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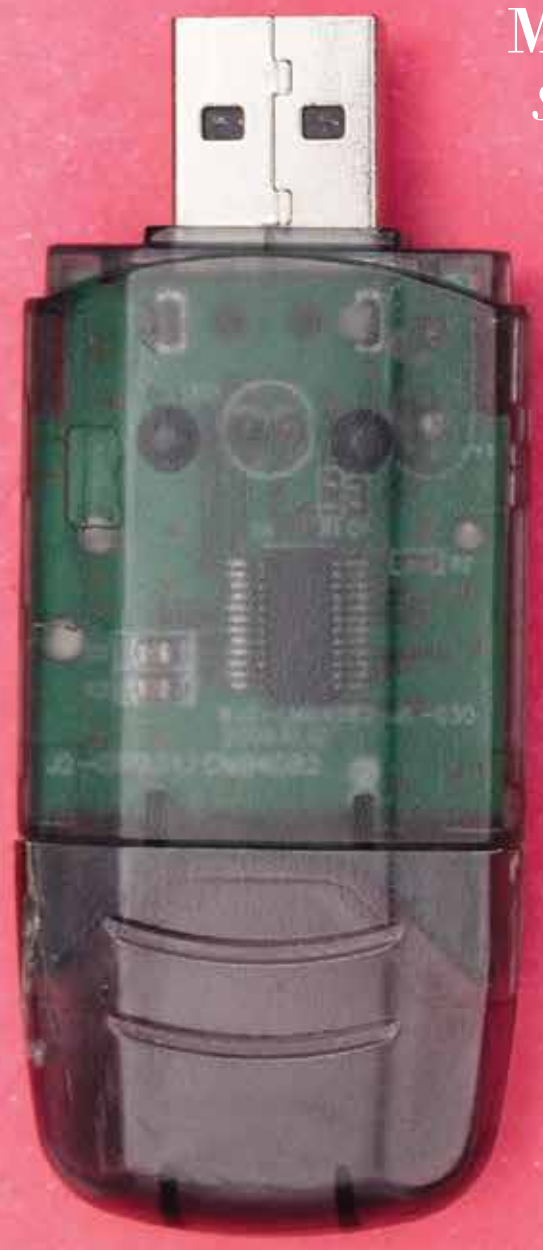
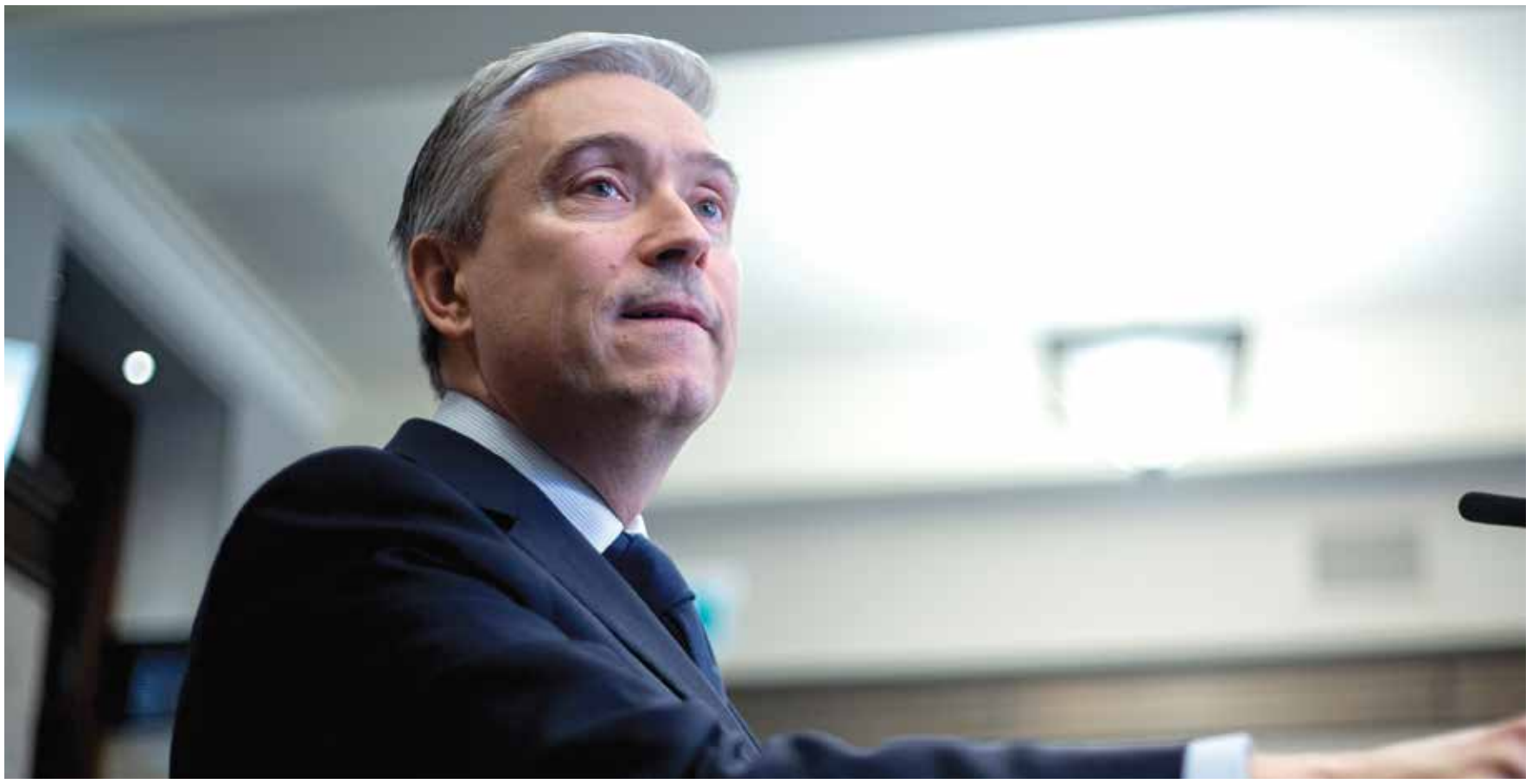
RESEARCH & INNOVATION





Innovation Minister François-Philippe Champagne and Finance Minister Chrystia Freeland released a blueprint on Feb. 16 intended to guide the operations of the new Canada Innovation Corporation. *The Hill Times photograph by Andrew Meade*

Improving economic gain of intellectual property must be a priority for new Canada Innovation Corporation, say experts

The Canadian Innovation Corporation, a new Crown corporation to be led by the private sector, is expected to begin operations later this year.

BY JESSE CNOCKAERT

Experts in Canada's innovation sectors are looking towards the Canada Innovation Corporation (CIC) to help businesses turn world-changing ideas into intellectual property, which they argue typically is a challenge.

"The activation of the Canadian Innovation Corporation is at the top of everyone's mind. Who is going to lead it? What is the program and delivery mechanism? And we need this sooner rather than later," said Alain Francq, director of innovation and technology at the Conference Board of Canada, in an interview with *The Hill Times*. "Those [countries] with strong innovation activity and the ability to commercialize their IP see improvements for greater productivity, economic growth and job creation. The CIC really needs to be, and is, focused on that."

