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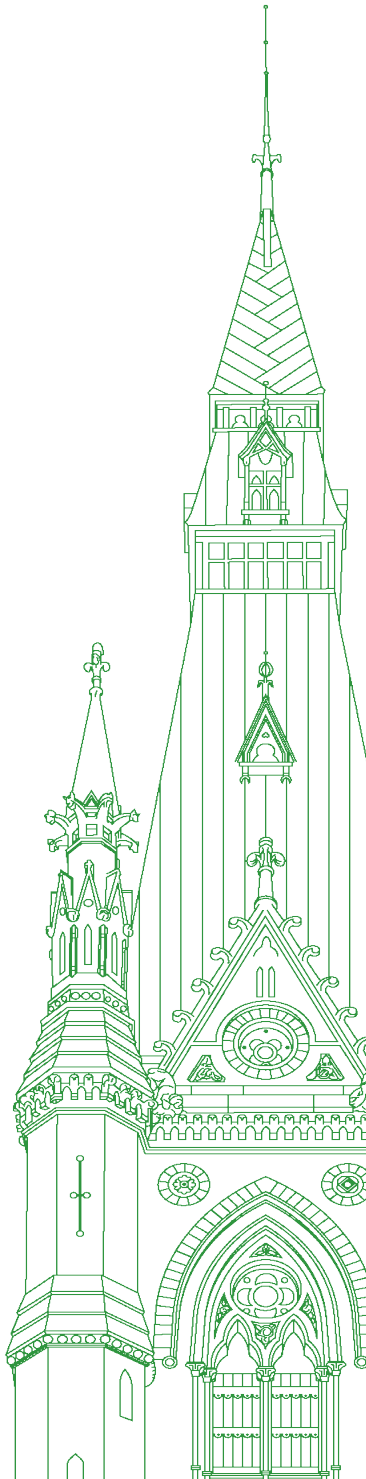

Chair: The Honourable Kirsty Duncan

Standing Committee on Science and Research

Tuesday, March 1, 2022

● (1830)

[*English*]

The Chair (Hon. Kirsty Duncan (Etobicoke North, Lib.)): Dear colleagues, I call this meeting to order.

[*Translation*]

Welcome to the seventh meeting of the Standing Committee on Science and Research.

[*English*]

As you all know, the Board of Internal Economy requires that committees adhere to health protocols, which are in effect until March 11, 2022. As chair, I will enforce these measures and, as always, I thank you all for your co-operation.

Today's meeting is taking place in a hybrid format pursuant to the order of November 24, 2021. I'd like to outline a few rules to follow.

Interpretation services are available for this meeting. You may speak in the official language of your choice. At the bottom of your screen you may choose to hear the floor audio, English or French. The “raise hand” feature is on the main toolbar should you wish to speak. I remind you that all comments should be addressed through the chair. When you are not speaking, your microphone should be muted.

The committee clerk and I will maintain a speaking list for all members.

Dear colleagues, we have two panels tonight. We're delighted to welcome our witnesses for the first panel.

From Niagara College, we have Dr. Marc Nantel, vice-president, research and external relations. Welcome, Dr. Nantel. From the Université du Québec en Outaouais, we have Dr. Adel El Zaïm, vice-president, research, creation, partnership and internationalization. From the University of Saskatchewan, we have Dr. Baljit Singh, vice-president, research.

We welcome you all. We're grateful for your time.

We'll have statements from each witness for five minutes. I will hold up a yellow card when you have 30 seconds left.

We'll begin with Dr. Nantel for five minutes.

Welcome. The floor is yours.

Dr. Marc Nantel (Vice-President, Research and External Relations, Niagara College): Thank you very much, Madam Chair.

I would like to thank the committee for allowing me the opportunity to speak today and for the committee's service to the Canadian people. It's nice to see some of you again, including you, Madam Chair.

My name is Marc Nantel. As said, I'm the VP of research and external relations at Niagara College. I'm also the chair of the national research and advisory council of Colleges and Institutes Canada. I have experience in research at both university and college levels.

I got a Ph.D. in plasma physics in 1994. I then went to France and then to the University of Michigan, where I worked with Gérard Mourou, who was fortunate enough to have the Nobel Prize given to him with our friend Donna Strickland a couple of years ago. I then spent 10 years from 1998 to 2008 at the University of Toronto as an adjunct professor. I have been at the college since 2011.

