategies, and investments. Although our collective impulse may be to focus on what's new, the secret to sustaining success is often found in building on what's already been done—and done right.

In 2017, the federal government unveiled and financially supported the Pan-Canadian Artificial Intelligence Strategy. The goal was clear: to capitalize on Canada's strength as a pioneer in AI research and cement its position as a world leader in the field.

Five years later—thanks to support from the federal government, Ontario and other provincial governments, and the private sector—Canada's strategy leadership on AI is acknowledged around the globe.

These targeted and efficient investments have helped to put our country in an enviable position. The Brookings Institute has described Toronto's AI cluster as "one of the most ambitious efforts in North America to upgrade a strong ecosystem into a world-class position." A recent *New York Times* feature labeled Toronto "the quietly booming tech town" and noted that the city is now the third-largest tech hub in North America. Toronto's tech workforce is expanding quicker than that of any U.S. city, and AI is a significant part of that.

The federal government's Pan-Canadian AI Strategy has empowered Canada's national AI bodies—the Vector Institute, Alberta Machine Intelligence Institute, and Mila–Québec AI Institute—to attract and retain top AI researchers. By making clear that AI research is a Canadian priority, it also jumpstarted growth in the supply of homegrown AI talent. Last year, more than 1,400 Ontario students began their studies in a Vector-recognized AI-related master's program, an increase of 270 over the previous year.

That increase is crucial because AI represents a once-in-a-generation opportunity to improve the lives of Canadians—not only by giving Canadian companies new tools to enhance productivity and create high-paying jobs but also by driving innovation in other areas that affect quality of life. Advances in AI-powered precision medicine are already allowing doctors to better identify disease risk and better anticipate the onset of medical crises in Ontario, such as cardiac arrest.

Artificial intelligence will be a foundational element of future economic success. The countries that lead in foundational and applied AI will position themselves to grow and prosper.

With its investments in AI research and corresponding growth in AI talent, Canada is laying the groundwork for future success. Large Canadian companies—many of whom include our founding private sector partners at Vector—are already making AI an essential (and tangible) element of their operations.

The challenge now is ensuring that the benefits of AI are extended to small- and medium-sized enterprises (SMEs), which drive both the Canadian economy and the job market. A heightened focus on efforts to commercialize and apply AI research will position these companies to better compete in both the national and global marketplace. And it will amplify the impact of AI investments already made by governments and the private sector.

We are already seeing some progress on this front, thanks in part to the federal government's 2021 commitment to invest $185-million over five years to support AI commercialization.

At Vector, we recently launched a program that helps SMEs build AI fluency and critical capabilities—so they can apply technological solutions to real-world challenges and opportunities. And this is only a beginning.

As with any success story, the risk going forward is complacency. We need to double down, not stand pat. Countries around the world are aware of Canada's momentum on AI—but many are also focused on catching up. They understand, as we do, that leadership in AI translates into increased productivity and competitiveness. Canada needs these tools of growth more than ever as it strives to recover from the economic impact of the pandemic.

Last year, the federal government renewed its support for its Pan-Canadian AI Strategy. This sends an important message about our country's determination to build on its success by attracting and retaining top talent, strengthening local and regional AI ecosystems across the country, and keeping successful AI companies here in Canada.

Tomorrow's prosperity depends on today's decisions. We position Canada for future success when we commit to supporting growth and excellence in the pivotal field of artificial intelligence.

Dr. Garth Gibson is president and CEO of the Vector Institute.

The Hill Times

Medical professionals' discomfort with digital tech is stumbling block to spread of AI in health care, say experts

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and Biggar, said that Health Canada's current regulatory regime doesn't contemplate ML in medical devices with algorithms that change over time. Algorithms can be locked, meaning their function does not change, or they can be adaptive, meaning their behaviour can change over time. The current regulatory regime doesn't accommodate the changing nature of adaptive algorithms, according to Tseng.

"If you were to have machine learning software, basically every time the machine learns something … you'd need to file a new medical device licence, or what you would do is file an amendment, which you just can't really do given that with machine learning, it's continuous," she said. "Because of the nature of how machine learning algorithms work, where it's adaptive, you get new data and therefore, your output is different, even though your input is the same. You can't continuously file for new amendments with Health Canada. That's why a new regime to reflect machine learning is required."

Medical devices approved by Health Canada currently on the market use locked, rather than adaptive, AI algorithms.

Tseng said that Canada may look to the FDA in the U.S. for guidance on how to develop a regulatory framework for AI and ML in medical devices. On Jan. 12, 2021, the FDA published an action plan proposing a "Predetermined Change Control Plan" that would include the types of anticipated modifications, based on a retraining and model update strategy, and the associated methodology being used to implement those changes.

"Right from the start when you're filing your application you specify what modifications you're expecting, and you specify the protocol or the methodology you're going to use to make sure that any risks with those modifications are managed, known, or at least assessed," said Tseng. "Maybe that's what we will do. We shall see."

Another challenge in developing regulations for AI and ML in medical devices is ensuring the data is representative of the area where it is used, according to Tseng.

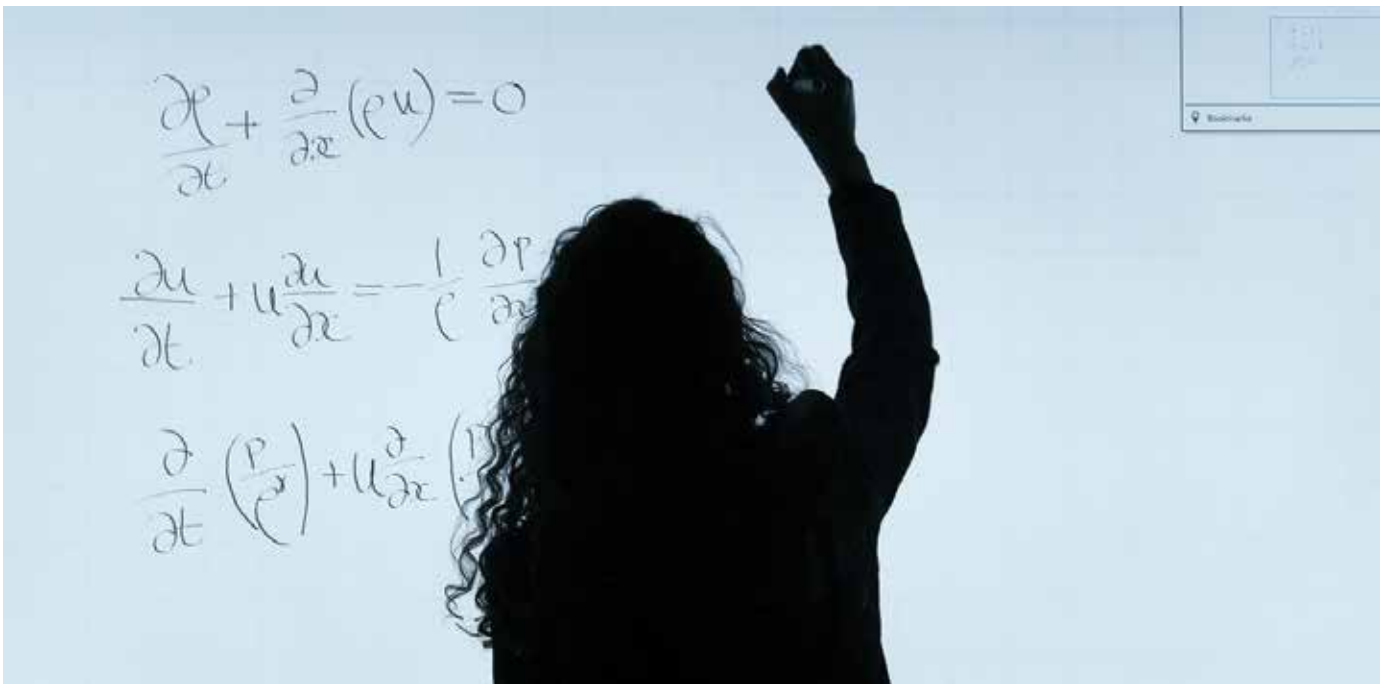
"Let's say it's a wealthier area [and] maybe the type of medical conditions you see, [or] the type of testing that's done … maybe that varies compared to what might be conducted in a different institution or in a different jurisdiction, all within Canada," she said. "That's actually really important—to make sure that that testing [and] the data you get is sufficiently reflective of whatever population it's going to be used for."

