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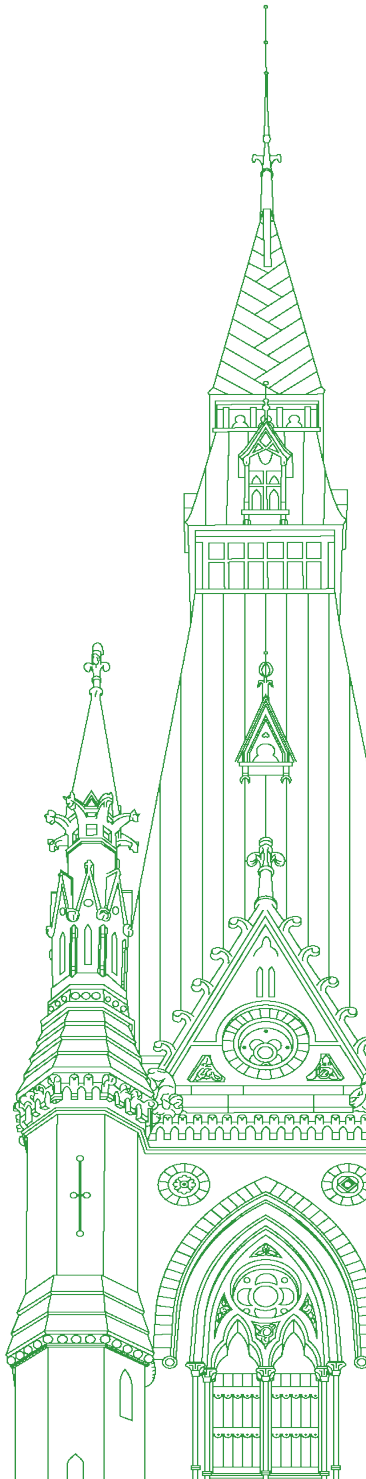

Chair: The Honourable Kirsty Duncan

Standing Committee on Science and Research

Thursday, February 10, 2022

● (1830)

[*English*]

The Vice-Chair (Mr. Corey Tochor (Saskatoon—University, CPC)): We will get the committee started here.

Welcome, everybody online and in person. This is meeting number four of the House of Commons Standing Committee on Science and Research.

We're very honoured to have three presenters with us today, so we'll have five-minute presentations from each, and then afterwards we'll have rounds of questioning.

For the members on the committee, at 7:30 p.m. we will be breaking and going in camera to take care of committee business.

With that, we will start off our presentations tonight with Dr. Myers.

Dr. Robert Myers (Director, Perimeter Institute for Theoretical Physics): Thank you, Mr. Chair and honourable committee members. It's a pleasure to be here addressing a committee that's taken up the important work of thinking broadly about science in Canada.

I'll say a word about myself. I'm from Deep River, Ontario, just up the river. I'm a theoretical physicist educated in Canada and the United States. Currently I'm the director of the Perimeter Institute for Theoretical Physics.

What is Perimeter? Perimeter is an independent research centre devoted to theoretical physics research, training and outreach. The institute was founded through the generosity and vision of Mike Lazaridis, inventor of the BlackBerry, the world's first smart phone.

When I first met Mike, he was passionately interested in the future. He wanted to help catalyze the breakthroughs that would shape the world of our grandchildren's grandchildren. He realized that theoretical physics was the smartest area he could invest in to make those breakthroughs happen. It didn't require massive infrastructure, yet it changed technology over and over again. The discovery of quantum mechanics, for example, led to the transistor, which led to Silicon Valley, which created literally trillions of dollars of value and changed our society.

Perimeter was created to focus on the deepest problems in fundamental physics, the moon shots. Successive federal and provincial governments as well as private donors have all recognized Perimeter's strategic value and have invested in us. Our funders all understand that theoretical physics is a low-cost, high-impact investment for advancing all of science and technology.

In just 20 years, Perimeter has measurably increased Canada's international standing in physics. We're ranked as a top centre in the world. In fact, the 2021 Nature Index rated Perimeter as Canada's highest-performing independent research institution.

Perimeter has catalyzed the “quantum valley”, a rapidly growing quantum ecosystem in the Waterloo-Toronto corridor. We've trained over 1,000 young researchers, and our educational outreach programs reach tens of thousands of students and teachers across Canada every year.

How has Perimeter done it? There are many things that make Perimeter stand out and that make us different, but I want to focus on one critical factor: talent. We've always been uncompromising in recruiting at the very highest levels. We don't hire based on quotas but on opportunities. We look for daring, brilliant young minds that match the ambition of the institute, people who want to make breakthroughs and who are willing to take risks.

When I think about Perimeter, I think about the people. Briefly, hopefully you'll now see three pictures that exemplify Perimeter's approach.

In the first picture on the top left, there's the CHIME telescope out in Penticton, B.C. CHIME has been called the world's first software telescope, and the brains behind that software is Perimeter researcher Kendrick Smith. Kendrick's algorithms have enabled CHIME to pick out faint signals from an enormous data stream in real time. His work has literally vaulted Canada to the forefront of radio astronomy in the world.