I would like to talk quickly about some of the success I see from the funding program point of view. When I got my Ph.D. in 1994, research funding in Canada was at a low ebb, so I had to go away. However, when I saw in 1997 that the Government of Canada had created a Canada Foundation for Innovation, the CFI, and then the Canada research chairs, I knew it was time to come back, because Canada was getting serious again about research.

When I came back from Michigan, my first grant I received was from the CFI for the establishment of the University of Toronto's laser micromachining facility. The equipment is still in use today. I'm quite happy with that.

I consider these two programs to be great successes, the CFI and the CRC. They brought back Canadian scientists to Canada and recruited international stars. I think they are doing what they are supposed to do.

Another program that is dear to me is NSERC's college and community innovation program. Niagara College is one of the six colleges across Canada to help NSERC conduct this pilot for the program in 2006-09. The success of the pilot led to the continuing CCI program funding that NSERC runs for the tri-council. The annual budget is $85 million a year. This amount represents only about 2%-and-change of the total tri-council support for post-secondary research with the rest, 97%-plus, going to universities. Nonetheless, I consider this program to be a resounding success. Through NSERC's CCI program, the power of community colleges to contribute to research was unleashed, albeit only partially. We would need several times the current budget to fully realize it.

A challenge we hear a lot from the press these days, and for a while, has been that Canada does well at basic research and publishing results, but not so well at reaping the benefits of our intellectual property for Canadians. I don't purport to have solutions for how universities are going to tackle that, but let me tell you how colleges try to contribute.

College research complementary to universities is often about the application of knowledge to solve more immediate problems and about the companies, mostly SMEs, small and medium enterprises, that approach us for help. It's about developing new products, processes and services for them. It's about transferring these solutions and new commercializable results directly to industry, and it's about giving college students a richer education through these applied research projects so that they can be a better workforce.

Our timelines for these projects are, therefore, shorter. They're a few months to a year, as is the timeline for commercialization, because the IP is generally given straight up to the industry partner who can get on right away with commercializing it. It's more of a market pull situation than technology push.

The colleges are trying to help. All of the government and big science eventually needs to hit the ground. Often, at that point, colleges are involved in taking the concepts and prototypes that you make and bringing them to life with the companies that are going to put them on the market. Big science needs applied research to be successful in reaching its commercialization end goals.

College campuses are situated within 50 kilometres of 95% of the Canadian population and 86% of the indigenous population of Canada. We have 140 colleges across Canada, including more than 750 labs and research centres. In 2019 and 2020, they worked on more than 6,400 applied research projects, yielding more than 5,500 prototypes, processes, products and services, and 85% of these were realized within one year. Along the way, 42,000 students worked on the projects and got an enhanced education that allowed them to be innovative for the employer that will hire them.

Colleges work with SMEs, and the results and commercialization of the research leads these companies to be competitive on the market domestically and internationally, and to create jobs in all sectors of the economy. Because most of the companies with which we work are small and medium-sized enterprises and not multi-national corporations, the results directly benefit Canada.

At Niagara College, we focus, for example, our applied research on advanced manufacturing, agriculture and the environment, food and beverage and business and commercialization research. Other sectors covered by other colleges include ICT, health, energy and anything you'd like.

● (1835)

That's why I'd like to end my introductory remarks by asking that the committee consider the place that college-applied research could play in the overall research landscape in Canada and in the economic development, job creation and wealth generation that it can bring.

We can contribute so much more with better than 2% of the federal dollars going to all post-secondary research—

The Chair: Dr. Nantel, I'm sorry to interrupt. I know people will be really interested in what you have to say and will want to follow up. Thank you so much.

Dr. Marc Nantel: I didn't see your sign, Madam Chair, because I was reading my text. I apologize.

The Chair: Thank you so much. I know people are really looking forward to talking with you.

We will now go to Dr. Adel El Zaïm. It will be for five minutes.

We look forward to hearing from you.

[*Translation*]

Dr. Adel El Zaïm (Vice-President, Research, Creation, Partnership and Internationalisation, Université du Québec en Outaouais): Thank you, Madam Chair.

I would like to begin by thanking you for inviting me to testify before your committee and wishing you great success in your mandate. On behalf of the Université du Québec en Outaouais, I assure you of our full cooperation for the future of science and research in Canada.

We already know that Canada has many successes in science and high-quality research, which is worth celebrating. My comments today will focus more on the challenges and opportunities in science and research.