To support the AI sector, Canada's 2021 federal budget included a promise of up to $443.8-million over 10 years in support of the Pan-Canadian Artificial Intelligence Strategy, which has the objective of attracting and retaining AI researchers, and to support a national research community on AI through training programs and workshops.

jcnockaert@hilltimes.com

The Hill Times

Five barriers to the commercialization of medical AI research



Commercializing academic research has multiple benefits, including generating beneficial economic activity within Canada that can also attract highly skilled talent from overseas, writes Khaled El Emam. *Photograph courtesy of Pexels*

If we want to encourage commercialization of medical AI research from our academic medical centres, then a serious effort is needed to address barriers.

Khaled El Emam

Opinion

Consistent and significant investments in AI research in Canada have resulted in globally recognized centres of academic excellence across the country. The often-repeated challenge moving forward is to translate that academic work into commercial success. Based on my experience spinning off two companies developing technologies using AI in the medical space from the University of Ottawa and the Children's Hospital of Eastern Ontario, I see five key barriers to such academic commercialization efforts.

Commercialization of academic research in general has multiple benefits including the following:

- It is a faster path to transitioning research results into practice rather than relying on the natural technology transition process from academia.
- It converts research to valuable IP and equity that can be a source of additional revenue to academic institutions to support their broader educational mandates.
- It generates beneficial economic activity within Canada that can also attract highly skilled talent from overseas.

The barriers to gaining these benefits relate to incentives and data. For incentives, we need to:

1. **Create the right incentives for commercialization within academia.** Currently in many academic institutions the reward structure is not set up to encourage commercialization. In fact, some have argued the exact opposite—commercialization activities are an inappropriate use of academic resources. If we really want to commercialize medical AI research, the incentives need to be aligned to encourage that.

2. **Celebrate our success.** Cases where there have been successful commercialization efforts are generally unknown. We are not good at promoting these, telling the stories, and establishing a positive narrative around the conversion of research results into successful businesses. The stories we tell are important as they demonstrate what is possible, set examples, and give room for faculty and students to take some risks.

Medical AI is built on data. The ability to get access to health data to train models, and to commercialize these models, is important. This also faces some friction.

3. **Restrictive policies on IP.** Given that most health data is generated from a public system and that we have a more or less single-payer system, our data are quite valuable relative to other jurisdictions that are much more fragmented. However, the IP rights to the data and to AI models generated from the data are not always clear. This is problematic especially in the context of commercialization. And if there is an assignment of the IP in data, the terms would need to be predictable, reasonable, and not impose conditions that would be unattractive to investors.

4. **Stakeholders against the commercialization of health data.** There are stakeholders who hold strong views against the commercialization of health data, seeing data as a public resource that should only be used for the public's benefit, and only entrusted to public sector entities. Profiting from data use is not deemed to be socially acceptable. To the extent that these perspectives take hold in policy and legislative circles, that would be a strong disincentive to commercialization—no one wants to be the enemy of the people. It is difficult to scale the commercialization of research if there isn't a consensus that we should commercialize research.

5. **Consistent privacy laws that enable commercialization.** Privacy laws need greater flexibility to safely and responsibly allow health data to be disclosed to commercial entities to train AI models. This is typically done by creating non-identifiable datasets that are shared, using techniques like synthetic data generation, for example. The lack of clarity in many Canadian statutes on the obligations of companies when creating and disclosing these datasets (e.g., obligations with respect to patient consent and purpose limitation) creates uncertainty, and uncertainty results in risk-avoidance, which in turn means we throttle the commercialization of medical AI.

These barriers are not independent of each other and are somewhat inter-related. While the barriers above are specific to health data, they may manifest themselves in other verticals as well. If we want to encourage commercialization of medical AI research from our academic medical centres, then a serious effort is needed to address these barriers.

Dr. Khaled El Emam is the Canada Research Chair (Tier 1) in Medical AI at the University of Ottawa, where he is a professor in the School of Epidemiology and Public Health.

The Hill Times

How does AI factor into growing Canada's economy?

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processing, voice recognition, and autonomous vehicles—from a representative sample of more than 850,000 firms comprising the private non-farm economy. Our research found that average AI diffusion across the economy has been low. We estimate that the aggregate adoption rate for all firms in the U.S. economy was only 5.8 per cent (and 6.6 per cent when adoption is imputed) as of 2017, despite a lot of apparent investment. We are working on a new study with more details specifically in the manufacturing sector, which is a leading adopter of advanced technologies.

How does this apply to Canada? The research finds the adoption is very concentrated in larger firms, and the distribution of large firms in the U.S. is greater than those in Canada. If there are any economies of scale in AI adoption, this will slow its diffusion north of the border.

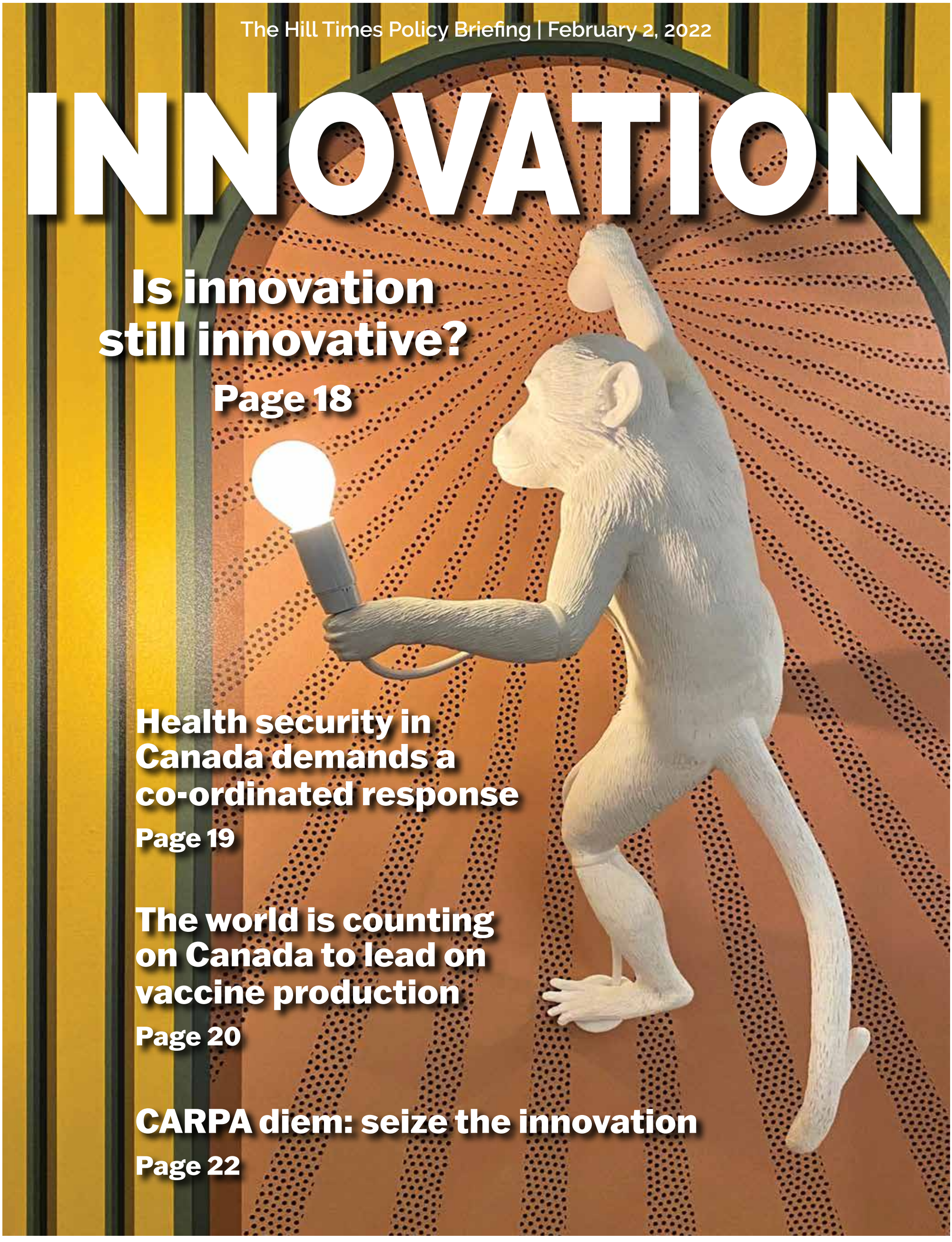
The other thing that is quite consistently emerging from my research on digital technologies, more generally, is that it is rarely enough to just think about the technology in isolation. Having other inputs that work with and reinforce the technology—what we call "complements" in the academic studies—are critical. For instance, I recently published a paper with Brynjolfsson and Wang Jin of MIT's Initiative on the Digital Economy, showing that the use of predictive analytics spread very quickly in the U.S. But it only yielded economic benefits in firms that had other inputs in place such as a robust IT infrastructure, educated managers, and a production process that was relatively stable. Canadian firms should be looking at these findings and thinking about what other inputs will be important to make AI adoption achievable *and* productive.