The next picture on the top right is perhaps a familiar image, Avery Broderick. One of the first things Avery did when he joined Perimeter was host a conference where he and his friends convinced the leaders of a dozen radio telescopes around the world to create a new collaboration called the Event Horizon Telescope, or EHT. Avery was confident that the EHT could do something that many thought was impossible. We were confident in Avery, so we invested in a few more conferences, some graduate students, some post-docs and some computational resources. The payoff in 2019 was that Avery was one of the four lead EHT scientists who unveiled the world's first image of a black hole. It was a remarkable technological achievement, one that has really transcended science now and reached out and touched humanity.

On the bottom at the far right, we have a young researcher from The Pas up in Manitoba, Roger Melko. Roger really kicked off a firestorm in his field with research combining machine learning and quantum matter. To support and amplify his work, we created the Perimeter Institute quantum intelligence lab.

● (1835)

We call it “PIQuIL”. Again, our investment was small: some space, some graduate students and some post-docs. What PIQuIL is doing is unique. It brings together researchers from academia, quantum start-ups and the government. There are now several copycat institutes in the U.S. and Europe trying to do the same thing.

In the five years that we've had PIQuIL, they've made major discoveries and in fact have spun out two start-ups, one headed by Estelle Inack, the woman to Roger's left. Estelle gave up an incredible offer from Microsoft down in the States because she thought she could do more interesting work right here at Perimeter.

In each of these cases, what makes this possible isn't scale; it's investing in exceptional talent. It's finding brilliant and daring young minds, giving them a secure home, equipping them with the right resources and inspiring them to take on the biggest challenges.

Thank you very much.

The Vice-Chair (Mr. Corey Tochor): Thank you kindly for the presentation.

Moving along, we're going to have the vice-president of research and innovation from the University of Ottawa, Dr. Charbonneau.

[*Translation*]

Dr. Sylvain Charbonneau (Vice-President, Research and Innovation, University of Ottawa): Good evening, Mr. Chair and members of the committee.

[*English*]

thank you very much for the invitation to meet with you. I am very pleased to contribute to your important study on successes, challenges and opportunities for science in Canada.

[*Translation*]

Tuesday evening, you heard from Gilles Patry, of the U15 Group of Canadian Research Universities, and Mona Nemer, the chief science advisor, both of whom have close relationships with the University of Ottawa. I have no doubt that their presentations, as well as those of the other excellent witnesses, will be invaluable to the committee.

[*English*]

Before I begin, I would like to thank the government for the support you have given to post-secondary institutions across the country. I also want to express our appreciation for the vision of and the efforts by the chairperson that led to the creation of this standing committee that gives voice to science, research and innovation in Canada.

● (1840)

[*Translation*]

My name is Sylvain Charbonneau. I’m the vice-president of research and innovation at the University of Ottawa. Before joining the university, I worked as a researcher and executive director for the National Research Council of Canada. I also had my own small photonics business—right here, in Kanata North.

[*English*]

Over the past 30 years, I've had the unique privilege of being part of several transformative research evolutions and, more recently, to answer the call in my leadership role at the University of Ottawa on everything from the pandemic to advanced technology in areas such as quantum, 5G and cybersecurity.

With excellence, relevance and impact as our guideposts, uOttawa is spearheading research and innovation initiatives that align with industry-relevant research, the translation of research-derived innovations to products and start-ups, and the development of an entrepreneurial mindset at all levels of the university.

This means creating an ecosystem that bridges together academia, government and industry for the commercialization of discoveries into the next generation of high-growth companies, new investments and the creation of jobs. Whether it is building the first-ever university industry research lab in the heart of Canada's largest technology park in Kanata North, or a first-in-Canada partnership with IBM in cybersecurity or working with Telus to make our campus 5G ready, our institution is playing a critical role in shaping Ottawa and Canada's future.

Canada's research excellence is world class. Our talented scientists and researchers are developing innovative solutions that generate economic growth and solve complex and pressing societal problems. As we move out of the pandemic, our researchers' and students' expertise will be needed to build a Canada that is more competitive, more sustainable and healthier.

But more is needed to propel Canada to the forefront of research and innovation globally. Between 2014 and 2018, the number of full-time researchers per million inhabitants in Canada declined by 4.8%. During that same period, the number of researchers in the U.S. increased by 4.9%, in the U.K. by 9%, and in Germany by a full 20%. Between 2014 and 2018, 32 countries increased spending on R and D, boosting global research spending by 19%, outpacing the growth of the global economy. Canada was not one of these countries. Canada ranked 23rd in the 2021 World Index of Healthcare Innovation analysis, a drop from 17th place in the year before.

I see these statistics as opportunities not just for governments but also for academia and the private sector. Our combined strength is the path forward. We stand ready to help create the conditions to allow innovation to flourish, and along with it, entrepreneurs, new companies, new products, services and solutions, as well as generations of highly skilled graduates. Talent is the prized currency and Canada's universities hold the key to unlocking the potential of the next generation of highly skilled and diverse talent.

Locally, uOttawa and its affiliated research hospital institutes are on a mission to break down the traditional silos between academia, health care, government and industry. For example, the Coronavirus Variants Rapid Response Network is led by uOttawa and brings together a network of researchers from across the country to address the threat of emerging COVID variants such as omicron. It is our first line of defence against these new variants.