The Université du Québec en Outaouais is a young university with some 6,000 students across its three locations: in Gatineau, Ripon and Saint-Jérôme. We are a university with a regional mission and very internationally diverse staff and student body. Our researchers often tackle real and multicultural challenges that require a multidisciplinary approach, including in natural sciences, the environment, forest sciences, education, computing, engineering and social sciences.

The COVID-19 pandemic has been and still is a tremendous challenge for all of our systems, both in Canada and abroad. It has also provided an opportunity for transformation, as we have been forced to become more agile, more flexible and more quick to meet needs.

Canada's research councils and the Fonds de recherche du Québec, a Quebec research fund, have implemented agile funding to find solutions quickly. Researchers from around the world have been working together and have developed solutions faster than before based on knowledge they have acquired, such as the vaccine and experimental treatments, which are currently of interest to us.

We have also seen innovation in other fields, such as transportation logistics, distance education, telemedicine, the development of technological solutions for service delivery, but also cybersecurity, an area of excellence at the Université du Québec en Outaouais.

Canada will now have to learn from the crisis by identifying the needs and deficiencies exposed by the crisis before addressing them. So we will have to go from a reactive approach to a proactive approach if we want to forecast the future better and, more importantly, innovate more.

Major global challenges, such as the climate change crisis, will increasingly require ongoing intersectoral, interprovincial and international partnerships. Therefore, we will have to foster collaborations with countries that share our values of democracy and openness to the world.

International partnerships increase our research capacity. Therefore, strengthening research, institutions and the system for managing research and its outcomes in Canada is becoming a fundamental and vital issue for the sustainability of Canadian success and its benefits for the country and for the world.

In addition to developing fundamental knowledge, research in the 21st century must reflect complex issues and, more so than ever, it will have to be multidisciplinary and interdisciplinary. Some programs from Canada's research councils foster that approach. We will have to develop more of them and train more researchers on multidisciplinary approaches. So we will also have to recognize this type of training and expertise and researchers' background in order to develop young scientists's full potential.

It is no exaggeration to say that one of the dangers to democratic society nowadays resides in the lack of science culture and research culture. Our education systems hope to develop critical thinking in our young people. However, many of them can't distinguish between a personal opinion, the public opinion and a proven scientific fact. So young people must be introduced to research culture when they start school and given support, with general culture, throughout their development, whether they are headed to university or not.

Our universities' research offices are working hard to meet funder requirements. However, even large universities are suffering in having to manage all those requirements. So Canada could simplify procedures, thereby giving small universities more means.

● (1840)

As far as perspectives go, Canada has a lot of friends around the world. We export knowledge and know-how. We can also import more of it and thereby ensure a more sustainable development of science and research skills in Canada.

The pandemic has shown us the benefits, but also the limitations, of a globally interconnected society. We will now need more investment in leading sectors to position us as a global leader and to ensure scientific innovation and social innovation through research.

Finally, allow me to reiterate the following ideas. Science culture must be developed in young people—

The Chair: I'm sorry to interrupt you, Mr. El Zaïm, but your time is up.

Thank you very much for your presentation.

[*English*]

I know that our colleagues eagerly await to talk to you.

Now we will go to Dr. Singh for five minutes.

Thank you, all, so much.

Dr. Baljit Singh (Vice-President, Research, University of Saskatchewan): Good evening, Madam Chair.

Thank you very much for this privilege to be in front of the Standing Committee on Science and Research.

My name is Baljit Singh. I am vice-president of research and professor of veterinary medicine at the University of Saskatchewan, which is located on Treaty 6 territory and the homeland of the Métis people.

This university is a proud member of the U15 group of Canadian research-intensive medical doctoral universities and enrolls more than 20,000 students, including 4,000 graduate students from 130 countries. We are proud to say that 15% of the student body—about 3,500 students—are self-declared indigenous students. That percentage is equal to the percentage of indigenous peoples in the province of Saskatchewan.

The Canadian government has proudly made significant investment over decades in basic and applied research that has lead to the current levels of prosperity that we enjoy every day.

Today, Madam Chair, I would like to make four specific points for consideration by this committee. I hope some of those are fresh points and some will support what has already been presented to the committee.