While we still need to continue the research, my intuition is that building the Canadian talent pool—not just in terms of developers but also managers and business leaders who can understand these issues of co-invention and co-ordination—will be essential to leveraging this fast-rising technology for growth in the Canadian context.

Kristina McElheran is an assistant professor of strategic management at the University of Toronto. She is a visiting professor at MIT and Digital Fellow at the MIT Initiative on the Digital Economy.

The Hill Times

INNOVATION



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CARPA diem: seize the innovation

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Broad support in life sciences innovation vital in preparing for future pandemics, say industry experts

Canada will need support across the life sciences sector to have the tools to contend with future health crises, according to industry and research associations.

BY JESSE CNOCKAERT

A diverse approach as the federal government invests billions of dollars into the life sciences sector will be critical if Canada is to be prepared for the next health crisis after COVID-19, according to industry and research associations.

"We can put all of our money on the mRNA [vaccine] horse, and that could come in last in the next race. What you really want to do is build the facility that trains the horses, so you've got a whole bunch of horses to bet on," said Andrew Casey, president and CEO of BIOTECanada, an industry association with more than 250 member companies in the biotech sector. "More shots on net are what we need to do to prepare for the next [health crisis], not trying to figure out the exact shot we need to take. I think nurturing an ecosystem that develops more solutions, more ideas, the talent, [and] the science, that's a better play."

The Liberal government promised more than $2.2-billion over seven years in the 2021 budget for a Biomanufacturing and Life Sciences Strategy. This includes $500-million over four years for the Canada Foundation for Innovation to support the bioscience capital and infrastructure needs of post-secondary institutions and research hospitals, and $59.2-million over three years for the Vaccine and Infectious Disease Organization (VIDO) to develop vaccine candidates and expand its facility in Saskatchewan.

Casey said the Liberal government deserves "full marks" so far for the early investments in the life sciences sector, and now it's a matter of watching how the rest play out. Innovation will need to be stimulated across the life sciences sector, because it cannot be predicted what type of response will be needed in future health emergencies, according to Casey.

Andrew Casey, president and CEO of BIOTECanada, says 'more shots on net' are what Canada needs to prepare for the next health crisis. *Photograph courtesy of BIOTECanada*

"The bigger part of these investments is the longer term—the recognition that we have to prepare for another one. What do we need to do so that we're not back in the situation of scrambling, [using] duct tape and wire to keep this plane in the air?" said Casey. "Trying to predict what the next one's going to be is next to impossible. We just don't know where it's going to come from [or] how it's going to manifest itself. Is it going to come from animals? Is it humans? You want to spread your bets out a little bit to just develop all the different types of technologies."

Canada was at a disadvantage early in the pandemic because the country's protein-based vaccine production facilities were not capable of producing the Messenger RNA (mRNA) vaccines needed in the fight against COVID-19, according to Casey. Actions to address this gap include the federal government announcing a memorandum of understanding on Aug. 10, 2021, with vaccine developer Moderna to build an mRNA vaccine production facility in Canada.

"My analogy at the time was: 7Up and champagne are both bubbly liquids that you drink and are stored in bottles and served in glasses, but that's where the similarity ends. You cannot ask Moët & Chandon to make 7Up, and you can't have 7Up make champagne. It's a very different manufacturing process, and the same thing is true for vaccines," said Casey. "The mRNA vaccine manufacturing process is completely different from a traditional protein-based vaccine. You cannot ask a Merck facility or a GSK facility here to do mRNA vaccines, and vice versa."

Canada will need to think bigger and broader than just innovation in biomanufacturing if the goal is to be prepared for future pandemics, according to Jason Field, the president and CEO of Life Sciences Ontario (LSO), an industry association for life science companies in the province.

Jason Field, the president and CEO of Life Sciences Ontario, says Canada needs to 'think beyond just COVID-19.' *Photograph courtesy of Jason Field*

Field compared the life sciences sector to a garden, arguing that to help it grow means watering the whole garden, and not just pouring water on a single spot, borrowing an analogy he credited to Dr. Sheila Singh, a professor in the surgery and biochemistry department at McMaster University in Hamilton, Ont.

"I think that a lot of the efforts have been focused around specifically vaccine production as it relates to COVID-19, as well as other areas of vaccine production, which are good, but we have to think beyond just COVID-19," said Field. "We are definitely in a better position than we were pre-pandemic, but we still need a lot of work around maintaining those investments, and continuing to invest in the other areas … including our building capacity and our health system."

The Liberals' Biomanufacturing Strategy includes a proposal to support post-secondary institutions, research hospitals, and Canadian scientists to help grow the talent pool in the life sciences sector, and to take steps to close the gaps in the biomanufacturing supply chain.

Innovation Minister François-Philippe Champagne told *The Hill Times* that the federal government is investing to expand vaccine-production facilities using 'a wide range of technology platforms.' *The Hill Times photograph by Andrew Meade*

Field said the strategy provides a good framework, but needs to be fleshed out to ensure investments in life sciences support long-term growth, and aren't just a "flash in the pan."

"We know very clearly the direction [Prime Minister Justin Trudeau] wants to take Canada … in terms of [climate change] specifics, but we haven't seen that same top-down commitment around Canada's vision as leaders in life sciences," said Field. "I want to see policymakers looking through the lens of 'does this support a healthy life sciences ecosystem? Does this support the direction and vision of biomanufacturing life sciences in Canada?' That, I think, is a component that's missing."