In addition, uOttawa is investing in critical research and innovation infrastructure, such as the new Advanced Medical Research Centre and the Ottawa Health Innovation Hub, to help bring research discoveries to market. Our partner, the Ottawa Hospital, has plans to expand its biotherapeutics manufacturing centre to manufacture vaccines, biotherapeutics and new therapies for infectious diseases and cancer. It will be a major asset to combat the next pandemic.

I encourage you to invest in our universities to ensure Canada is leading internationally on what I call the three Ts: talent, technology and transformative initiatives. We stand ready to lead Canada's charge to push the frontiers of knowledge and enhance our country's innovation impact, and along with it, the entrepreneurs, new companies, products, services and solutions required for a better Canada—all enabled by the next generation of highly skilled graduates who flourish in an environment that is inclusive, diverse and welcoming.

Finally, I would like to extend an invitation to the committee members to visit us at the University of Ottawa and see first-hand the innovation of today and the talent of tomorrow.

[*Translation*]

Thank you, Mr. Chair.

● (1845)

[*English*]

The Vice-Chair (Mr. Corey Tochor): Thank you.

Now I'm going to head over to someone from my hometown. We're lucky to have with us tonight Dr. Bedard-Haughn, dean and professor at the College of Agriculture and Bioresources at the University of Saskatchewan.

Dr. Angela Bedard-Haughn (Dean and Professor, College of Agriculture and Bioresources, University of Saskatchewan): Thanks very much, Corey.

Good evening. I speak to you today from Treaty 6 territory, the traditional homeland of the Métis, and the centre of the prairie provinces.

I grew up in Saskatchewan and did my first two degrees here before moving to California for my Ph.D. I returned to USask as a professor of soil science and eventually started as dean of agriculture and bioresources in the summer 2020.

The prairie provinces are home to 81% of Canada's farmland. I'm here to talk about how agriculture and ag research are part of the solution for achieving Canada's climate goals. I speak as both a dean whose college transcends any perceived boundary between environment and agriculture, and as a scientist whose research has always focused on that interplay between soils and their environment.

With that, I'll begin my comments where I'm grounded—in the soil. In 1937, Roosevelt said, "A nation that destroys its soils destroys itself." Soil performs a myriad of ecosystem services, only one of which is supporting plant growth. Soil plays a crucial role in global water and nutrient cycles, in particular, carbon and nitrogen cycles, which are essential for plant growth but problematic when mismanaged.

On the Prairies, we celebrate the no-till success story, a widespread change in management that served to drastically reduce erosion, conserve water and nutrients, and increase carbon storage: a win-win-win. But to further enhance soil carbon sequestration and any associated benefits, we must further our understanding of what drives carbon dynamics, how agronomic decisions affect the quantity and the quality right down to the molecular level of the carbon that is stored.

Moving on to plants, the crop development centre here at the University of Saskatchewan is another incredible success story. When you drive our endless prairie highways flanked by fields of cereals, oilseeds and pulses, the impact of crop breeders is everywhere, but crop breeding is about more than increasing yield or commodities. With genomic advances, we are able to isolate specific traits and look at how they perform under different environmental conditions. This will allow us to develop crops that have a higher probability of success under climate extremes. Furthermore, what traits contribute to greater carbon sequestration, or require less fertilizer and the associated energy inputs, or are more resilient to other emerging threats coming with climate change, like new pests and pathogens? This is all part of climate change adaptation, and research in this area is going to be crucial in the years ahead.

Let’s move up the food chain to animal agriculture. It gets a bad rap from an environmental perspective, but here’s the thing: of that 81% of Canada’s ag land that's here in the Prairies, over one-third of it is used for pasture or forage. It feeds animals who feed us. Pasture tends to be grown where we can't produce other crops due to climate or soil limitations, but perennial grasses and forage crops are also massive carbon sinks, meaning animal agriculture is actually the most environmentally appropriate use of a large proportion of our very large land base. Rather than just focusing on eating less meat, can we better understand the role of animal agriculture as part of the ecosystem? How can we optimize grassland and forage productivity and by extension soil health and carbon sequestration? Can we tweak diets and supplements even further to reduce methane production?

Finally, not everything we grow is consumed by humans. Canola crushing for our fryers or our biodiesel also produces canola meal that can be used as animal feed. Plant-based protein extracted from field peas has starch as a by-product, which can be turned into pill casings or compostable packaging. Wherever possible, can we integrate stewardship of the land and water and plants and animals into a closed loop system? Are we doing everything we can to capture value and minimize waste? Our bioprocessing scientists and our economists can help us by identifying opportunities for fully utilizing what we produce, and by understanding all the costs and benefits of our decisions, both direct and indirect.

Our long-term success requires research that spans boundaries and the very success of prairie agriculture is built on collaborations among university and government researchers, industry and the farmers and producers. Programs like CAP and agri-science clusters are examples of funding mechanisms that have worked really well and should be continued.

● (1850)

We continue to look for more ways to facilitate cross-sector collaboration, including things like infrastructure.