Number one is research facilities. Canada has done a commendable job in investing to create unique and world-class research facilities in this country. There are 17 national research facilities, and we are proud to have three of those at the University of Saskatchewan. Because we operate those, we also have experience in the challenges of finding funding to operate those facilities in an adequate and optimal manner; therefore, I would request the committee to consider a national conversation to create an alternative funding model for large, national research science facilities that considers the full life cycle of the facility from the first brick to the finish of the facility.

The second point, Madam Chair, I would like to make is about work with indigenous communities. As part of our national work, universities have developed significantly better ways of working in a respectful manner with indigenous communities and their leaders to undertake research in partnership with the communities into challenges that are directly confronted by our indigenous peoples.

The road is long; there are still challenges, but I also see that there are massive opportunities in front of us if we can do the work right. I would request the committee to consider creating a better funding model that galvanizes the partnerships between universities and indigenous communities to create a better and prosperous way of life for our indigenous peoples in Canada.

The third one, Madam Chair, I would make is about One Health. Over the last couple of years, we have seen what a fast-moving and complex threat such as COVID-19 can do to expose the gaps in our knowledge and abilities of public policies to tackle that problem. What emerges are the intersections of the animal health, human health and environmental health. We don't have to react in a similar way to future challenges.

There is a better way, and it's called One Health. One Health examines deeper connections between animal health and human health, and it leads to the creation of a better public policy framework. The University of Saskatchewan is engaged with other universities and some federal departments in advancing the concept of One Health to protect the health of Canadians, their animals and their environment when a future outbreak takes place in this country.

I would recommend leadership from the federal government to allow us to coalesce the existing abilities in the area of One Health to create a legacy program for Canadians to protect their health.

The last point, Madam Chair, I would make is about better funding in the areas of social sciences, humanities and the arts. I think the COVID-19 pandemic has shown the epidemic of mental health in our country. Also, we don't have a better way of building cohesive, resilient and multicultural communities in our country. A better investment into social sciences and humanities will allow us to do that and also give us a better way of expressing ourselves culturally, and different ways of artistic expression will allow us to create wellness in our country.

With these comments, Madam Chair, I, again, am very grateful for the opportunity to be in front of this committee. Thank you so very much.

● (1845)

The Chair: Thank you, Dr. Singh, for your comments.

Again, I welcome all three witnesses. You have a committee that's really interested in the work you're presenting and is eager to learn more, so we thank you.

With that, we will now go to our first round of questions. This is a six-minute round, beginning with Mr. Baldinelli.

It's over to you.

Mr. Tony Baldinelli (Niagara Falls, CPC): Thank you, Madam Chair.

I thank all the witnesses for being here this evening and for their insightful presentations.

I'll begin with my questions to Mr. Nantel from Niagara College.

In a previous session of one of our hearings, one of our witnesses, Mr. Kenyon from Brock University, during his presentation talked about the power of smaller research institutions. He talked about how smaller institutions can play a larger role in the cultural and economic activity of their communities. I really felt that sentence and that line defined perfectly what Niagara College is doing and has been doing for the past several years.

You mentioned in your presentation the notion of applied research and working with industries, and working in terms of months, not several years, on several of the projects in your innovation centres, be it the Walker Advanced Manufacturing Innovation Centre, the Canadian Food and Wine Institute and the innovation centre there, or the Agriculture and Environmental Technologies Innovation Centre.

Could you give us some examples of the projects, applied research projects, that have made a real difference to Canadian companies, primarily those in our local communities?

● (1850)

Dr. Marc Nantel: Thank you very much. Through the chair, Mr. Baldinelli, yes, I can give you examples from each of our innovation centres.

From the Walker Advanced Manufacturing Innovation Centre, we are leading a nine-institution network called the Southern Ontario Network for Advanced Manufacturing Innovation. It's funded through FedDev Ontario, the regional development agency for southern Ontario. It is tackling a whole bunch of problems. It can go from auto safety to better ways of drilling holes. It runs the gamut. It has McMaster University involved and seven colleges, including Niagara College.

One way of relating this to the committee's question today is that when COVID struck in March 2020, we the members of SONAMI went to our funders and said, “Hey, could we pivot our funding to look at COVID-19-related projects?” FedDev was very gracious in saying, “Yes, please do; we need the help. There's a problem with PPE, personal protective equipment; there's a problem with fluids for cleaning. Any old problem that you could help with would be great.”