Casey said it will be important to maintain an attitude of support for the life sciences sector that doesn't end with the construction of new facilities.

Procurement Minister Filomena Tassi announced on Jan. 17 Canada had received its first shipment of 30,400 treatment courses of Pfizer's COVID-19 oral antiviral treatment, Paxlovid. *The Hill Times photograph by Andrew Meade*

"The athletes don't go home between the Olympics and sit on the couch and eat, drink, and eat chips and then wake up one day before the Olympics. They've got to be physically fit throughout the four-year period, right? It's the same thing," said Casey. "Use these facilities to really nurture the ecosystem, spin up new ideas, new companies, new innovations and support the growth of companies. You use it in between the crises, so you're even further enhancing the capacity of the ecosystem to respond to the next crisis or other ailments like cancers and neurological disease."

The Liberal government's approach to supporting the biomanufacturing sector has included expanding vaccine-production facilities using "a wide range of technology platforms," which includes new mRNA vaccines, as well as production of other biologic drugs, such as monoclonal antibodies and genetic therapies, according to Innovation Minister François-Philippe Champagne (Saint-Maurice—Champlain, Que.) in an emailed statement to *The Hill Times* on Jan. 27.

"As new and expanded capacity becomes operational over the next few years, we will soon be able to produce vaccines at population scale using a variety of cutting-edge technologies, including for example mRNA vaccines, protein subunits and virus-like-particles," said Champagne in the email. "This will position us to be more self-sufficient in meeting future COVID-19 variants and other pandemic diseases, no matter what technologies will be required, and to further contribute to wider responses to global health emergencies."

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Policy Briefing **Innovation**

Canada needs a responsible quantum innovation policy

A quantum strategy born out of last year's budget should not simply engage with equity, diversity, inclusion, and decolonization, but consider it as a foundational layer to build a resilient quantum ecosystem.

Tina Dekker & Florian Martin-Bariteau

Opinion

Quantum technologies are leading the next technological revolution, and nations are racing against time. Lacking a coherent and comprehensive vision, Canada seems to be finally adding quantum technologies to the top of its innovation policy agenda. But will it be able to learn from others, and from its own pitfalls with artificial intelligence, to take the lead and bring forward an innovation policy that puts Canadian society at its forefront?

Quantum technologies will inevitably affect society and disrupt it as the technology matures. It will underpin next-generation electronics and nanotechnologies, changing how we see and measure our world, and offer ultra-secure communication channels. Quantum computing will offer unique computational capabilities that can potentially transform numerous industries with improved optimization and modelling. Yet the same computational power that may help solve some of the world's toughest problems, such as climate change, may also be abused, exacerbate global inequalities, impact the environment, create resource scarcity, pose significant cybersecurity and national security risks, or facilitate controversial practices such as algorithmic surveillance and genetic engineering.

After years of waiting and lagging behind our partners, the government finally announced the development of a national quantum strategy for Canada as part of the 2021 budget, with a seven-year commitment of $360-million. The government opened the conversation to stakeholders in its first public consultation and sought input on issues of talent, commercialization, adoption, and security. The consultation also mentioned equity, diversity, and inclusion. Yet the survey was clearly directed to industry and STEM experts, inquiring about the quantum field in which the participant is an expert with no inquiry into the opinion of experts in social sciences, law, and ethics. A false start, if not a *faux pas*, for an inclusive and responsible endeavour.

Many countries are developing quantum strategies with a strong focus on innovation. However, societal, ethical, legal, and policy considerations should not be an afterthought that is displaced by the drive for innovation. Canada should learn from its partners—like Australia, whose chief scientist called for diversity and inclusion in quantum innovation—as well as learn

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Canada should shift from the attempt to define a national innovation strategy to greater support for local and regional initiatives, writes Ken Coates. *Photograph courtesy of Unsplash*

Is innovation still innovative?

Tinkering with Canada's existing innovation policies will not transform the national economy into a creative economic power. Governments need to rethink their approaches and look for innovative innovation policies.

Ken Coates

Opinion

For the last 30 years, the world has been awash in the rhetoric of innovation. National and regional governments have committed billions of dollars to building truly innovative economies. The Government of Canada is revising—not for the first time—our nation's approach to innovation, but will the new approach be innovative?

Innovation is complicated. Governments need the workforce, businesses, research capacity, and public acceptance necessary for the development of a technology-enabled economy. Achieving such an outcome requires government funding, careful co-ordination between the state, business, and institutions, strong global awareness, and an ability to act decisively.

It is no surprise to discover that Canada is, at best, mid-range globally in terms of technological and commercial innovation. We do reasonably well on some measures, such as government support for basic research. We are far from nimble technologically or commercially. Our regulatory burdens are at the high end among competitor nations. Indeed, in most measures of innovation, investment, and activity, Canada's performance is unremarkable and, in some areas, disappointingly dull.

For several decades, national innovation policies followed a simple "innovation equation":

Expand Post-Secondary Education + Improve Basic Research + Invest in Commercialization

Done properly, these investments result in **Job Growth + Economic Prosperity**.

This approach was popularized by Silicon Valley and emulated around the world, including in the successful innovation environments in Waterloo, Ont., Ottawa, Montreal, Vancouver, Calgary, and in the emerging centres of Prince Edward Island, Sherbrooke, Que., and Kelowna, B.C.

The ubiquity of the innovation equation can be seen in hundreds of government announcements about college, polytechnic, and university spaces, money for major scientific facilities, research grant programs and student funding, new applied technology programs and institutions, start-up incubators, R&D financial support, and strategies for scaling up business. There is no shortage of money for innovation.

Innovation investments are as commonplace as cold winter winds on the Prairies. They support a comforting narrative: that governments are preparing the country for the vicissitudes of the 21st century economy. When we hit the big time—JDS Uniphase, Nortel, Blackberry, Open Text, Ballard Power, Shopify, among others—governments rush to celebrate their success. The country loves high tech startups, like current shooting stars Maple, Bolt Logistics, and ApplyBoard, for they demonstrate Canadian competitiveness.

But observers know the problems. Canadian innovations, often government funded, are frequently sold outside the country. Many highly skilled Canadian trainees build their careers in other nations. Few Canadian companies scale up into the 95/5 firms (international sales/Canadian sales) that demonstrate global competitiveness. Government tax breaks underperform. Grant programs have cumbersome processes, and a predication toward caution rather than risk taking. Companies continue to underinvest in new technologies and digitization, limiting productivity gains.

Governments devote a great deal of money to their innovation agendas. A series of Innovation Superclusters received more than $1-billion each in government funding, with industry and other partners matching those investments. The announcements were greeted with loud political hosannas. But the early excitement has not been followed by major commercial developments, although these may come.

For a country that routinely spends great sums on innovation, Canada maintains a traditional economy, largely dependent on natural resources and manufacturing for our continued prosperity. Tinkering with Canada's existing innovation policies will not transform the national economy into a creative economic power. Governments need to rethink their approaches and look for innovative innovation policies.

This will require a review of the innovation equation because the traditional spending has not produced the technology-centred economy that promoters promised outside a few centres. There are many creative ideas on how to reform our approach to economic and technological transformation, but they are falling on deaf ears. The federal government's fascination with a Canadian version of DARPA, the U.S. government-funded high-risk research initiative, has been widely panned and is unlikely to produce significant results.

Canada must review our approach to financing corporate R&D, ensuring that the granting and support systems operate at the speed of contemporary business. Measures are needed to slow the outflow of key personnel, ideas, patents, and companies. The current emphasis on basic research should be balanced by greater priority to applied development. More significantly, the country should shift from the attempt to define a national innovation strategy to greater support for local and regional initiatives. Canada absolutely must prioritize the support of entrepreneurs and wealth creation, generally. The latter is a serious national weakness.