In Saskatchewan, we are currently looking at opportunities for a new plant growth facility that would support shared research needs of university, Ag Canada, NRC, and the private sector. Right now, our biggest challenge is a workable shared governance model. How can we make this easier?

In closing, in the Prairies, our researchers and ag industry are already part of the climate change solution. We are willing and able to do more, but we need the infrastructure, support systems and funding in place to do the necessary research, and then the policy to translate it into action.

Together, we can and will dig deeper, and explore new ways forward, recognizing that the best opportunities will grow our collective future, contributing to both economic and environmental sustainability.

Thank you.

The Vice-Chair (Mr. Corey Tochor): Thank you for that presentation.

I also wish to thank the witnesses for the other two presentations.

We're going to start our six-minute round of questioning with MP Baldinelli.

Mr. Tony Baldinelli (Niagara Falls, CPC): Thank you, Chair, and thank you to the witnesses for joining us this evening. Thank you for your presentations. They were very informative.

What I found over the last meeting, and going into today's meeting as well, is this notion of creating an ecosystem to be the foundation.

Dr. Charbonneau, you had mentioned that yourself.

Last session, we had the chief science officer make a presentation. She talked about the ecosystem foundation being critical to science, research and innovation moving forward. In fact, if you go, and look at documents such as the Naylor report from 2017, it talks about harmonization, collaboration, coordination of programs, agencies and administration. One of the other witnesses talked about this notion of a one-step process, so that dealing with the government isn't as difficult, isn't as cumbersome and isn't as bureaucratic, for example.

I'd like your comments on the research side, as well as from the universities and agency side, in dealing with government. What can be done better to facilitate the research that you're doing, so that the monies that we spend can be delivered into your hands quicker to do the work you're looking to do?

That could be to any one of you.

Dr. Sylvain Charbonneau: You're absolutely right. It takes a village to bring research into commercial success. Let's look at what happens within our own ecosystem here in Ottawa.

Ottawa is a very rich G7 capital. It has a number of federal government departments that have research-aligned management. You have an ecosystem here in Ottawa where you have a very strong IT ecosystem. Of course, you have the hospitals and universities.

You often see solitude that exists within all of these ecosystems. How to best integrate the collaboration between the various parties is actually very important. This is what we've been trying to do here at the university, to try to bring the solitudes together, and to complement each other with the various programs that exist within the federal government. It could be tri-council, and it could be others.

We've been quite successful in doing this. I think more needs to happen. You heard in your meeting on Tuesday that one of the challenges that we have in this country is related to the SR&ED program, the SR&ED tax credit that exists. Indeed, the business expenditure and R and D in this country is in free fall. How can we best support our industrial sector in order to invest in the research ecosystem? That's very important. How do we bring these national [*Inaudible—Editor*] scientists? It was mentioned earlier by Mr. Myers, how we could be doing this.

It's all of the above, trying to bring this ecosystem together. It does take a village, and it's all about talent and the mobility of this talent among the sectors.

● (1855)

Dr. Angela Bedard-Haughn: I could speak briefly to that as well.

Mr. Tony Baldinelli: Yes, Dr. Bedard-Haughn. Thank you.

Dr. Angela Bedard-Haughn: I'll keep my comments brief.

I would comment on a couple of pieces. As I mentioned in my comments with respect to infrastructure, it would be helpful to think about how we can ensure that we have optimized use of shared infrastructure.

An example is the plant growth facility I spoke of. We have different institutions all co-located here on the University of Saskatchewan campus with shared needs. The cost of those shared needs exceeds what any one of us could realistically achieve on our own, but in order for us to maintain or regain our status as global leaders in crop development and in some of the genomic aspects that I was speaking about earlier, it's really urgent for us to put this together.

We're looking to make it easier for us to be able to collaborate across those boundaries, because we are finding that the difference in terms of expectations or how we approach the governance structures is one of the big challenges, but also a real opportunity.

When we think about the funding timelines, for example, that university grants typically operate on versus some of the opportunities that might be available through partnership with some of our federal agencies, there is real opportunity there for us to build on that and to create really powerful partnerships. However, we do need to think about how we break that down, because some of those silos that Dr. Charbonneau referred to are a function of those barriers that were perhaps put in place for security reasons, or perceived security reasons, but have now served as a barrier to collaboration as well.

Mr. Tony Baldinelli: Dr. Myers, could you quickly provide some comments?

Dr. Robert Myers: Sure. Here in my domain, there is an interesting ecosystem. Of course, it's an innovation spectrum. We're at the end of fundamental research, but we connect with people who are doing experiments and we connect with people who are looking for applications. In fact, there's venture capital that's investing in these areas.

In my particular instance, what I would focus on is an issue that came up the other evening, which is to have secure, ongoing funding. I'm hoping that the strategic science fund is a step in that direction. It's certainly an issue when you're trying to recruit talent across the border. They want to know that there's a secure path forward, not just for the next two or five years, but they want to build a career here. Therefore, that secure funding is really key to our success.

The Vice-Chair (Mr. Corey Tochor): Thank you kindly, Dr. Myers.

We'll move along to the next member, Madame Diab, for six minutes.