The CIC, a new Crown corporation to be led by the private sector, is expected to begin operations later this year. The agency was promised in the 2022 federal budget with an initial budget of $2.6-billion over four years.

Ottawa released a blueprint document on Feb. 16, 2023, providing details about how the CIC will operate. The blueprint said that the CIC will be an outcome-driven organization that will support Canadian businesses across all sectors and regions in developing and protecting intellectual property, and in capturing important segments of global supply chains that will help drive economic growth and create jobs.

Francq told *The Hill Times* that Canada excels at developing innovative ideas, but the country falls short when it comes to translating those ideas into the innovation economy, and that can be partly attributed to low business expenditures in R&D.

To help establish a large-scale platform of business R&D support, the Industrial Research Assistance Program (IRAP), which traditionally has been a part of the National Research Council, will be placed under the CIC umbrella, according to the blueprint.

"We're considered global leaders in innovation in several measures, but we struggled to turn those advantages into commercial success and economic growth," said Francq. "IRAP is a big piece as the anchor of the CIC. I suspect it will be operations as usual, but really with a renewed focus and visibility towards the commercialization side even more so, I would say. But for us, again, at the Conference Board, it's about what is the performance metric of that CIC? What is the economic impact?"

To help research the critical issues facing Canada's innovation economy, the Conference Board of Canada announced the establishment of the Canadian Centre for the Innovation Economy (CCIE) on May 4, along with founding members MaRS Discovery District and the Innovation Economy Council. The CCIE will "unpack the significant pain points to improved innovation in Canada," with an emphasis on intellectual property, R&D, red tape and the skills gap, according to a press release.

"We're going to focus on metrics. We're going to look at which policies and innovation programs are driving economic growth," said Francq. "You can't come up with a strategy or change something on a map unless you know where you're going. That's what we're hoping to provide there."

Alain Francq, director of innovation and technology at the Conference Board of Canada, says Canada struggles to turn innovative ideas 'into commercial success and economic growth.' *Photograph courtesy of Alain Francq*

Canadian businesses require resources to support their protection of intangible assets, such as intellectual property rights that result from R&D, because without proper protections, "powerful global multinational firms" can challenge the ownership of those assets and complicate the commercialization process, according to the CIC blueprint.

Canadian businesses don't invest in R&D to the same degree as peer nations, according to a Finance Canada press release. The blueprint also argues that, with low levels of Canadian business investment in R&D, the economic benefit that results from new Canadian discoveries is often realized in other countries.

"The global economy is changing, and with smart investments today, we can help create more good jobs for Canadian workers. By supporting Canadians and Canadian businesses in turning their new ideas and technologies into new products, services, and growing businesses, the Canada Innovation Corporation will help build a stronger and more innovative Canadian economy," said Finance minister Chrystia Freeland (University-Rosedale, Ont.) in the press release.

According to the Global Innovation Index's 2022 report, Canada is ranked 15th out of 132 nations in its innovation rankings. The Conference Board of Canada's 2021 Innovation Report Card gave Canada a C rating, and ranked the country at 11 out of 16 countries.

The House Science and Research Committee has held nine meetings between March 7 and April 27 to discuss the commercialization of intellectual property. Francq appeared before the committee on April 25 and told the MPs that the Conference Board's 2022 report card—which has not yet been publicly released—once again issued an overall C grade for Canada.

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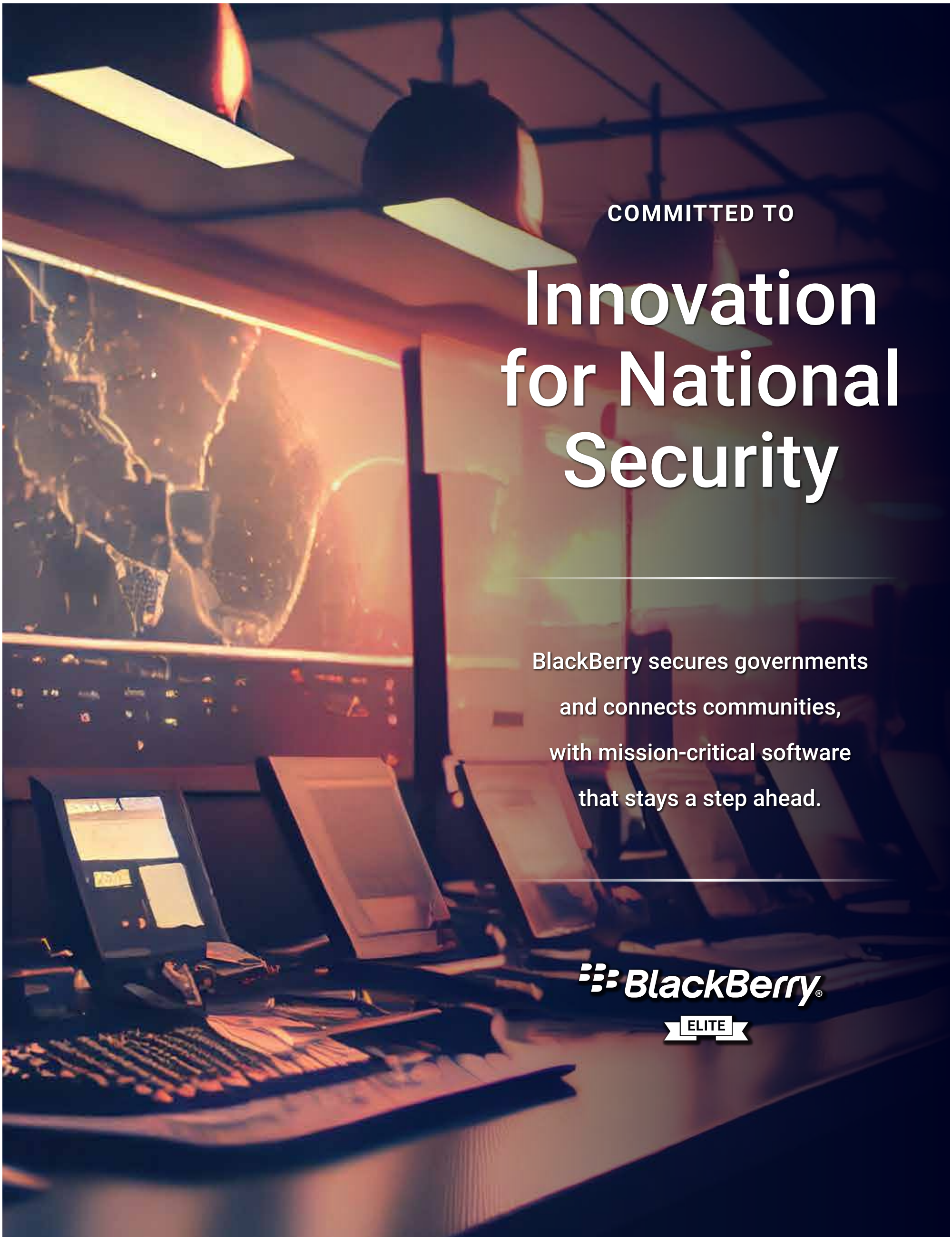
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To continue to prosper, Canada must support innovation in both basic and applied research, which cannot happen if our brightest minds leave for better-funded opportunities outside of Canada, writes NDP MP Richard Cannings. *Photograph courtesy of Pixabay*

A case for lifting Canadian researchers out of poverty

Underfunding Canada's best and brightest at the start of their scientific careers may force many to either drop out of their studies, or leave Canada.