Innovation-based economies are emerging across Canada. In addition to the best-known centres, localized developments are underway in Victoria, B.C., Whitehorse, Yukon, Saskatoon, Sask., Halifax, N.S., and St. John's, N.L. But we are not keeping up with international developments and are not keeping pace with our competitors. Canada can do much better. Our economic future depends on our ability to take a truly innovative approach to economic and technological innovation. That our strategies have become dull, imitative, and predictable is the antithesis what is needed for 21st century economic competitiveness.

Ken Coates is Canada Research Chair in Regional Innovation at the Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan. He is a distinguished fellow with the Macdonald Laurier Institute, with responsibilities for Indigenous and northern issues.

The Hill Times

Health security in Canada demands a co-ordinated response

Effective implementation of a national biomanfacturing and life sciences strategy depends on deep collaboration among all actors engaged in the bioinnovation ecosystem.

Christine Allen

Opinion

Confronted with an urgent health crisis, the Canadian government turned to science. A rapid mobilization effort not seen since wartime increased the availability of PPE, created important national networks of scientists to inform the pandemic response, and secured vaccine supply. Canada is now expanding biomanufacturing facilities and spurring domestic vaccine development. With the Biomanufacturing and Life Sciences Strategy, the federal government hopes to increase the country's capacity to respond to health emergencies and drive economic growth through innovation.

Yet, as the immediate crisis promises to recede, some of the challenges that led to Canada's lack of preparedness remain. By aiming to strengthen each element of the life sciences ecosystem, from research systems, to infrastructure, talent development, and commercialization, the Canada Biomedical Research Fund and the Biosciences Research Infrastructure Fund, coupled with the Strategic Innovation Fund, have begun to provide a framework for co-ordination among stakeholders.

Effective implementation of a national strategy depends on deep collaboration among all actors engaged in the bioinnovation ecosystem—startups, universities, hospital networks, pharmaceutical companies, and the federal government. As a recent report from the C.D. Howe Institute argued, Canada's small share of the global pharmaceutical market reinforces the need to integrate the research, innovation and regulatory spheres.

Canada has the foundation for a competitive and dynamic life sciences sector. The country ranks in the top four global health and bioscience hubs. World-class life science hubs in our major metropolitan centres are a training ground for university and private-sector research talent, and a magnet to attract collaborators from around the world. These ecosystems are the foundation for drug discovery, therapeutics development, and clinical trials essential to growing industry and preparing for future health threats.

Thanks to these ecosystems, groundbreaking companies such as Deep Genomics, AbCellera, AmacaThera, Edesa Biotech, and I3 Biomedical Inc. are transforming health care, increasing Canada's supply of PPE, and creating jobs for Canadians.

Retaining and recruiting talent is critical. When I started as a professor in Toronto, 20 years ago, my students graduated and went on to domestic opportunities. Now, many are recruited by leading U.S. companies. We can turn this around if we create a thriving national biomedical ecosystem that trains, retains, and attracts top talent.

Can Canada's ambition match that of our competitors? Faced with similar shortages in home-grown vaccines, France has announced investments of 7-billion euros to address every aspect of the country's medical discovery to patient care continuum. In Canada, between 2014 and 2018, in both universities and the private sector, the number of full-time researchers per million inhabitants is reported to have declined by 4.8 per cent.

New investments in our life sciences ecosystem will improve health care beyond the immediate needs of the pandemic. Canada must catch up on preventative cancer screenings, deploy regenerative medicine to tackle the acute pressure on our health-care system from diseases like diabetes and heart failure, and grow the workforce across the health-care system. At the University of Toronto, in collaboration with our hospital partners, we are leveraging our location at the heart of Canada's largest tech and life sciences hub to advance these priorities.

The pandemic has turned scientists and public health experts into household names. As a result, we have a unique opportunity to continue to keep the conversation and importance of science and health at the forefront of public policy. As this crisis transitions toward its end, it is time to focus on moving from an urgent response to implementing a sustained strategy that brings all stakeholders to the table and strengthens Canada's health security.

Christine Allen is the associate vice-president and vice-provost, strategic initiatives, at the University of Toronto and a professor in the Leslie Dan Faculty of Pharmacy.

The Hill Times

Sadly, our current government is failing to ensure that Canadian companies can produce and get vaccines to market while more than half of Canada's promised vaccine donations to the global COVAX facility remain unfulfilled, write Conservative MPs Ed Fast and Ryan Williams. *Unsplash photograph by Steven Cornfield*

The world is counting on Canada to lead on vaccine production

Let's get the Medicago and Novavax vaccines approved so that Canada can take up a leadership role in the COVID-19 recovery effort instead of just waiting on the rest of the world to solve our problems for us.

Conservative MP Ed Fast & Conservative MP Ryan Williams

Opinion

Pablum. Insulin. Child-resistant medicine containers. Heart-valve replacements. Cystic fibrosis and stem cell research. Discovering T-cell receptors in cancer research.

With these medical advances and many more, each time Canada has led the world.

We've always had the capacity to be an "innovation nation," led by a world-class education system, abundant talent, and the know-how of our Canadian innovators. When innovation and creativity are called for, invariably the world turns to countries like Canada for solutions. Never has this been more evident and important than now, as we deal with the challenge of an increasingly persistent pandemic.

Sadly, our current government is failing to ensure that Canadian companies can produce and get vaccines to market while more than half of Canada's promised vaccine donations to the global COVAX facility remain unfulfilled. And despite the government's spurious claims of having attracted large amounts of investment to Canada's biomanufacturing sector, these claims belie the fact that, over the last six years, Canada has experienced historic net outflows of capital. An unfavourable tax environment, burdensome regulations, and a lethargic approval process have caused the world to turn away from Canada as a preferred investment destination. That must change.

Two Canadian vaccine manufacturers, Novavax and Medicago—the latter plant-based, the former protein-based—are perfectly positioned to offer alternatives for those who may be vaccine hesitant and to help vaccinate the rest of the world. Disappointingly, almost two years into the pandemic, these companies are still not in production, and Canada has yet to produce a single dose of its own vaccines.

In February 2021, Industry Minister François-Philippe Champagne announced a $160-million investment for the Novavax facility, saying "we hope to have production starting in December." The federal government has also committed $173-million towards the Medicago vaccine candidate, which will be produced in Quebec City. This came after the ill-fated and imprudent CanSino deal with China failed to produce a made-in-Canada COVID-19 vaccine and wasted precious time and millions of dollars.

At a House Health Committee meeting on Jan. 18, Health Minister Jean-Yves Duclos was asked when the new Canadian vaccines would be approved. The minister couldn't answer, other than to leave his deputy minister Stephen Lucas to explain that "we expect to be making decisions on both vaccines in the coming weeks."

That's not good enough. Health Canada has been reviewing Novavax's protein-based vaccine for a least a year. Medicago has had its COVID-19 vaccine under review by Health Canada since April of last year.

> "An unfavourable tax environment, burdensome regulations, and a lethargic approval process have caused the world to turn away from Canada as a preferred investment destination. That must change.

In this time of crisis, Canada must think and act differently. After all, innovation is about "thinking outside of the box" and pushing the limits of research. It's about strategic partnerships between government and the private sector that unleash the power of Canada's innovators to deliver ground-breaking discoveries and products to the global marketplace. And in today's pandemic environment, it's about delivering safe and effective vaccines and therapeutics in a timely way to keep Canadians healthy.

Let's get the Medicago and Novavax vaccines approved so that Canada can take up a leadership role in the COVID-19 recovery effort instead of just waiting on the rest of the world to solve our problems for us.