Ms. Lena Metlege Diab (Halifax West, Lib.): Thank you very much, Mr. Vice-Chair.

Panellists, thank you very much for attending our historic science and research standing committee here in Parliament.

As you know, we're timed. I'm interested in the whole science world, but given my time here, Dr. Charbonneau, I just want to focus a couple of questions to you.

You spoke about attraction and retention, in particular the attraction and retention of researchers. In your years and in your position, what have you observed as the most important factors influencing the university's ability to attract researchers and to retain them? Then aside from that, have those factors changed in the last two years, given COVID; and postpandemic, how do you see that going? I know that question is a mouthful.

You come from the University of Ottawa. Quite frankly, I've always compared Ottawa to where I come from, Halifax, in terms of a community, where you talked about the universities, the hospitals, the collaboration and things going on.

I'd like to get your thoughts on that.

● (1900)

Dr. Sylvain Charbonneau: Madame Diab, how much time do I have? It is a topic that is—

Ms. Lena Metlege Diab: Don't take forever, but answer as best you can.

The Vice-Chair (Mr. Corey Tochor): You have four and a half minutes left.

Dr. Sylvain Charbonneau: Attraction and retention of talent is one of the most important things for this country. The talent will go wherever the investments are. I will answer that, with regard to COVID, it has been extremely difficult to attract international talents into this country. They're not able to travel. It's difficult for the interviews. There are programs in place now that were launched recently about the Canada excellence research chairs, which will certainly help us to attract world talent into our respective regions.

As I mentioned in my remarks, this is the most important asset we have, not only in the universities but across the spectrum in industry as well. When we established our satellite campus, as I like to call it, in Kanata North, I heard three things from industry in terms of what they want. They want talent; they want the ability to re-skill their people; and they want to partner with universities to bring the next generation, the solutions, into their hands. Those are the main three things.

As I said, retaining our talent is very important, and if we don't invest in our infrastructure and the indirect costs of research.... The research support fund that the federal government provides is very important for universities in order to put this infrastructure in place. I will limit it to this, but I could go further because I think my colleagues might want—

Ms. Lena Metlege Diab: Let me ask you one more question in the time I have.

Before coming to Parliament, I was in the provincial government in Nova Scotia, and I know we used the services of University of Ottawa.

[*Translation*]

I have another question for you.

If I'm not mistaken, the University of Ottawa is the largest bilingual university in the world. Tell us, if you would, how the diversity of your student body, researchers and professors enriches your research activities in quality and scope.

Dr. Sylvain Charbonneau: How much time do I have to answer the question, Ms. Diab?

Ms. Lena Metlege Diab: You have about two minutes.

Dr. Sylvain Charbonneau: That's an excellent question.

The University of Ottawa is indeed the largest English–French bilingual university in the world, with more than 45,000 students, 15,000 of whom are French speakers. We attract francophone students not only from across the country, but also from around the globe, and now that includes African countries. You brought up diversity, and members of both English-speaking and French-speaking Africa are ever-present on our campus.

We, of course, have to ensure our programming lives up to their expectations, and we have been very successful at doing that, offering hundreds of programs in both languages.

By the way, Ms. Diab, you speak French incredibly well.

Ms. Lena Metlege Diab: Thank you very much.

My heritage is Lebanese.

[*English*]

Dr. Myers, just very quickly, because I have one minute left, can I get your opinion on research-university collaboration and enterprise, so academia-government enterprise, from your perspective? How has that been affected in the last two years?

Dr. Robert Myers: I would say that collaboration has been key to Perimeter's success, certainly in training graduate students. We're not a degree-granting institution and so we work with the University of Waterloo as well as universities throughout southern Ontario in all of our training programs as well as in doing the research.

I told you about Avery Broderick and Roger Melko. They're both jointly appointed here and at the University of Waterloo. Again, we have joint appointments with universities throughout southern Ontario. In fact, we have one associate faculty who's at the University of Dalhousie now in the math department there.

These kinds of collaborations I see as opportunities not only to work and to diversify or increase our reach but also to try to raise the level of research across the country. We live in a community and we'd like to see the entire community flourish.

● (1905)

The Vice-Chair (Mr. Corey Tochor): Thank you kindly, Madam Diab and Dr. Myers.

We now move to MP Blanchette for six minutes.

[*Translation*]

Mr. Maxime Blanchette-Joncas (Rimouski-Neigette—Témiscouata—Les Basques, BQ): Thank you, Mr. Chair.

I want to say hello to the witnesses and thank them for being with us this evening.

My questions are for Mr. Charbonneau.

Mr. Charbonneau, it was quite telling to hear the statistics you shared in your opening statement. They speak volumes. You said that the number of full-time researchers per million inhabitants in Canada had dropped by 4.8% between 2014 and 2018. During the same period, other countries experienced the opposite trend, with the number of researchers increasing by 4.9% in the United States, 8.9% in the U.K. and 20.6% in Germany.

Your colleague Mr. Patry, whom you probably know quite well, is a former president of the University of Ottawa and represents the U15 Group of Canadian Research Universities. He, too, told us that the number of researchers in Canada had shrunk, in particular, over the past six years. Unfortunately, Canada is the only G7 country to have experienced such a decline.