NDP MP Richard Cannings

Opinion

On May 1, young researchers across Canada walked off the job. Thousands of graduate students and post-doctoral fellows from 45 universities and scientific institutions are protesting the lack of a wage increase in 20 years. Not only does the low real-value of Canada's graduate scholarships and fellowships force our best and brightest to live in poverty, but also it drives a brain-drain to nations where the pastures are greener.

Most of the actual work of scientific research in Canada is done by postgraduate students working on Masters degrees, PhDs or post-doctoral fellowships. An important source of their income are the federal government scholarship programs. The recipients of these scholarships—literally our best and brightest young researchers—work full time on their research, relying on the scholarships for their food, housing and other essential expenses. The values of the Canada Graduate Scholarship Masters ($17,500) and the Postgraduate Scholarship Doctoral ($21,000) have not changed since 2003. The federally funded post-doctoral fellowship stipend ($45,000) has been constant since 2015.

The April 2023 edition of the *Canadian Journal of Biochemistry and Cell Biology* contains a report titled "Analysis of financial challenges faced by graduate students in Canada." The report makes for sobering reading, with findings that only 9.3 per cent of the 1,305 students questioned said they were comfortable in their financial position, 8.8 per cent said they were struggling financially while 34.6 per cent described their finances as tight. The report also found 85.7 per cent of respondents felt stressed and anxious about their finances, 37.9 per cent were concerned about making their rent, and 35.9 per cent worried they would not be able to afford food.

I've spoken with university professors who tell me that their graduate students are increasingly asking for breaks in their research so that they can take jobs that pay wages good enough so that they can save up to return to their studies at a later date.

By forcing Canadian researchers into poverty, Canada is damaging its economic future. To continue to prosper, we must support innovation in both basic and applied research. This cannot be accomplished if our brightest minds leave for better funded opportunities outside of the country. Speaking before the House Science and Research Committee, Dr. Shaun Koo, a postdoctoral fellow at the Université de Montréal said, "Canada's academic institutions are not just competing with other countries for talent. They're competing with other industries that are offering us salaries that are double or triple those in Canada's academies and with better working conditions."

Dr. Thomas Bell, a professor at Britain's Imperial College in London, U.K., is one such researcher lured away from Canada. In testimony to the House Science and Research Committee, he said, "you need to understand what financial and scientific rewards will draw them to Canada, or they'll go elsewhere. 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."

Modern economies require a constant stream of innovation to remain competitive. By underfunding our best and brightest at the start of their scientific careers, we force many to either drop out of their studies or leave Canada. Both choices are a loss to our country.

The solution to reversing this negative trend is fairly simple: 1) increase the dollar amounts of the graduate scholarships and post-doctoral fellowships to sufficient levels to provide a living wage; 2) double the number of these scholarships and fellowships; and 3) index the dollar value of these scholarships and fellowships to inflation.

Unless we take these steps immediately, Canada will continue to export our young researchers, enriching other nations while impoverishing our own.

NDP MP Richard Cannings represents the riding of South Okanagan-West Kootenay, B.C. He is his party's deputy critic for innovation, science and industry.

The Hill Times

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Zhou Xing
Professor, Medicine

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McMaster University

Opportunities ahead for innovation in a world transformed by COVID-19

Advancements in technology and globalization, combined with shifting demographic and socio-economic trends, are rapidly evolving the working environment.

Ginger Grant

Opinion

The COVID-19 pandemic devastated millions of lives and disrupted the world of work. This unwelcome disruption also presents an opportunity for innovation to transform and improve organizations, leaders, employees, and stakeholders. To address a complex environment and global talent shortage, it is crucial that organizations "revision" the way we lead, work, adapt to change, and collaborate creatively in ways that leverage and grow available talent, moving from innovation control to a more dynamic, design-driven innovation delivery. The five generations now in the workforce have different value systems, aspirations, and goals that add to our current challenge.

Our new world of work

This new world refers to employees' changing landscape on a global stage. Advancements in technology and globalization, combined with shifting demographic and socio-economic trends, are rapidly evolving the working environment. Some key aspects to keep in mind in creating culture that supports innovation:

Remote work. One thing we did learn (hopefully!) from the pandemic is that much can be done from home or other remote locations. Because of the increasing availability of technologies and internet connectivity, remote work is now a desired accommodation for many people. A remote or hybrid work program provides for great flexibility and creates a work-life balance that was not possible for most before the pandemic. Many employers simply would not consider such a move, thinking that employees must be physically present at the office in order to be productive. It took a pandemic to break that fixed way of thinking.

Flexible schedules. Along with remote work, much more flexible working arrangements are considered desirable, if not mandatory. Aside from the obvious benefit of reducing traffic jams on our roads, flexible schedules provide employees with the freedom to attend to personal and/or family needs as those situations arise. It should give us food for thought and maybe even change our perspective on flexible schedules and what working from 'home' could mean. And what 'managing' could mean.

Collaborative Work. The nature of the work we do is also changing and becoming more collaborative and project-based. Many employees are working in teams, both within and across an organization, whether locally, nationally, or internationally. This requires employees to be more agile and adaptable as well as being fast learners. In order to both retain and attract new talent, firms must be able to create flexible work environments that foster collaboration.

Focus on Skills and Learning. Continuous learning and skill development—or upskilling—is becoming increasingly important. Investing in training and professional development programs to help employees keep up with changing technologies and job requirements can become a benefit that helps talent management.

Emphasis on EDI. An emphasis on equity, diversity and inclusion is now a mandatory component of any organization. Making the effort to create a more inclusive work environments that embrace diverse perspectives and backgrounds will increase creative capacity across the organization. Healthy dissent is necessary to avoid groupthink that can keep an organization stagnant. Having a more inclusive and diverse workplace provides an environment where everyone feels valued and respected.

Gig Economy. The rapid increase in the gig economy has many implications for employees. It does offer more flexibility and autonomy, as workers can choose when and where to work. The downside is that workers may not have access to health insurance, sick-leave or retirement benefits. Job security may also become an issue both for employee and employer.

Perhaps, in retrospect, the pandemic will be recognized as a catalyst for organizational and workforce changes to many legacy beliefs, structures and behaviours that have lingered with us since the Industrial Revolution. With the rise of remote work and the gig economy, more employees are no longer tied to a physical location or a traditional employment contract. Instead, they are able to work from anywhere, at any time, and on a project-by-project basis. For organizations, the new world of work allows them to access a global talent pool and tap into new markets. It also requires them to rethink their traditional employment models, and find new ways to manage and motivate a mobile workforce. Those who can embrace disruption and capitalize on its opportunities can drive innovation and shape the future. By doing so, they can harness the power of "assets with feet" and build a more resilient, innovative organization.