We've done it before, and we can do it again. It's time our government re-asserts itself and demonstrates the leadership that the world expects from Canada.

Hon. Ed Fast, MP, is a lawyer, former international trade minister, Member of Parliament for Abbotsford, B.C., and the Conservative industry critic. MP Ryan Williams is a hotelier, passionate innovator, Member of Parliament for Bay of Quinte, Ont., and the Conservative deputy industry critic.

The Hill Times

Policy Briefing **Innovation**

CARPA–Supercluster synergy can reshape Canadian innovation

While Canada needs bold initiatives like the Superclusters, it also needs a mechanism to bring all policy and business instruments together, and create new international business partnerships.

Bill Tam

Opinion

Of the many aspects of the COVID-19 pandemic that will be examined and re-examined in the months and years to come, its spurring of demand-side innovation should be front and centre. In Canada, this examination must give way to action on two complementary fronts: catalyzing breakthrough ideas and technologies, and bridging the innovation continuum to commercialize market-based applications.

The good news is that we already have one of those two pieces on the board, with the other on the verge of falling into place.

For decades, Canada has favoured a supply-side approach to innovation programming, with R&D investments, start-ups, venture capital, and university-industry relations yielding the bulk of technological advancements. Yet, as Montreal's Institute for Research on Public Policy pointed out in a 2019 report, this supply-side focus is being hindered by an economic catch-22. On the one hand, "if businesses do not use the latest technologies, they fall behind in productivity." On the other hand, "if businesses do not sense a readiness and ability of the market to absorb their innovations, they are reluctant to innovate."

Innovation Minister François-Philippe Champagne is pictured in Ottawa on Oct. 26, 2021. Shaped by government and its priorities, CARPA presents opportunities for socially driven breakthrough innovation while mobilizing collaboration with suppliers, customers, universities, research institutes, government, and non-profits, writes Bill Tam. *The Hill Times photograph by Andrew Meade*

Breaking that vicious cycle is one of the key goals of the Innovation Supercluster Initiative (ISI), which since 2017 has successfully encouraged the adoption and creation of new technologies "where large companies and Canadian SMEs work together to find integrated technology solutions to a series of mission-oriented problems," according to a recent Brookfield Institute study.

Across Canada, the five Superclusters have been fine-tuning the art of collaborative innovation, bringing together start-ups and scale-ups, academia and researchers, government agencies, community organizations and industry leaders to develop solutions to some of the world's biggest problems: climate adaptation, sustainability, food security, diversity, and inclusion, health cost sustainability and outcomes, the list goes on. Industry is the essential partner investing in ambitious R&D projects that capitalize on the Superclusters' network reach and proven capacity to commercialize market-based innovations.

While Canada needs bold, scaled, business-driven initiatives like the Superclusters, it also needs a mechanism to bring all policy and business instruments together in support of the clusters, as well as create new international business partnerships to strengthen both cluster development and enhance Canada's brand in these areas. That is where the proposed Canada Advanced Research Projects Agency, or CARPA, comes in. Shaped by government and its priorities, CARPA presents opportunities for socially driven breakthrough innovation while mobilizing collaboration with suppliers, customers, universities, research institutes, government, and non-profits. In this regard, CARPA can take its cues from the Superclusters, which together have already created a network of more than 7,000 organizations across Canada.

At the same time, CARPA can build the capacity to help ideas and technologies reach domestic and global customers through public procurement, access to private capital, and other public and private means. Indeed, American multinationals like Lockheed Martin and Boeing offer prime examples of how the United States' hugely successful Defense Advanced Research Projects Agency (DARPA) model of innovation, matched with public procurement at scale, can supercharge both innovation and economic growth.

While there are and inevitably will be promoters and detractors of CARPA, a new report from the Ottawa-based Public Policy Forum is right in asserting that we need to invest in user-driven innovation to address the structural weaknesses of our innovation continuum. Here, the synergy between CARPA and Superclusters has the potential to create a national innovation ecosystem where the sum is greater than its parts.

The pandemic has provided us with a unique opportunity to double down on market-based innovation to strengthen the foundation for long-term prosperity. As the Public Policy Forum report puts it, "There is reason to be energized by the growing momentum for different models of innovation policy in Canada. It is indeed time to shake up Canada's underperforming innovation ecosystem and recommit the country to the goals of innovation, technology and progress."

Ultimately, CARPA and the Superclusters are complementary. Properly aligned, they will work together to reshape innovation in Canada.

Bill Tam co-founded the development of the Digital Technology Supercluster and currently serves as its chief operating officer.

The Hill Times

CARPA diem: seize the innovation

Prime Minister Justin Trudeau is pictured in Ottawa on Jan. 12. Instead of $950-million spread across five superclusters, the Liberal platform promised that the Canada Advanced Research Projects Agency will launch with an initial endowment of $2-billion. *The Hill Times photograph by Andrew Meade*

Canada will need more than a well-funded advanced research agency if we want its work to turn into innovation and sustainable economic growth.

Benjamin Bergen

Opinion

It can be hard to cast your mind back to the halcyon days of 2015 and 2016, but I remember it fondly. In the early days after the Liberal government took office, there was a real sense of excitement around innovation in Canada.

Prime Minister Justin Trudeau went viral for a video explaining quantum computing. The federal government retooled the immigration system to fast-track highly skilled tech visas, giving a shot in the arm to firms bringing talent to Canada.

And the crown jewel of it all was supposed to be a $900-million program to create hotbeds of innovation across Canada: the so-called superclusters.

A few years later, the Parliamentary Budget Officer would scrutinize the program and conclude that the superclusters were unlikely to achieve their lofty goals for economic stimulation and job creation. In the fullness of time, there may yet be some benefits to emerge from the superclusters, but it seems like former innovation minister Navdeep Bains' excitement from the early days has not manifested itself into hotbeds of regional innovation as we were once promised.

So, what should we make of last year's campaign promises from both the Liberals and Conservatives to create some Canadian advanced research agency, modelled on the United States' Defense Advanced Research and Projects Agency (DARPA)?

The optimistic interpretation is that it presents an opportunity to learn from the superclusters, and design a program which is more effective.

Already, there's reason to be optimistic on that front. Instead of $950-million spread across five superclusters, the Liberal platform promised that the Canada Advanced Research Projects Agency (CARPA) will launch with an initial endowment of $2-billion.

Moreover, we could do a lot worse than to take inspiration from DARPA, which has a solid track record for success by funding ambitious innovation challenges led by leading experts over short three- to five-year timelines, with projects being selected largely independent of political interference. All this allows DARPA to take big swings, and risk big misses because they also hit home runs.

But Canada will need more than a well-funded advanced research agency if we want its work to turn into innovation and sustainable economic growth. Canada already has world-leading universities doing cutting-edge research.

The key dimension that will be needed when setting up CARPA will be a focus on commercialization and ensuring that this agency is geared towards solving problems with real potential for economic benefits.

The leadership of CARPA should be free from political meddling, but they should be mandated to focus on real challenges that exist in Canada and globally, where Canadian companies have the talent and IP to solve problems and commercialize the solutions globally.

The leadership of this new agency must also consider Canada's strengths, as well as global market opportunities when planning their work. This requires strategic thinking: if the research projects aren't validated with significant potential clients, we risk pursuing dead ends, or creating a reliance on public sector contracts.

We should also focus on areas where existing Canadian companies have the chance to excel. From artificial intelligence breakthroughs to battery technology, we've seen examples where Canadian research winds up propelling foreign tech giants. Canada's next great research breakthroughs should propel homegrown firms.