Talk to us about those striking statistics. Why is Canada missing the boat?

Dr. Sylvain Charbonneau: It boils down to the level of ongoing investment over the years. I think that speaks to the heart of the decline. As you know, Canada's population of university teachers is getting older and older, and few young researchers are taking their place. That may be one of the reasons why it's challenging to shore up the university sector.

It has to do with the investments made by the federal and provincial governments. Some of the programs out there are great—mitacs, for instance, sends students into the private sector to gain skills and experience.

I brought up the scientific research and experimental development program earlier. The shortcomings in that regard are clear. The government could have invested directly in research and the industrial sector. I urge you to take a look at the site Research Infosource Inc., which provides a ranking of the top 50 or 100 R and D spenders in Canada. It tells you exactly where things are happening on the R and D front in Canada. It's really helpful to see how things are changing.

Investing in major research programs is a long-term undertaking. I applaud the government on its $2.2-billion investment in bio-innovation and bio-manufacturing, under the 2020-21 budget. I think it will go a long way towards helping the health sector. As you know, Canada had trouble when it came to COVID-19 vaccine research, and it's an area we are continuing to work on. I think this funding will do a lot on that front.

Mr. Maxime Blanchette-Joncas: You brought up innovation, and in your opening statement, you told us that 32 countries had increased their R and D spending between 2014 and 2018. Unfortunately, over the past two decades, Canada has been the only G7 country to have reduced its investment in R and D. From 2001 to 2019, Canada went from number eight on the World Index of Healthcare Innovation to number 17.

You talked about recent investments. No one is against doing the right thing, but will the funding be enough to reverse the trend and make up for how far we've fallen behind over the past two decades?

● (1910)

Dr. Sylvain Charbonneau: There's a lot to say about that. I don't like drawing comparisons with Germany or the U.S., but it's hard not to.

In terms of business R and D expenditures, Canada is in free fall. I think we were at less than 1.5% in 2021, so very little investment is happening at the industry level.

The federal government wants to set up a research organization similar to the Defense Advanced Research Projects Agency, or DARPA, in the U.S. It could adopt a model whereby R and D investment supported the creation of innovative technologies, while contributing to significant purchasing power. As you know, DARPA's success is thanks to the American defence sector. Federally, the U.S. allocates a very large share of departmental budgets to R and D.

That is a way to support innovation and commercialization of those inventions, while putting them in the government's hands. Many groundbreaking innovations have been commercialized and are now being used in cell phones, GPS being just one.

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Charbonneau.

How much time do I have left, Mr. Chair?

[*English*]

The Vice-Chair (Mr. Corey Tochor): You have eight seconds.

[*Translation*]

Mr. Maxime Blanchette-Joncas: All right. Another member can have the floor.

Dr. Sylvain Charbonneau: Thank you, Mr. Blanchette-Joncas.

[*English*]

The Vice-Chair (Mr. Corey Tochor): Thank you for keeping it within six minutes. Not all members have done that tonight, so I recognize the good behaviour.

Moving on to the next member, we have MP Cannings for six minutes.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you all for being here today.

I'm sorry that I was a little late in getting here, but I did try to listen to your testimony as I ran between the House of Commons and this building.

I want to start with Dr. Bedard-Haughn, simply because it's always wonderful to talk to a soil scientist. There's a soil scientist theme running through my family. My brother-in-law is a soil scientist. My father and my uncle worked for Agriculture Canada in Summerland in the soil building. It's not often that I meet a soil scientist again. It's great to have you before us.

With that in mind, because all of my connections to soil scientists are with Agri-Food and Agriculture Canada, or whatever it's called now.... They have a centre in Saskatoon.

I have a broad question about collaboration and co-operation between academic institutions, like the university, and government research that we have there. You talked about sharing resources and things like that. Is that something that goes on easily? Is it something that we should foster, in terms of infrastructure, equipment and collaboration on projects?

Dr. Angela Bedard-Haughn: It absolutely goes on, easily and naturally, to some degree. In a per-square kilometre basis, there are perhaps not as many soil scientists as there could or should be in the Prairies.

Some of my own collaborations, certainly earlier in my career, were very close collaborations with Agriculture and Agri-Food Canada scientists. We're co-located; up until fairly recently, we had a number of the scientists co-located right in our building. The Ag Canada building was right next door, but we had some of those scientists sitting right in our building, sharing facilities and lab space here. It was only as our college continued to grow and some of those scientists retired that, eventually, the remaining few moved back next door.

Across all disciplines that are represented here, we see really strong collaborations with the centre right here in Saskatoon, Swift Current and the other centres across the Prairies. Part of that has to do with the complementarity of our expertise. It's something that we always work toward.

We can continue to work on making that simpler. As I alluded to, there is the potential for sharing infrastructure and trying to make it a bit smoother to be able to share some of those resources. We've worked through it and we have the systems in place now, but anything we can do to continue to expedite and simplify those types of processes would go a long way toward facilitating and strengthening those collaborations.