For the first six or eight months of the pandemic, we conducted 32 projects that are COVID-related. They were manufacturing and designing face shields. They were using our distilleries to make cleaning fluid. They were designing and building better laryngoscopes in order to intubate people more safely. There were apps for phones to facilitate physical distancing during delivery. All the companies with which we worked were able to step up into the breach during the early part of SONAMI. That's one way in which we help, in a very local way but that can have far-reaching implications.

We worked with manufacturing companies. We doubled the production of a machine shop in Niagara that used to do mostly car parts but is now pivoting to do horticultural products, handling machinery. Your little alfalfa sprout that you grow has to be processed, cut, cleaned, dried and bagged, and this company now produces machinery that does this. It sells worldwide. Within a few months of having finished their SONAMI project with us, they were doubling their machining space and doubling their staff, and they were selling millions of dollars' worth around the world. That's one example.

In another example, we've helped companies make new beverages. There's a company called DistillX that makes zero per cent alcohol gin, and we designed the product with them. We're currently working on a tequila with them, too. Now their product is on the market, and in December, if you were watching *Dragon's Den*, you would have seen them on that show pitching their "zero gin" product. They got offers from each and every dragon, so they are currently commercializing this product with the help of investors and being very successful and are still working with us on their second product.

Those are two or three examples. I can give more, but I don't want to take the whole time.

Mr. Tony Baldinelli: Thank you.

If you'd like to share some more details, I'm sure the committee would take those in a written format.

I'd like to put a question to all the witnesses. Again, thank you for being here.

Over previous meetings we've heard from a number of witnesses about the importance of the ecosystem—the foundation—and how it's critical to science and research innovation. We've also heard about the needs for greater harmonization, collaboration and coordination. We've heard from one witness as well about the notion of almost a one-stop shop to try to make it easier for the institutions.

From your perspective, what can the federal government do to reduce the challenges and some of the barriers that you may be facing not only as a college, but as a university, in trying to secure those grants and to support that critical work you're doing?

Mr. Nantel, I'll start with you and then we'll go to the other witnesses real quick.

Dr. Marc Nantel: Through the chair, thank you so much for the opportunity, MP Baldinelli.

As a college, it's actually not that easy to secure the funding to keep us going. That's not because of the two per cent number that I mentioned in my address, but because faculty at a college is not hired to do research. They are hired to teach and do a bit of admin, unlike a university professor who has research as his or her function along with teaching and admin.

It falls to the office of research to lead the way. We write the proposals, make the connection with industry and respond to industry. These offices are not particularly well supported.

● (1855)

The Chair: Dr. Nantel and Mr. Baldinelli, I'm sorry to interrupt. It was so interesting to hear about the work that was being done.

I apologize.

Mr. Tony Baldinelli: No, thank you.

The Chair: I'm afraid we're going to have to go on.

Monsieur Lauzon, we'll go to you for six minutes, please.

Mr. Stéphane Lauzon (Argenteuil—La Petite-Nation, Lib.): Thanks, Madam Chair.

[*Translation*]

I thank Mr. Nantel, Mr. Singh and Mr. El Zaïm for joining us today. We are happy to have them.

I assume that Mr. Nantel is also a francophone, based on his name.

I would like to give Mr. El Zaïm an opportunity to talk to us about the recommendations he did not have time to cover.

Mr. El Zaïm, could you tell us about your recommendations?

Dr. Adel El Zaïm: Thank you very much.

I thank the committee members for giving me this opportunity to present my recommendations.

The first recommendation concerns the importance for Canada, as a global leader, to develop people's appreciation for science culture from an early age. This is not just a matter of science or education, it is also a matter of society. So an appreciation for science culture and science research must be nurtured.

The second recommendation is about the fact that we cannot resolve this alone and that we need domestic and international partnerships. Those are sometimes risky, but we need them.

The third recommendation is about the importance of helping researchers do their job and of simplifying the process to foster the emergence of new talent without drowning them in procedures. This recommendation may also answer Mr. Baldinelli's question on ways to facilitate the work. The quantity of processes, procedures and documents is tremendous, and that requires a lot of work.

We have actually seen the limitations of the interconnected world we are living in. We need a Canada that is aware of its limitations, but that assumes a leadership role in science, research and innovation.

For instance, certain countries are investing in semiconductor production. That is an area where innovation possibilities are still numerous. Canada can play a very important role in innovations related to, for example, computer tools and semiconductors thanks to photonics and quantum computing.