This is a topic that Dan Breznitz writes about in some detail in his recent book, *Innovation in Real Places*. Breznitz talks about policymakers identifying the "agents of innovation—companies and individuals" in a region and identifying what kinds of support they need.

"Find the most effective ways to stimulate said agents to innovate and grow their businesses," Breznitz writes. "While it would be truly wonderful, for multiple reasons, to have the most highly educated science, technology, engineering and medical workforce in the world, if the individuals in that workforce don't engage in innovation, then all your investment in skills and education is for naught."

In the CARPA idea, we see real potential, but it must be developed in collaboration with Canadian innovators, and what they bring to the table. In fact, at the outset of the government's new mandate we see a real glimmer of optimism on the innovation file.

Both the Liberals and the Conservatives promised in their platforms to modernize the Scientific Research and Experimental Development tax credit, the cornerstone innovation funding mechanism in Canada. And the Liberals committed to creating a council of expert economic advisers, which would help add capacity and create a conduit for consultation with the private sector on economic matters.

These measures aren't as sexy as a shiny new advanced research agency taking aim at ambitious challenges, but arguably they're more important. Altogether, what matters is the ethos of collaboration, and a sense of urgency that creating the conditions for innovation success in Canada will drive 21st century prosperity.

Benjamin Bergen is president of the Council of Canadian Innovators, a national, non-partisan business council made up of more than 140 homegrown Canadian scale-up companies.

The Hill Times

Canada needs a responsible quantum innovation policy

Quantum technologies will inevitably affect society and disrupt it as the technology matures. They will underpin next-generation electronics and nanotechnologies, changing how we see and measure our world, and offer ultra-secure communication channels, write Tina Dekker and Florian Martin-Bariteau. *Photograph courtesy of Unsplash*

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from its own mistakes. Canada's CIFAR-led 2017 pan-Canadian AI strategy has been a global success story for research and innovation. However, despite best efforts, the AI strategy lacks true investments in the societal, ethical, and legal policy considerations that should be realized in AI deployment. Despite such issues being well documented and discussed everyday in the news and Parliament, Budget 2021 renewed the AI strategy without the necessary update.

A quantum strategy born out of last year's budget should not simply engage with equity, diversity, inclusion, and decolonization, but consider it as a foundational layer to build a resilient quantum ecosystem. An ethical and diverse approach begins with who is given a seat at the table, from the design stages to funding decisions. The development and deployment of the strategy need to include members from Canada's diverse communities from the very beginning, and experts from social sciences and law. Only an inclusive approach will foster long-term, responsible innovation in quantum technologies, and avoid the setbacks that AI has experienced from pushing for commercialization before considering the societal impacts of deploying the technology in high stakes contexts.

Canada should foster a responsible development of quantum technologies in view of their potential societal and geopolitical impact. Active steps should be taken to mitigate the potential harms and incorporate safeguards, such as through regulation, to ensure the responsible development and commercialization of quantum technologies. This might include classifying some quantum technologies under the military, dual-use, or strategic goods frameworks to control their development, export, commercialization and use. Owing to concepts like retroactive decryption, the security risks of quantum technologies require foresight and readiness before the technologies are operationalized. Canada needs its "quantum firewall" prepared to intercept threats before they can take hold in society.

Quantum innovation also requires competition and antitrust policy to support the Canadian ecosystem. For example, much of the quantum computing hype is currently led by MAGIIQ—Microsoft, Amazon, Google, IBM, Intel, and Quantinuum. This dominance raises significant concerns to ensure fair and equal access to the technology through legal instruments aimed at protecting ethical values. As quantum computing will enable other technologies, such as AI systems and materials engineering, whomever dominates the space will achieve a competitive edge in other markets as well as lead to potential shifts in geopolitical powers, as we're currently seeing with lithium and chips.

Will Canada simply be another pawn in the race for the illusion of national dominance and political "quantum sovereignty"—or will Canada be a leader and change the rules of the global "race" with a responsible quantum innovation policy? The strategy will tell us.

Tina Dekker is a research fellow of the University of Ottawa Research Chair in Technology and Society. A graduate of the Institute for Quantum Computing at the University of Waterloo, she is currently a JD candidate at the University of Ottawa. Dr. Florian Martin-Bariteau holds the University Research Chair in Technology and Society at the University of Ottawa, where he is an associate professor in the Faculty of Law, and the director of the university's Centre for Law, Technology and Society.

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Innovation Minister François-Philippe Champagne is pictured at the National Press Theatre on Feb. 6, 2020. There is no silver bullet that will propel Canada to the forefront of technology and innovation-driven economies. Rather it is a combination of programs, people, and policies that create and expand the ecosystem and provide incentives, opportunities and the ability to scale and compete globally, writes Elizabeth Cannon. *The Hill Times photograph by Andrew Meade*

Getting CARPA right to deliver transformational innovation

Regardless of the area of focus, CARPA needs to start small with minimal bureaucracy, be staffed with people who have industry and/or academic experience, and be an independent structure for creativity and nimbleness.

Elizabeth Cannon

Opinion

In 1983, I was a summer student at a Calgary-based high-tech company that had purchased the first transportable commercial GPS receiver for use in offshore rig positioning. Costing US$150,000 and weighing 25 kg, we were tasked to evaluate its capability, which entailed lugging it around and buying ice packs to keep it cool due to its high power consumption. Little did I know that decades later, GPS chips would be the size of a fingernail, exceedingly low cost, and embedded into countless devices used every day. This phenomenal evolution can be traced back to the early 1980s when the U.S. Defense Advanced Research Projects Agency (DARPA) launched a program to miniaturize GPS, thus creating more effective military equipment, but more importantly, myriad commercial applications that support today's thriving global GPS industry.

Created in the late 1950s by the U.S. government, DARPA also had its hand in the development of enabling technologies such as the internet and voice recognition. Its mission to drive transformational change rather than incremental advances is at the core of its success. Key characteristics are that it is nimble, focused on impact, and accepting of risk and failure. Being small, relatively free from bureaucracy, and outsourcing R&D to teams of industry players and academic researchers have all been identified as keys to its success. Perhaps most crucial are the program managers that often have industry and academic experience, and who serve for three to five years, bringing new ideas and talent to DARPA with a focus on implementation.

DARPA's success has motivated replication in other jurisdictions, including Canada. The creation of the Canada Advanced Research Projects Agency (CARPA) is a commitment by the federal government to support high risk/high reward R&D to drive technological breakthroughs in order to grow companies and skilled jobs. However, for CARPA to be successful it is important to understand the risks and opportunities it would create and how it would fit into Canada's innovation ecosystem and broader science-based industrial strategy. Replication of DARPA is risky, even for the U.S. where ARPA-E was created to support the energy sector, and where the common view is that it has not lived up to expectations.

Canada benefits from strong university research capacity, which punches above its weight on several metrics including excellence. However, there is a lag in translating research to industry and scaling companies to become international powerhouses. And relative to other jurisdictions, there is a declining investment in university discovery research, significantly lower R&D spending in the private sector and a lower rate of industry employment of PhD graduates. This is combined with an inherently smaller national procurement system and strategy, a general aversion to the high-risk/high-reward mindset, which entails acceptance of failure at the political level, and a poor history of mobility of personnel between the public, private, and academic sectors that underpins the development of program managers with the right experience to drive results.

All of these factors lead to the need for careful design and implementation of CARPA. First and foremost, focus must be in one or two areas where Canada has robust research and industrial capacity, transformational problems to solve and an obvious client for demand pull. Agtech would check these boxes with major challenges such as food security and supply front and centre. Similarly for Canada's commitment to net-zero emissions, although other programs such as Pathways to Net Zero have already been formulated. Life sciences, with a focus on vaccine development and manufacturing, would fill an obvious void but would need significant investment for industry scale-up. Quantum science is where AI was 20 years ago in Canada. There is a growing, high-quality research community, soon to be supported by the recently announced National Quantum Strategy, but it may be too early for CARPA. Regardless of the area of focus, CARPA needs to start small with minimal bureaucracy, be staffed with people who have industry and/or academic experience, and be an independent structure for creativity and nimbleness, while ensuring appropriate accountability.