I would be absolutely remiss if I didn't indicate that—as I said earlier—much of the success comes from those close collaborations throughout. The original soil survey units were co-located right here in the building. We do much of our plant breeder work really closely with the breeders who are located next door. That is absolutely something that we need to continue to work on.

● (1915)

Mr. Richard Cannings: Is that something that happens at a lot of federal agriculture research facilities?

When I worked at UBC, there was a federal agriculture station at the university. I think that's been closed down now and those people have moved to Summerland, where my father worked. I kind of grew up at that station, in a way.

Is there a policy that you know of that helps collaboration?

Dr. Angela Bedard-Haughn: I don't know that it's an official policy, but it's certainly something that seems to naturally occur and be fostered. Part of it is that scientists get trained at universities and then go on to become research scientists at Agriculture and Agri-Food Canada, so those collaborations come quite naturally.

Also, part of that comes from the research scientists with Agriculture and Agri-Food Canada who many times will work closely with universities so that they can work with graduate students and train graduate students. We have grad students who are often co-supervised with Ag Canada scientists, whether they're based here or elsewhere. Those students might come here, take their courses and then go back to the station, whether it's in Swift Current or Lethbridge, and do their field research in partnership with an Ag Canada research scientist.

In Summerland, of course, with the opening of the UBC Okanagan campus, that certainly strengthened their university partnerships as well. I did a sabbatical at the Summerland station, so I know that there are some excellent scientists and some excellent collaborations there.

Mr. Richard Cannings: Thank you. I think my time is pretty much up.

The Vice-Chair (Mr. Corey Tochor): You still have 15 seconds, Mr. Cannings.

Dr. Sylvain Charbonneau: You still have 15 seconds, so if I could—

Mr. Richard Cannings: Yes. Jump in there.

Dr. Sylvain Charbonneau: You still have 15 seconds, so if I could just add to the previous answer, yes, indeed, Canada is just too small not to collaborate, and the national labs are extremely important for the universities, and for the entire ecosystem, to be honest.

I could talk about quantum. We have a joint centre in extreme quantum photonics at the University of Ottawa with the National Research Council. I could talk about the largest nuclear magnetic resonance...in the country, purchased by CFI grants and located in a national lab. Or I could talk about the importance of having graduate students, as was mentioned previously, who are being co-supervised, with many of our adjunct professors in university—I'm talking probably across the board here in Canada—who come from the national labs. It's a very rich environment and should not be forgotten.

Thank you.

The Vice-Chair (Mr. Corey Tochor): Now we're going to move on to the five-minute round.

We have MP Williams.

Mr. Ryan Williams (Bay of Quinte, CPC): Good evening and thank you very much, Mr. Chair.

Thank you, everyone.

I'm going to start with you, Dr. Myers. I think Perimeter sounds amazing. They are things I could never understand, but I think they're incredible.

I want to talk about Canada's quantum potential. I know that we have some centres in Quebec, and we certainly have what you're doing. What makes our quantum potential different from that in the U.S. and how will Canada gain an edge as we move that forward in advancing and developing it?

Dr. Robert Myers: It's amazing that Canada is a player in that domain, but I think it's been decades, literally. We started in the early 2000s, or Mike Lazaridis, actually, started in the early 2000s, investing in and drawing attention to that particular area.

The investments that we see now around the world are just off scale in that particular area, so I think it's important to double down and bet on the excellence that we have here because of those past investments, but it's also an opportunity to collaborate. We've certainly talked about collaboration across the country, but I think there are also opportunities to collaborate outside and with those global players. Certainly, here at Perimeter, we're working with scientists at MIT down in Maryland and with Harvard out in California. These are leading research centres in their own right. It would be a real lost opportunity if we weren't working with the best in the world down south of the border there.

● (1920)

Mr. Ryan Williams: That's fantastic.

Is there a difference in what we're doing? Do you collaborate also between the provinces and all those centres? I'm assuming that you'd have massive collaboration in Canada, correct?

Dr. Robert Myers: We actually have various programs. One of them is the affiliate program for like-minded faculty at universities all across Canada. I think it hits every province. We give them an opportunity to come here and collaborate with us. COVID was mentioned and, of course, it's on the tip of everybody's tongue.

A decade and a half ago, we started recording all of our lectures, all of our conferences and all of our seminars, and those are readily available to scientists all across the country. That's a resource that puts our research, the research that we're hearing about, centre stage for anybody across the country who's interested.

Mr. Ryan Williams: Thank you very much, Doctor.

Dr. Bedard-Haughn, a big part of being successful in innovation is developing our own products in our own fields and not just copying or parallelling advances of the Americans. We need to take advantage of the resources we have here in clean energy, natural gas, critical minerals and agriculture rather than going and copying what they've done. We have more farmland that we can harness into world-leading innovation than any other country in the world.

How can we turn Canada into an agricultural leader in innovation in food processing?

Dr. Angela Bedard-Haughn: I think one key place for us to invest to make that possible is in supporting those innovations and that risk space. We're certainly seeing more and more investment now in the start-ups and the opportunities here in Saskatchewan and in the Prairies in general than we have in the past. There's been tremendous growth in terms of the bioprocessing space.