Ginger Grant is the dean of research and innovation at Humber College in Toronto, and is a member of the Council for Innovation and Commercialization at the Conference Board of Canada.

The Hill Times

Investing in highly qualified talent to grow Canada's economy

Canada needs to do more to help people attain graduate-level degrees and to support the university research enterprise as the backbone of talent development.

Alice Aiken

Opinion

Canada's economy is facing a set of unprecedented challenges. New pressures, including global economic disruptions caused by the pandemic and war in Ukraine, the requirement to transition our resource-heavy economy to meet net-zero commitments, and the inevitable need to adapt our workforce to rapid developments in AI are running headlong into one of Canada's long-standing key economic weaknesses: poor business investment in innovation, research and development.

For Canada to meet these demands, we need a far greater supply of highly qualified drivers of innovation in business, government and civil society. We require more individuals who can respond to change, deal with uncertainty, and integrate technical knowledge within a broad range of social and cultural competencies to tackle challenges in key areas, like quantum technologies, artificial intelligence, agri-tech, health care and clean energy.

Universities play a critical role in the development of this highly qualified group. Through basic research, universities are a talent pipeline for the science and deep-tech innovation ecosystem. Trainees at the graduate and post-doctoral levels are, in effect, apprenticed to research professors—whether in science, medicine, or the arts and humanities—to understand the breadth of existing knowledge and then lead at the frontier of innovation. Think of Chris Burns who studied at Dalhousie with lithium-ion battery pioneer Dr. Jeff Dahn, and then started Novonix Battery Technology Solutions, which currently employs almost 150 people and has just under half-a-billion-dollar market cap.

According to the 2021 INSEAD Global Talent Competitiveness Index, Canada ranked third for the quality of our universities, and eighth in the relevance of our education system to the economy. We benefit greatly from Canada's world-class research universities, which provide the talent at the heart of our innovative communities. Most of Canada's PhD-holders are employed in business, non-profits and the public sector; less than half remain in academia. These highly skilled knowledge workers carry into their careers the ability to absorb and apply leading-edge ideas, techniques and technologies. They are the agents by which innovation spreads out from the knowledge frontier and is adapted to the requirements of Canada's business and public sectors.

Canada, however, ranks just 28th in the OECD in graduate-level attainment. In short, we are not producing enough people with the education and training required to fuel an innovative society.

We need to do more to help people attain graduate-level degrees and to support the university research enterprise as the backbone of talent development. Without financial support for investigator-led research, this essential process of developing human capital breaks down. The most talented people leave for better prospects while the economy falls farther behind.

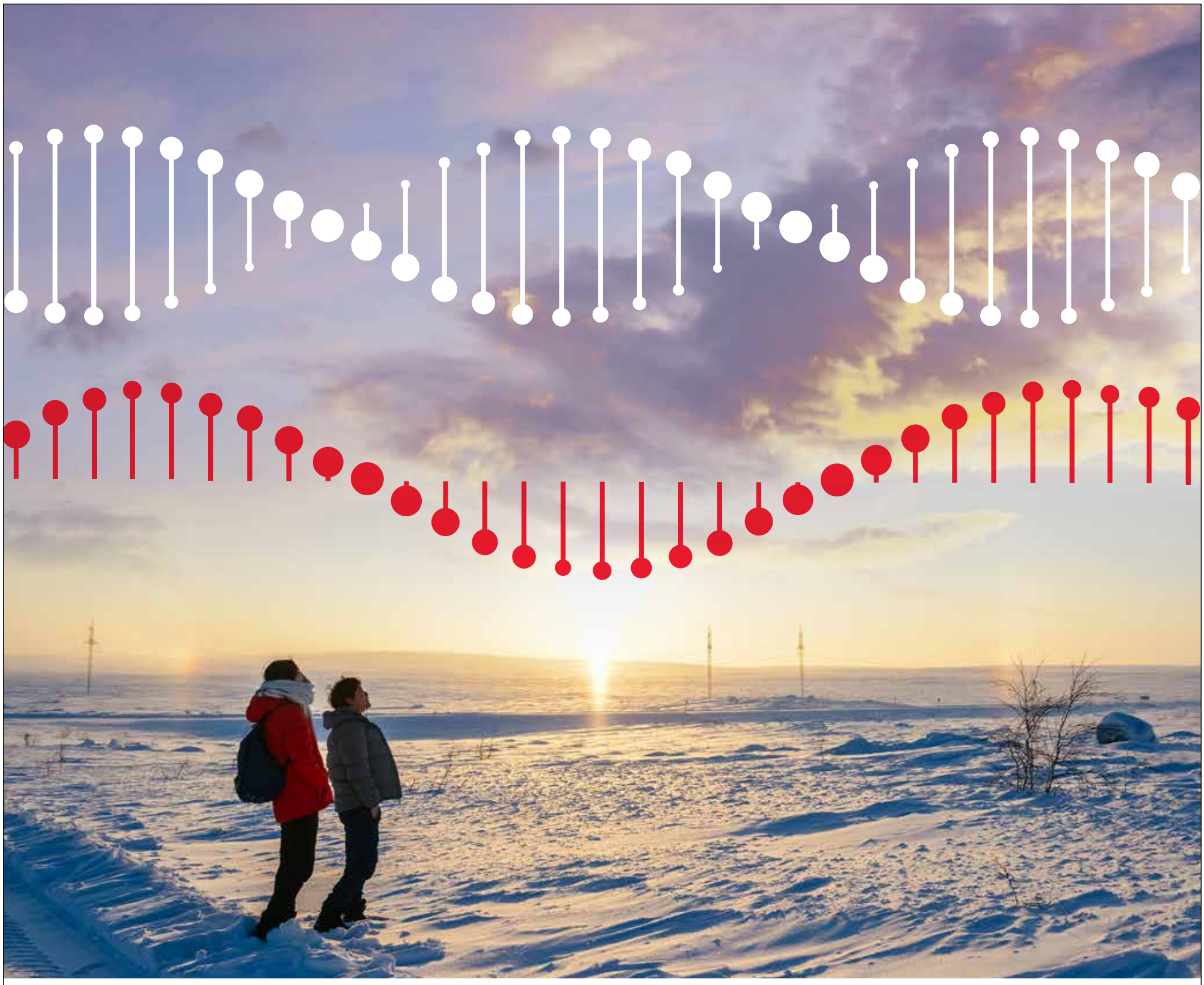
In addition to financial support for investigator-led research, complementary investment in innovation, entrepreneurship and intellectual property training for graduate students is essential. Successive federal governments have tried to stimulate business investment in R&D with initiatives such as the Scientific Research and Experimental Development tax incentives, the Global Innovation Clusters, and the new Canada Growth Fund. These initiatives are critically important, but they are not enough. They need to be paired with strategic investments in the development of highly qualified personnel with the entrepreneurial skills needed to capitalize on these federal programs.

Dr. Rafaela Andrade, a biochemist, credits university innovation programming with equipping her with the business skills she needed to co-found Myomar Molecular, a health diagnostic tool that will be going to market next year. As a postdoctoral researcher, she participated in Lab2Market, co-founded by Dalhousie University and now a national network. Lab2Market increases the innovative and entrepreneurial capacity of trainees, and provides them with the skills and tools needed to take their research to market. Such programs support a culture of innovation in universities, enable students to build entrepreneurial skills while they pursue their studies, and produce a pipeline of highly skilled graduates ready to engage with an increasingly innovative and knowledge-based economy.