There is no silver bullet that will propel Canada to the forefront of technology and innovation-driven economies. Rather it is a combination of programs, people, and policies that create and expand the ecosystem and provide incentives, opportunities and the ability to scale and compete globally. Canada already has a multitude of innovation programs aimed at increasing research capacity, nurturing talent and incenting industry. The addition of CARPA to the mix can build on these foundations, but its success and that of Canada's innovation economy will ultimately hinge on doing things differently, which takes the right leadership and political will. The prize is worth it.

Dr. Elizabeth Cannon is president emerita of the University of Calgary. Her research has been on the forefront of GPS since 1984 in both industrial and academic environments, and she commercialized technologies to more than 200 agencies worldwide. She is currently a corporate director and seed-stage investor, particularly in female-led companies.

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Broad support in life sciences innovation vital in preparing for future pandemics, say industry experts

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Liberal investments in the biomanufacturing sector during the pandemic have included $173-million towards Medicago in Quebec to develop a plant-based, virus-like-particle vaccine and for the construction of a biomanufacturing facility, and for $175.6-million towards AbCellera in B.C. to support construction of a manufacturing facility for the production of therapeutic antibodies. The 130,000-square-foot facility is scheduled to be completed by early 2024, and at full capacity "will employ hundreds of highly skilled scientific personnel," according to an AbCellera press release from June 22, 2021.

"At the same time, we are supporting a world-leading research and innovation ecosystem—developing the vaccines and therapeutics to meet the needs of future health threats and building a sustainable, innovative, global industry. These investments will help Canada to be a world leader in emerging technologies like cell and gene therapy, and will continue to generate economic returns long after the COVID-19 pandemic has passed," said Champagne in the email.

During the pandemic, the federal government's Advanced Manufacturing Supercluster (NGen) has funded 33 projects valued at more than $122-million to support the production of technologies, equipment, and medical devices, including ventilators and test kits, according to Champagne.

"Recognizing the contributions of domestic manufacturers to the COVID-19 response, the government continues to provide support to domestic PPE manufacturers to gain market access globally," said Champagne. "Thanks to partnerships with Canadian businesses, there is significant domestic supply of most PPE commodities, making Canada more self-sufficient and prepared for future pandemics."

On June 17, 2021, Champagne announced an investment of up to $28.9-million towards Meltech Innovation Canada Inc., a division of Medicom Group Inc., to support construction of a factory dedicated to manufacturing the fabric required to produce respirators and surgical masks.

Thinking long-term, Canada will need investments and policy decisions that support antiviral medication, antibody therapy, and attracting talent to the sector, to be prepared for the next health crisis, according to Dr. Volker Gerdts, director and CEO of the Vaccine and Infectious Disease Organization at the University of Saskatchewan.

Antiviral drugs are different from vaccines because a vaccine helps prevent a virus from infecting a person by providing immunity, and antivirals attempt to treat a virus by slowing down an infection after it has already entered a person's body.

On Jan. 17, Health Canada authorized the use of an oral antiviral treatment developed by pharmaceutical company Pfizer. The treatment, Paxlovid, is intended to treat mild to moderate COVID-19 cases in non-hospitalized adults who are at risk of progressing to serious illness. The federal government received an initial shipment of 30,400 treatment courses of Paxlovid on Jan. 17, with 120,000 more expected to be delivered by the end of March.

Dr. Volker Gerdts, the director and CEO of VIDO, says Canada must ensure to have facilities that can produce therapeutics. *Photograph courtesy of David Stobbe*

"The investment by all levels of government into the biological sector has really helped with developing capacity to the manufacture of vaccines, both on the pilot scale as well as through deals with large companies for the commercial deals, and we would hope to see the same also for the therapeutics, and there is probably some need for more investment in those areas," said Gerdts. "As we want facilities that can produce vaccines, we also want to make sure that we have facilities that can produce therapeutics in the future, and depending on the type, you can do some in the same facility."

Canada also needs to think about training skilled workers to make sure that the vaccine production and life sciences facilities currently being built will have access to a suitably wide talent pool, according to Gerdts.

"In the skills of manufacturing vaccines, I would say that's another shortage that Canada has right now, because we didn't have all these facilities. Training has always been something that has been done by the big companies when they hire people, and then they train them internally. But it didn't help us with all the other ones that are now coming on board," he said.

Canada's bio-economy is facing a severe labour shortage, according to a labour market study released on Oct. 13, 2021, by BioTalent Canada. An additional 65,000 workers in bio-manufacturing and production will be needed by 2029 to meet growing demand in the sector, according to the study. The labour supply in bio-manufacturing and production, as well as distribution and logistics, is projected by BioTalent to reach less than 25 per cent of the labour demand between 2021 and 2029.

"Unless steps are taken now to ensure a steady flow of bio-economy skills, Canada will not be ready for the next few years, let alone another crisis," said Rob Henderson, president, and CEO of BioTalent Canada in a press release accompanying the study. "Infrastructure is not enough—Canada needs world-class brainpower inside those buildings."

BioTalent's recommendations include greater outreach to students about possible careers in the bio-economy, and broadening the talent pool through expanding immigration. Immigrants currently comprise only nine per cent of bio-economy workers in Canada, according to BioTalent. The organization also recommended expanding re-skilling programs so that bio-economy employers can look for talent from other industries.

"The talent pipeline should be overflowing, but it's not," said Henderson in the press release. "The evidence makes it clear [that] action is needed now."

jcnockaert@hilltimes.com
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Biomanufacturing facilities that received government support during the pandemic*

- Medicago (Que.): $173-million to develop a plant-based virus-like-particle vaccine and for the construction of a Good Manufacturing Practice (GMP) facility, alongside an APA for eventual delivery of its vaccines.
- AbCellera (Vancouver, B.C.): $175.6-million in support of antibody discovery for clinical testing and for the construction of a GMP antibody production facility
- Precision Nanosystems (Vancouver, B.C.): $25.1-million to build a biomanufacturing centre for production of RNA vaccines.
- KABS Laboratories (St-Hubert and Val-des-Sources, Que.): $54.25-million toward a biologics production facility with a focus on antibody therapies and fill-finish capacity, which refers to the process of filling vials with vaccine and finishing the process of packaging.
- Novocol (Cambridge, Ont.): $32.7-million toward expanded fill-finish capacity.
- Resilience Biotechnologies (Mississauga, Ont.): $199-million to increase manufacturing and fill-finish capacity for vaccines and therapeutics including mRNA technologies.
- BioVectra (Charlottetown, P.E.I.): $39.8-million to support BioVectra in manufacturing mRNA and plasmid DNA, as well as fill-finish capabilities

**This is an incomplete list.*
—Source: Innovation Canada

Life sciences industry statistics as of September, 2021

- As of September 2021, total venture capital investment in Canadian life sciences companies surpassed 2020's full-year investment by almost 50 per cent, reaching $1.658-billion.
- In 2021, almost 60 per cent of venture capital investment in Canada in life science companies went toward drug discovery, diagnostic equipment and biotech companies.
- U.S. investment in Canada's life sciences companies, which by mid-September 2021 reached $754-million for that year, surpassed the amount of U.S. capital invested in all of 2020, at $684-million.

—Source: Torys LLP quarterly statistics report released in September, 2021.