We're trying to move away from that notion that we're just a net exporter of commodities to look at more and more opportunities for bioprocessing here. We look at the strengths and the strides that we've made in terms of plant-based protein and the processing there.

As I alluded to in my remarks, I think one of the really important pieces there is to recognize that along with those bioprocessing opportunities, there are other spin-off opportunities, because we're rarely taking one commodity and turning it wholesale into something else. There are usually fractions that are being used. When we're talking about the new energy plants that are going up in parts of the Prairies that are looking at producing energy from canola that cannot be used for human consumption—sometimes it's just off-grade—that doesn't mean it can't be produced and used for biodiesel. There are by-products. I alluded to canola meal, but that's only part of it. We need to continue to invest in that foundational science that says, okay, what is in these by-products? What are the useful pieces of these by-products? What would it take for us to turn this into something useful, whether that's from a soil amendment through to some other types of products that can maybe be used in manufacturing other types of materials?

I think the foundational research is looking at the composition, our tools for examining what those different compounds are made up of, how that tool kit has continued to grow, but then there's providing the space and the investment for those ideas to incubate. It's really exciting to see more of that investment happening here, and I think that having those ecosystems supported at all levels will be key going forward.

● (1925)

Mr. Ryan Williams: Thank you very much.

The Vice-Chair (Mr. Corey Tochor): That concludes MP Williams' time.

Now we will have, for five minutes, MP McKinnon.

Mr. Ron McKinnon (Coquitlam—Port Coquitlam, Lib.): Thank you, Chair. I'm sharing my time with Jenna Sudds.

Go ahead.

Mrs. Jenna Sudds (Kanata—Carleton, Lib.): Terrific. Thanks so much. It's a pleasure to be with you here tonight.

I have so many questions, but I'd like to focus on one issue we haven't talked about too much yet. I'm going to direct this to Dr. Charbonneau.

You talked about talent being so key, and we're here today to talk about the successes, the challenges and the opportunities for science in Canada. Thinking of the challenges and opportunities and recognizing that tomorrow actually, February 11, is declared the International Day of Women and Girls in Science. I'd like to get your perspective on how we are doing with respect to attracting and retaining more women and diverse individuals.

Could you comment on the progress or the challenges, either way, with respect to attracting more women and diverse individuals to STEM-related careers?

Dr. Sylvain Charbonneau: Because you mentioned “STEM-related”, I was going to go on a tangent to say that I think in certain disciplines, Canada is doing extremely well on the diversity of attracting stellars in various fields. In the STEM disciplines, I do agree that there is added complexity. At the University of Ottawa the need for bilingualism is in the mix. Visible minorities, women, STEM disciplines and bilingualism—the pool of talent becomes increasingly smaller. That's the ecosystem in which I live on a daily basis.

Having said that, I think for most universities, if not all universities—this was led by your chair, in fact—when we introduced the EDI categories for the Canada research chair, certainly it stimulated the ability of universities to attract women and visible minorities and people with disabilities and indigenous scholars in all fields. Now that we are progressing in our ways, it will be divided into the three councils—the social sciences; the STEM disciplines, if you wish, or NSERC; and the CIHR, the health sciences. We are going to be asked to try to meet these equity targets up until 2029.

That's at the talent level on the Canada research chair side of things, but so much more needs to be done in all of our respective institutions, to be honest with you. How do we do this? It's a challenge that every university is dealing with, but we're making significant progress. I mean, we have data on this.

Mrs. Jenna Sudds: That's great to hear.

I'm going to pass the rest of my time over to MP Bradford, as I know she has a question.

Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.): Thank you so much, MP Sudds. I really appreciate it.

Dr. Myers, first of all, it's so fascinating to have you with us. I am from Kitchener-Waterloo, so I'm really familiar with Perimeter. I'm so glad you could join us.

From your position in Waterloo, how do we develop stronger private-public partnerships so that more graduates have jobs and opportunities in Canada and we can compete on a per capita basis with other G7 countries?

Dr. Robert Myers: That's a great question. It's a real challenge. My alma mater is the University of Waterloo. I'm a graduate of the co-op program. One possibility that we're working on is extending that program to the graduate level to try to connect the students here with internships with local start-ups or start-ups in the Toronto area.

I think that's a major step forward, but it's also having institutions like PIQuIL. We literally have scientists from local quantum start-ups sitting at desks side by side with the graduate students, post-docs and researchers we have here at Perimeter. They are sharing opportunities and co-supervising students. I think it really opens the eyes of the graduate students to what the possibilities are.

That's been an effort that we've started here more broadly at Perimeter with a program called “career trajectories”. It's really just to open the eyes of the highly qualified young talent that we have here to the possibilities that are beyond the academic career path and out into the private sector. We have been seeing a number of successes there, where students have started their careers in start-ups or with major firms in the Toronto area, or they've launched their own start-ups.

It's something we are working toward. It's a really important question that you asked there.

● (1930)

The Vice-Chair (Mr. Corey Tochor): Thank you, Dr. Myers.

It's been a very eye-opening committee tonight. I want to thank our witnesses on behalf of all of the committee members for their presentations and for their fulsome answers.

We will suspend the meeting so that we can move to the in camera portion of the evening.

[*Proceedings continue in camera*]