Mr. Stéphane Lauzon: Thank you.

We heard from the executive director of the U15 Group, Gilles G. Patry, whom you are familiar with. He told us that many Canadian students were ending their education once they earn their bachelor's degree and were not earning graduate or postgraduate degrees.

You alerted us to that.

How does the Université du Québec encourage young students to stay in school and to become researchers?

Dr. Adel El Zaïm: This is an essential question.

The continuity of science and research must indeed rest on new talents, from Canada, from here. When I say “here”, that includes people from all over who come live here.

It must be ensured, from the outset, that an appreciation for a university education is developed in young people. The Université du Québec en Outaouais plays that role through its mission and its foundation.

We work a lot with CEGEPs, colleges and schools to give young people an appreciation for not only earning a bachelor's degree, but also a master's degree and a Ph.D. We go to young people and explain to them the importance of doing that.

As we are present in a number of regions in Quebec, we are a really nice example of the collaboration that can be maintained.

● (1900)

Mr. Stéphane Lauzon: You do have a pretty significant pool in the national capital and in the Laurentians, more specifically in Saint-Jérôme, north of Montreal. There is also an institution attached to the Université du Québec in Ripon. That establishment is in the heart of my riding. I myself attended the Université du Québec.

You have partnerships. However, does diversity enable you to attract a clientele from abroad?

If so, what percentage does that clientele account for?

Dr. Adel El Zaïm: The Université du Québec en Outaouais is the network's youngest university. It currently has about 6,000 students, most of whom are studying in Gatineau and in Saint-Jérôme. The Institut des sciences de la forêt tempérée, an institute for temperate forest science, in Ripon, is more for students earning a master's degree or a Ph.D. A lot of forest research is done there.

There are about 500 international students, but our students come from all over. For example, people from Montreal come study at the Saint-Jérôme campus. Diversity is very important.

Mr. Stéphane Lauzon: Thank you.

You raised an important point, the fact that university institutions provide training in agriculture or training related to rural life.

Does your university have connections with rural regions to carry out research activities there?

Dr. Adel El Zaïm: Of course, we do have connections.

Mr. Stéphane Lauzon: Can you give me an example of a research project you have carried out in a rural environment?

I will ask you to answer the question in 15 seconds, if possible.

Dr. Adel El Zaïm: Rural life is very important. I can give the example of forest management. We are working with regional municipalities to ensure the proper management of the forest, in a sustainable, lasting and environmentally friendly way.

Mr. Stéphane Lauzon: Mr. Nantel and Mr. Singh, I had at least five questions for you, but I don't think I will have the time to ask them.

[*English*]

The Chair: Thank you so much, Monsieur Lauzon. I know the interest you have. The witnesses were so grateful. It's really interesting testimony.

Now we will go to Monsieur Blanchette-Joncas.

[*Translation*]

Mr. Blanchette-Joncas, go ahead for six minutes.

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

I want to greet my colleagues and, of course, all the witnesses joining us this evening.

My first questions will be for Mr. Nantel.

Mr. Nantel, you mentioned in your presentation that Canada was competitive when it comes to basic research. That piqued my curiosity.

Could you elaborate on that for us?

Dr. Marc Nantel: Thank you for the question.

It has been a while since I worked in basic research.

However, I can tell you that we are talking about large research institutions, such as Canada's particle accelerator centre TRIUMF, in British Columbia, or the Sudbury Neutrino Observatory, which is located here, in Ontario.

A number of large Canadian institutions have made discoveries of global importance. I mentioned that Donna Strickland won the Nobel Prize in physics. Canada is rising above its class and weight when it comes to basic research. Not a decade goes by without one, two or three Canadians winning the Nobel Prize. I don't have the data on hand right now, but Canada generally has a very good reputation in basic research.

Canada has a bit more difficulty in the commercialization of discoveries, in products, economic development and job creation. I think colleges can help address that issue. When it comes to research in Canada, better integration of colleges will really help resolve this issue.

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

What characteristics do you think make Canada really competitive on the global stage?

Dr. Marc Nantel: I provided two examples in my presentation.

The Canada Foundation for Innovation has had a transformative impact. I experienced this personally. I saw how it helped modernize facilities from coast to coast to coast, in universities and, more recently, in colleges.

What is more, the Canada research chairs program is becoming increasingly egalitarian. I thank committee chair, Kirsty Duncan, who was science minister at the time.