Maintaining a competitive level of investment in university research through the granting councils, increasing funding for masters and doctoral scholarships, and investing in innovation skills training, will increase the supply of graduates equipped with high-level research and innovation skills as well as the entrepreneurial mindset vital to catalyzing the growth of Canada's economy.

Dr. Alice Aiken is the vice-president of research and innovation at Dalhousie University in Halifax, N.S., and former dean of the faculty of health at Dalhousie. She is a full professor with her research focusing on health systems transformation and evidence-informed policy-making with a concentration on military and Veteran health.

The Hill Times



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The foundations of human knowledge and experience are right here at home

Canada has an opportunity to be much better prepared now than it was when COVID-19 first emerged.

Karen Mossman

Opinion

The next pandemic could come from anywhere, anytime, and in any form. The only certainty is that it will come.

Canada has an opportunity to be much better prepared than it was when COVID-19 first emerged and spread quickly around the world, with devastating consequences.

We don't need to reach very far back in our memories to recall how we worried first if there would be a vaccine against the virus, and later whether Canada could secure an imported supply, and finally, how long it would take for that supply to reach clinics across the country. When it was finally available, getting an appointment for a shot seemed like winning the lottery.

Relying on the goodwill of other countries to share their supplies amidst supply-chain issues compounded the concerns of Canadians who were eager to protect themselves and those close to them.

And yet, the foundations of human knowledge and experience had been right here at home the whole time. What we lacked was a way to scale up and align the expertise we already had and to make sure our own leaders in biomanufacturing and life sciences were armed with resources and personnel to create, manufacture and provide diagnostic tests, treatments and vaccines, much faster and at commercial scale.

At McMaster University, for example, in the years leading up to the pandemic, researchers had been making steady progress toward an inhaled vaccine against tuberculosis, using adenovirus-based technology discovered at McMaster. We had a small, highly specialized lab for making smaller batches of vaccines for research trials, and we had the in-house expertise and local clinical collaborators to design and analyze such trials.

Today, all that work is coming together as we test a promising inhaled COVID vaccine—one that can readily be adapted to protect against a range of respiratory pathogens.

That work could have been completed much sooner with more resources and greater connectivity.

There are many similar examples across the country, where funding had fallen away over the last 40 years, leaving our most talented researchers struggling to realize the full potential of their work.

Recognizing this need, the Government of Canada has created a program to revive this ecosystem and help our own experts—in academia, industry, and government—respond quickly and efficiently to the next pandemic threat, be that from a virus, bacterium, or fungus.

In fact, there are smoldering pandemic-scale problems that need attention immediately, including the elusive diagnosis, prevention, and treatment of too many forms of cancer and the perilous vulnerability of everyone to antimicrobial resistance (AMR) in which the power of known and developed antibiotics is waning quickly.

There will never be a shortage of pandemic-like problems to solve, but Canada is getting a chance to meet and overcome those challenges using our own talent and resources, writes Karen Mossman, vice president of research at McMaster University. *Photograph courtesy of Wikimedia Commons*

The federal government has designated five multidisciplinary hubs across Canada, based around universities and including other academic and industrial partners, to get us back up to strength. It has earmarked significant funding to facilitate their work.

McMaster University, where I serve as vice-president of research, is partnering with the University of Ottawa to lead the Canadian Pandemic Preparedness Hub, owing to our strengths in infectious diseases and cancer and our history of collaboration.

Parallel hubs are being led by the University of Alberta, University of British Columbia, Université de Montréal and University of Toronto.

The hubs project will allow Canadian researchers and industry collaborators to be much more nimble and much better co-ordinated not only to prepare all of us for the next infectious disease pandemic, but also to effectively combat cancer and AMR.

Sadly, there will never be a shortage of pandemic-like problems to solve, but we are getting a chance to meet and overcome those challenges using our own talent and resources.

We need to be able to anticipate, invent, manufacture and supply what Canadians need, as independently as possible and as efficiently as possible.

Canada can be a global leader in such critical work and become more of a helpful partner to other countries, rather than a reliant customer of other nations.

The goal is that next time, Canada won't have to be asking for help. We can be a country that helps itself—and others.

Karen Mossman, PhD, is a professor in the department of medicine, a former chair of the department of biochemistry and biomedical sciences, and is the current vice-president research at McMaster University, Canada.

The Hill Times

Graduate students are the lifeblood of research and innovation in Canada

Current inflationary pressures have made it virtually impossible for some of our most talented students to undertake graduate training in Canada.

Lisa Kalynchuk

Opinion

Preparing students for meaningful work and conducting research for a better, more informed world: this is what we do at universities throughout Canada. The March 2023 *Report of the Advisory Panel on the Federal Research Support System* highlighted some of the actions that the federal government can—and arguably should—take to ensure we can do those things more effectively. Even superbly.

The challenges the world is facing are complex and pervasive, and the well-being and prosperity of Canada and Canadians hangs on how well we nurture and empower the minds and skills of rising generations. Current inflationary pressures have made it virtually impossible for some of our most talented students to undertake graduate training here. As the advisory panel points out, "current support for graduate students, the researchers of tomorrow, is at a breaking point." The value of government-funded scholarships for university research trainees has been static for two decades and has not kept pace with increases to the cost of living or compensation trends in other countries. Increasing support for these young researchers is an opportunity for Canada. We cannot afford to miss it.

Graduate students are essential members of our knowledge economy and key drivers of research. They have the curiosity to ask why, and the courage to instigate the innovative change we need to stimulate economic development and find solutions to our most pressing societal challenges. If we lose our students to other countries, we will also lose the talent and energy they infuse into start-ups and small and medium-sized businesses. These companies are clamouring for the type of talent our graduate students can provide.

There is a real risk in our relying on other nations to provide the talent and innovation that will move the global community forward in the ways that matter to us: climate action, human rights and social justice, Indigenous resurgence, health and wellness, and fundamental discovery research. The future promises to be increasingly turbulent, and even friendly countries must deal with their residents' needs before ours. We need to invest confidently in our own talent pipeline to pave the way for more made-in-Canada solutions.

At individual post-secondary institutions and across the country, our students and trainees are a key indicator of our success. They become ambassadors for the universities they train at, and indeed for Canada as a whole. When we do a good job of preparing and empowering the next generation of researchers, artists, thought-leaders and problem-solvers, they will go out into the world prepared, confident, and eager to make a difference.

Changes to tri-agency funding requirements and commitments will help include more people and more forms of research and creativity throughout the country. As part of these changes, we need to prioritize investments in graduate students, post-doctoral fellows, and early-career researchers to build research and innovation capacity for the next decade and beyond.