Those two programs, among others, have done a lot to help Canada position itself close to the top.

● (1905)

Mr. Maxime Blanchette-Joncas: Mr. Nantel, other stakeholders shared with us another point of view on basic research. I would like to cite Roxanne Borgès Da Silva, who appeared before a House of Commons committee. She said that the government should be apprised of the importance of basic research and that a lot more emphasis was being placed on applied research. Of course, the funding issue also came up again, as that is always the crux, as you probably know. We all know the data. In fact, Canada is the only G7 country that reduced its investments in research and development between 2000 in 2020.

So I am trying to understand what you are telling us. We are competitive, and I am happy about that, but would we be more competitive if investments were made?

Could we even stand out internationally?

Dr. Marc Nantel: Yes, of course.

It is certain that my colleagues from the Université du Québec en Outaouais and the University of Saskatchewan would be favourable to additional subsidies not only in pure science, but also in applied science. We would be in an even better situation.

It is true that applied science has been favoured over the past two decades. I think the government was trying to bring to Canadians the fruits of basic research, which was done very well. It must now be ensured that this gives us jobs and meaningful economic development. That is what I was talking about.

There is always a way to do better. We won't stop you from going in that direction. Count on us for encouragement.

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

Madam Chair, how much time do I have left?

[*English*]

The Chair: You have about a minute and a half, Monsieur Blanchette-Joncas.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much.

I will continue with our other witness, Mr. El Zaïm.

Mr. El Zaïm, it is a pleasure to have you with us this evening. First of all, allow me to congratulate you on this new challenge that you have accepted as vice-rector at the Université du Québec en Outaouais, a position you have held since last August. I have read your track record, which is quite remarkable. I would like to know more about your international experience.

I know that you have made contributions through various francophone organizations.

In your opinion, is it still possible, in Canada, and even internationally, to do scientific studies and publish articles or books in French?

Dr. Adel El Zaïm: I thank you for the question.

It's always possible, but it's difficult. It's still possible to do studies in French and it's still going to be done. It's a bit harder to publish, but the main thing to ask is what you're going to publish, why and for whom. If one wants to publish to win a Nobel Prize, it would probably have to be done in a language like English. If you want to publish to inform policy-makers of scientific results, you should do it in their language.

We all benefit from being multilingual. Our French language is essential and fundamental. We will continue to publish in French. Even if it is more difficult, it is possible. But we need help to do more research in French and to publish in French.

We also teach in French. We have institutions in Canada where they teach in both languages. Indeed, when I travel abroad and deal with the internationalization of higher education, people always talk to me about Canada as a country where you can work in several languages.

The Chair: Thank you, Mr. El Zaïm.

Thank you, Mr. Blanchette-Joncas, for your very important questions.

[*English*]

Now we will go to Mr. Cannings for six minutes, please.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you, Madam Chair.

I'd like to start with Dr. Singh. You mentioned the 17 national research facilities across the country. I think you said there were three at the University of Saskatchewan. You said there was a struggle for ongoing funding. I was just wondering if you could expand on that. How are those facilities funded? What role does your university play in the funding of those facilities, and why is there a struggle?

Dr. Baljit Singh: Thank you very much, Madam Chair. I can respond to that question.

For example, currently at the University of Saskatchewan we have the Vaccine and Infectious Disease Organization, which developed Canada's first COVID vaccine. My colleague Professor Volker Gerdts appeared in front of this committee. We also house Canada's only synchrotron facility, called Canadian Light Source. These facilities are funded through a mechanism that is within Canada, CFI. These are called MSI, major science infrastructure funding competitions. Every five to six years, there's a competition. An external international review panel comes to visit these facilities.

For example, in the current round of MSI funding, we projected the operational costs of both of these national facilities for the next five to six years. Because of tight budgets, we were encouraged to look at a 15% reduction in the operating budget of the facilities. That was quite challenging. We believe the reason for this is that CFI, the current funding model, as my colleague from the agricultural college talked about, has served us very well for the last more than 20 years to allow equipment for individual researchers and the creation of larger facilities.

What we are proposing is that we need a different funding model that looks at a large facility. Whenever Canada decides to build a major science facility, from the day the shovel goes into the ground over the life cycle, which may be 20, 30 or 40 years, we should be able to project the cost of operating that facility and make a decision as to how we will fund it between the federal and provincial jurisdictions.