The advisory panel describes specific steps that will support graduate students, their research and professional development, and, ultimately, Canadian society. The report is specific: "Funding for graduate students and postdoctoral fellows should be increased to an internationally competitive level." The best way to accomplish this is for government to immediately increase the value of tri-agency scholarships. These scholarships provide crucial support for students struggling to make ends meet. That certainly was my experience long ago, when the high cost of living in Vancouver meant I could not afford food at the end of each month. A tri-agency scholarship allowed me to complete my PhD, and a postdoctoral fellowship convinced me to stay engaged in research. We owe it to the students of today to give them the same opportunities.

In recent years, the federal government has made significant investments in research in Canada through programs such as the Canada First Research Excellence Fund, Canada's Biomanufacturing and Life Sciences Strategy, and other direct funding for quantum science, digital research infrastructure, innovation, and international partnerships. As welcome as these investments are, let's not forget that research requires people. We need our graduate students to bring all these investments to life.

Lisa Kalynchuk is vice-president, research and innovation at the University of Victoria.

The Hill Times

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AI and robotics are transforming materials science, and we are leading the way.

The federal government's $200-million investment in the Acceleration Consortium at U of T has cemented Canada's status as the world's leading centre for autonomous, AI-guided labs. These self-driving labs rapidly predict, synthesize and refine novel materials and molecules, making R&D and innovation massively more efficient.

Our goal is a world with materials on demand: catalysts that pull carbon out of the air and turn sunlight into electricity; batteries made of inexpensive, sustainable materials to store all the green energy we need; and molecules for precision drugs that arrest the most devastating diseases.

Broad collaboration will enable the breakthroughs in our labs to change lives for the better. The Acceleration Consortium is bringing researchers together with industry partners to drive innovation and explore the incredible potential of self-driving labs.

Together, we can build a healthy and sustainable future.

Learn more about this visionary initiative at uoft.me/accelerate

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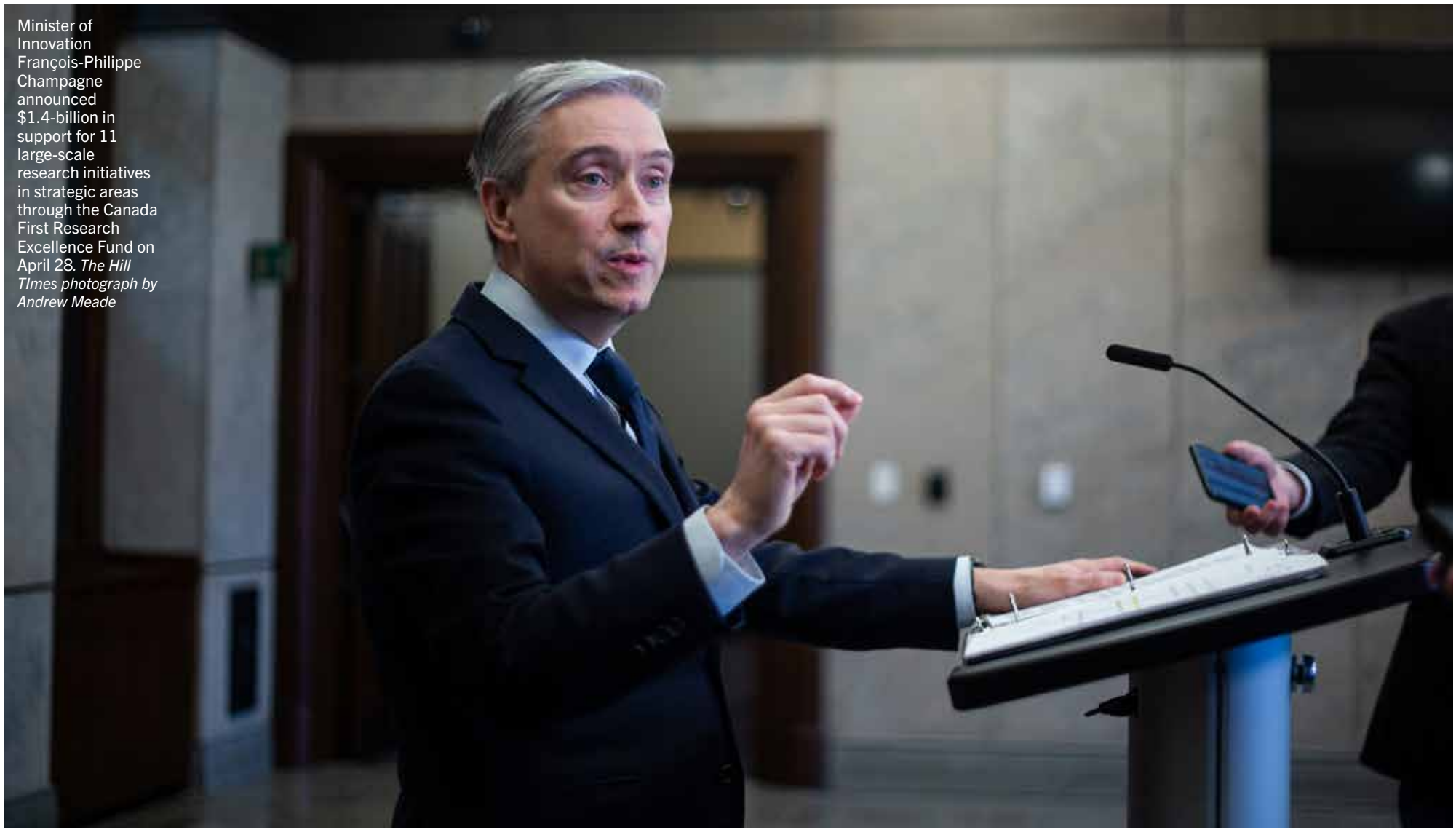

Minister of Innovation François-Philippe Champagne announced $1.4-billion in support for 11 large-scale research initiatives in strategic areas through the Canada First Research Excellence Fund on April 28. *The Hill TImes photograph by Andrew Meade*

The science of today is the economy of tomorrow

Complex global issues have multiplied, and investing in big, advanced and collaborative science is more critical than ever to addressing urgent challenges.

Leah Cowen

Opinion

When the federal government introduced the Canada First Research Excellence Fund (CFREF) in late 2014, its aim was to propel research at the country's universities from world-class to world-leading. Nearly a decade later, and with $1.4-billion in support announced last month, the program's foresight is clear.

Complex global issues have multiplied, and investing in big, advanced and collaborative science is more critical than ever to addressing urgent challenges such as climate change. As the Task Force on American Innovation has argued, research funding builds national economic advantages and sovereignty.

Our closest allies and competitors are doing no less, whether through generational investments in clean technology as we see in the United States, or globally leading plays in quantum technologies as we see in China's spending, among the world's highest as a percentage of GDP.

Canada has many strengths in this new strategic race, including unparalleled access to talent, an increasingly successful commercialization pipeline from researchers to business, and a federal government focused on developing the industries of tomorrow.

As Innovation, Science and Economic Development Minister François-Philippe Champagne said when announcing an impressive and visionary list of CFREF winners from across the country: "The science of today is the economy of tomorrow."

We don't always know when tomorrow will arrive, when investments in science will translate to measurable prosperity. That makes supporting frontier science more challenging, but no less important.

The University of Toronto's Acceleration Consortium (AC) is a prime example of frontier science with tremendous promise for economic gains. At almost $200-million, the latest CFREF is the largest U of T has ever received, a recognition of the potential its research has to improve human lives, from addressing climate change to new therapies and drugs. Its success now and in future has been built on earlier waves of investment and research in AI, robotics, materials science and health sciences, which the AC is combining to create solutions at speed and scale.

At the same time, stagnating support for research at our universities threatens to undermine these institutions as foundations for competitiveness. Without reinvestment, both home-grown and global talent will look elsewhere, jeopardizing one of the country's advantages.

These are the leaders who will scale new companies and attract other talent from around the world in advanced fields such as biomanufacturing, clean technology, and quantum and artificial intelligence. And they are in increasingly high demand due to a new era of science-based industrial strategy being pursued by governments, nowhere more so than in the United States.

The U.S. CHIPS and Science Act—US$280-billion in total, with $81-billion dedicated to the National Science Foundation, doubling its budget over five years—is predicted to be an engine of job creation and talent attraction.

Yet the Report of the Advisory Panel on the Federal Research Support System found that Canada's investment in the people running this global race is falling behind that of comparable jurisdictions—like Japan, the United Kingdom, Germany and the U.S.— and that grant and stipend levels for emerging researchers are not competitive with those in leading countries. Whether through scholarships for students or grants to principal investigators whose work supports trainees, our best and brightest would often do better elsewhere.

Finally, new technologies must serve human goals. Here, Canadian researchers are leading the way in demonstrating how to harness science for the greater good. The AC, for example, has put ethical concerns are at the centre of its work, from an equity, diversity and inclusion framework to inform trainee development, to integrating Indigenous researchers who will evaluate the impact of new materials.

In the past decade, the federal government has demonstrated it believes investment in research translates to economic growth. The Pan-Canada AI Strategy in 2017 is a case in point, as government support for research catalyzed an AI industry that created tens of thousands of jobs across the country. Research strategies in genomics, life sciences, and quantum have since followed.

The Advisory Panel made clear that to be counted among the ranks of science superpowers, Canada must scale such strategic missions while also reinvesting in investigator-led, discovery research. This is an industrial strategy for the 21st century, pairing prosperity with a university system that is leading edge on talent and research and committed to deploying those assets to benefit all.

Professor Leah Cowen is vice-president of Research and Innovation and Strategic Initiatives at the University of Toronto, co-director of the fungal kingdom program at the Canadian Institute for Advanced Research, and chief scientific officer at Bright Angel Therapeutics.

The Hill Times

We need a balanced research environment to foster a real 'innovation economy'

Funding research for our aging society, along with eventual applications in services and products, will help drive Canada's innovation economy, write John Muscedere and Alex Mihailidis.

John Muscedere & Alex Mihailidis

Opinion

The federal government often talks about fostering an 'innovation economy'—and for good reason. The application of technological innovations and entrepreneurship have been at the forefront of economic growth in the globalized economy for some time already, and that only promises to accelerate in the coming years.

Canada, of course, should not be left on the sidelines cheering-on critical innovations, but pioneering them. And it's a balanced research environment that will get us there.

History shows it's not so easy to back research 'winners' over 'losers.' It's better instead to create a healthy research environment where basic foundational research thrives and leads to multiple commercialization opportunities. The innovations which then best meet societal demands are the ones which go on to be successful and adopted.

It's a robust ecosystem, not a horse race, in other words. And every stage of the research cycle should be bolstered and encouraged.

Our governments at every level should be embracing a 'patient investor' approach to create a healthy pipeline from rich foundational research toward commercialization. Such a balanced approach requires robust funding for post-secondary research in order to create the essential foundation for the 'innovation economy'—keeping Canada competitive both now and into the future.

Let's take our aging society as a case in point.

Canada is rapidly approaching the status of a 'super-aged' society; by 2035, one in four Canadians will be older than 65 years of age. Overwhelmingly, most Canadians want to age in place, in their own homes. When surveyed, more than 92 per cent of Canadians reported that they support government investments in programs that enable healthy aging (Nanos, 2021).

Unfortunately, this contrasts greatly with the reality that we have not invested in healthy aging in Canada, and our approach has been to rely on acute care institutions and residential facilities to take care of Canadians as they age and require assistance.

Already, we can't keep up with demand for long-term care facilities or homecare need, and this will only get worse as our society ages. So, what needs to happen?

We clearly need to embrace new ways of healthy aging, and we need new government funding and policies to achieve it. This is part of the innovation economy too.

How can we modernize Canada's approach to aging? We need both basic research and commercialization opportunities to get there.

We speak from experience. Our organizations, AGE-WELL and the Canadian Frailty Network, have created Healthy Aging Canada as a new research collaboration to leverage the expertise and infrastructure of our organizations to lead evidence-based social, health care and technology research that will improve the healthy aging experience of older Canadians and their care partners.

We are combining our research gleaned from clinical practice and behaviour change research from across the community with developing and validating technology-based solutions for daily living and caregiving across settings. It's a marriage of basic research and application possibilities.

Funding research is a crucial piece of a successful innovation pipeline to modernize Canada's approach to aging. It's going to be how Canada tackles our 'super-aged' society 'problem' and makes it a benefit.

Funding research for our aging society, along with eventual applications in services and products, will help drive Canada's innovation economy.

Dr. John Muscedere is CEO of the Canadian Frailty Network and professor of critical care medicine, Queen's University. Dr. Alex Mihailidis is CEO of AGE-WELL, the Barbara G. Stymiest Research Chair in Rehabilitation Technology at the University of Toronto, and KITE Research Institute at University Health Network. The two organizations work in partnership on Healthy Aging Canada.

The Hill Times

Improving economic gain of intellectual property must be a priority for new Canada Innovation Corporation, say experts

Continued from page 24

The Conference Board awarded Canada a B grade in public R&D, but said the country lags significantly behind other OECD comparator nations by scoring D grades in business expenditures in R&D, labour productivity and intellectual property. The 2022 report card is expected to be released in June, Francq told *The Hill Times*.

Francq said that for Innovation Minister François-Philippe Champagne (Saint-Maurice—Champlain, Que.) to improve Canada's overall grade would be "a wicked problem."

"It's doable, but the structure and systems have to align longer-term to get those wicked problems at the root of them, and get policy that is impactful—that has an impact on economic growth, ultimately," said Francq. "The path forward is not going to be easy in that way. Usually, it takes a consortium or multiple concerted efforts to get there. It's very difficult to pull everybody together."

The Hill Times reached out to Champagne to ask about innovation priorities for 2023. Laurie Bouchard, senior manager of communications in Champagne's office, said in an emailed statement on May 4 that Canada is witnessing two major generational changes: the transition towards the green economy, and the "fast happening of the digital economy."

"As mentioned by the minister at the beginning of the year, 2023 is the continuity of 2022 as we are anchoring investments and projects to make sure Canadians can play a role in the economy of the future, create good-paying jobs and be the green supplier of choice," said Bouchard in the email.

Benjamin Bergen, the president of the Council of Canadian Innovators, told *The Hill Times* that the federal government has shown significant a focus on job creation, but not enough on innovation.

Benjamin Bergen, president of the Council of Canadian Innovators, says Ottawa is 'very much focused on a jobs strategy,' but isn't focused as much on an innovation strategy. *Photograph courtesy of the CCI*

As examples, he cited an announcement on March 13 that PowerCo, a subsidiary of major European automaker Volkswagen, will establish an electric vehicle battery manufacturing facility in St. Thomas, Ont. The plant, expected to be completed in 2027, will create up to 3,000 direct jobs and up to 30,000 indirect jobs, according to a press release on April 21 from the office of Ontario Premier Doug Ford.

Bergen said another recent example of Ottawa's focus on job creation involves Ericsson, a multinational telecommunications company headquartered in Sweden. On April 17, the federal government announced a five-year, $470-million research and development partnership with Ericsson Canada to create and upskill hundreds of jobs at facilities in Ottawa and Montreal, according to an Ericsson press release.

"That's a job strategy. That's not an innovation strategy, because we don't actually own these companies," said Bergen. "You see a government very much focused on a jobs strategy. And then you see the government spend on basic research and development, which is important, but it's not tied to the commercialization of that IP."

To address Canada's weak innovation performance, Bergen said the generation, retention and protection of IP should be a major area of focus, and which the CIC is poised to address.

"There's a potential opportunity here if the government gets it, but the government's been challenged with figuring out that kind of secret sauce," said Bergen. "The government has committed to finding a CEO and a board [for the CIC] … and the CEO will really determine its priorities. I think, fundamentally, whoever is put in charge of that will have a lot of power to determine the scope and the focus of the organization."

Dan Breznitz, co-director of the Innovation-Policy Lab at the Munk School and the department of political science at the University of Toronto, told *The Hill Times* that the CIC may be able to help reduce the risk of uncertainty so businesses are more confident about innovation. However, it will take more than that agency to reverse a downward trend in Canada's innovation support system that's been going on for decades, he added.

"Anyone who told you that there is only one thing to do is either delusional or is being paid by someone to tell you that," said Breznitz. "What we need is to actually attack the inability of our business sector to engage with knowledge, in more or less each and every way possible."

Breznitz said it will be important that the right individuals are chosen as CEO and chairperson to lead the CIC. The CEO will need to be someone who really understand business, and not just the high tech sectors, according to Breznitz.

"We are a big, resource-rich country. It is inconceivable that we're doing so bad in innovation in the resource sector, from energy, to mining, to forestry, to agriculture. [The CIC needs] somebody who also knows what is needed in those sectors, so our businesses can start to innovate and produce good jobs for Canadians who are not just R&D engineers," he said. "Somebody who can sit with the top CEOs in the mining business or the forestry business, as well as the banking business."

NDP MP Richard Cannings says Canada needs to do a better job of supporting companies to make sure innovative ideas are protected through patents, or other means. *The Hill Times photograph by Andrew Meade*

NDP MP Richard Cannings (South Okanagan-West Kootenay, B.C.), his party's deputy innovation critic, told *The Hill Times* that Canada needs to strengthen its game when it comes to protecting IP.

"There seems to be a consensus that Canada, as a country, needs to do a better job of supporting Canadian researchers and businesses that are providing innovations that we need to compete as a country … in terms of patenting—the protection of our intellectual property that is really essential to keeping that value within Canada," he said. "We need to do a better job of supporting companies to make sure those ideas, those innovations, are protected through patents or whatever mechanism would do that."

Cannings said that he would give Champagne a B grade in terms of his performance as Innovation minister, adding that improving the country's innovation ecosystem is a difficult task.

"I would agree, first of all, we are obviously behind, and so [Minister Champagne] has got a lot of work to do," said Cannings. "We are really falling behind other countries, both in direct research funding and private sector research funding. We only spend about a third, on a per capita or per GDP basis, of what other European countries are putting in, or the United States."

jcnockaert@hilltimes.com
The Hill Times

Global Innovation Statistics

- Canada was ranked 15th out of 132 nations in an evaluation of innovation performance by the Global Innovation Index in its 2022 report. The top ranked country was Switzerland (which held its top spot for the 12th consecutive year), followed by the United States, Sweden, and the United Kingdom.
- Investments in global R&D in 2020 grew at a rate of 3.3 per cent, slowing from the historically high 6.1 per cent R&D growth rate recorded in 2019.
- Government budget allocations for the top R&D spending economies showed strong growth in 2020, as governments vigorously sought to mitigate the economic effects of the [COVID-19 pandemic and global economic recession] on the future of innovation. For 2021 R&D budgets, the picture is more varied, with government spending having continued to grow in the Republic of Korea and Germany, but being cut by Japan and the U.S.
- In turn, top corporate R&D spenders increased their R&D expenditure by more than 11 per cent in 2020, and by almost 10 per cent to over US$900-billion in 2021, which is higher than in 2019 before the pandemic. This increase was primarily driven by four industries: ICT hardware and electrical equipment; Software and ICT services; Pharmaceuticals and biotechnology; and, Construction and industrial metals. Firms that cut R&D in 2020, including in sectors such as Automobiles; Industrial engineering and transportation; and Travel, generally – but not always – returned to R&D growth in 2021.
- IP filing activity grew during the global pandemic in 2020 and in 2021. International trademark filings saw particularly strong growth in 2021, up by 15 per cent.

Source: The Global Innovation Index's 2022 report

Business Innovation in Canada (2017-2019)

- Larger businesses (250 or more employees) were more likely to be innovative (85.8 per cent) than businesses with fewer employees, with 79 per cent of businesses with fewer than 100 employees being innovative in the 2017-to-2019 reference period.
- Ontario had the highest share of innovative businesses (83.1 per cent), followed by the "rest of Canada" category (which includes Manitoba, Saskatchewan, Alberta, British Columbia, Yukon, the Northwest Territories and Nunavut) at 79.4 per cent, Quebec (77.9 per cent), and the Atlantic region (68.5 per cent).
- The professional, scientific and technical services sector posted the highest proportion of innovative businesses (89.1 per cent), followed by the information and cultural industries sector (88.8 per cent) and the wholesale trade sector (83.3 per cent). Conversely, the management of companies and enterprises sector (60.8 per cent) and the agriculture, forestry, fishing and hunting sector (65.4 per cent) had the lowest proportion of innovative businesses.
- Approximately three in 10 businesses in Canada indicated that they used various types of government programs from various levels of government to aid in their innovation-related activities over the 2017-to-2019 period. This statistic was driven by small businesses (28.4 per cent), whereas, among large businesses, 42 per cent accessed government programs for aid on innovation activities.
- Businesses in Quebec had the highest usage rate of government programs (35.4 per cent) for innovation-related activities, followed by businesses in the Atlantic region (32.3 per cent), Ontario (31.7 per cent), and the rest of Canada (24.5 per cent).
- Slightly more than half of all businesses in Canada reported that they faced obstacles related to innovation in 2019. Of these obstacles, almost one in three cited lack of skills (29.7 per cent) and uncertainty and risk (29.3 per cent) as the most frequent barriers.

Source: Survey of Innovation and Business Strategy, 2017 to 2019, released by Statistics Canada on April 26, 2021