The second layer of complexity is the partnership money that we need to secure, as universities, from the provincial and other entities to complement the funding that will come from the federal government. That creates a patchwork funding model, which is not very conducive to operating these large national facilities. These facilities are also used by hundreds of international researchers who come to Canada, thereby creating prominence for Canadian science on a global stage.

Therefore, an adequate and newer funding model for these facilities is something that we need. We have first-hand experience at the University of Saskatchewan, because we operate these three national facilities for Canadian science.

Thank you.

● (1910)

Mr. Richard Cannings: Thank you, Dr. Singh.

Dr. Nantel, I have two post-secondary facilities in my riding, Okanagan College and Selkirk College. They're both small- to good-sized colleges, but they operate on that college model you talked about, where research is not paramount. It's operated in a more applied way.

You talked about the college and community innovation fund, 2% of our tri-council budget, and yet you listed off what sounded like very successful programs that are done with that funding. I'm just wondering if you could maybe expand on that.

At Okanagan College we have a sustainable building program that would be so useful for the green infrastructure we need for the future. At Selkirk College we have Metal Tech Alley and other things around the tech smelter that deal with advanced metal science.

I'm wondering if you could maybe expand on your ideas on how we can improve this to make it work better and on whether this model of how colleges do research could be better.

Dr. Marc Nantel: Thank you very much.

Through the chair, applied research at colleges is relatively recent. At Niagara College, we've been doing it for 23 years, but we were one of the first to actually receive funding from the government to help us work in collaboration with companies to do applied research. Universities have been doing it for centuries, but with colleges it's relatively new.

When we started in the late nineties and early 2000s, few colleges were actually ready to tackle this type of work. Now, and in great thanks to NSERC's CCI program, I think I saw that 90% of the 140 colleges across Canada conduct applied research and are building their research office infrastructure.

I mentioned earlier that when I was at the University of Toronto as an adjunct professor, I wrote my own grants, hired my own students and ran my own budgets. I was the principal investigator. I did it all myself. At the college, because the faculty is there to teach and to do a little bit of curriculum development, it's the research office that has to do all of that work. Once a company identifies us and wants our help, and we help them find the project and we get funding for it, then we assemble a team around the needs of the company. That's when we release faculty from teaching to work on the project. That's when we hire the students who are going to work with us.

It's a model that works pretty well, honestly. Right now, with the 20 years that we've taken in building ourselves up, it's the funding that could help.

● (1915)

The Chair: Dr. Nantel, I'm so sorry to interrupt.

Mr. Cannings, thank you for your questions. It's really interesting testimony.

We're now going to the second round. We will go to Mr. Williams for five minutes, please.

Mr. Ryan Williams (Bay of Quinte, CPC): Thank you, Madam Chair. Thank you to everyone for being here.

I'm going to continue with Dr. Nantel, so not to worry.

I also have a college in my riding in Bay of Quinte, that being Loyalist College. I know the challenges. Thank you for already answering a lot of the questions I had at the beginning.

Under your leadership, Niagara College has been successful in partnering with businesses to develop commercialized innovation. You spoke a little bit about that in the beginning. What kinds of tips or best practices would you share with other post-secondary institutions that they can copy?

Dr. Marc Nantel: Well, we're in competition. I can't give all my secrets, Madam Chair.

Through the chair, what makes a lot of sense is to understand how college applied research does work. It's to focus it on the needs of the companies in your region and the education of the students. We have what we often call a trifecta of success. You have a company with a need, students who need to be educated, and faculty or staff experts who can work together with them and solve the problems.

One thing I did when I first came to Niagara College was to focus on the areas that were important to our region. In Niagara region, we have food and beverage, agriculture, and manufacturing. I focused on those. All of a sudden, we weren't madly off in all directions. We actually focused on what was important to our region and the programs that we offer at the college because the students we hire on projects have to come from somewhere. They have to come from the programs that we have. That's one thing.

Then I would recommend going for stability. That's very important. Doing one project at a time or one little grant at a time is really tiring and it's hard to get momentum going. With NSERC and the regional development agency—in your case, it's FedDev Ontario—there is a way to actually get multi-year funding to bring the funding together when the industry partner needs you.

If I have to write a grant proposal every time, it's a six-month process. That's not the speed of business. I like to work at the speed of business, so if I can have umbrella funding that I can deploy whenever a project is judged worthy of undertaking, that really helps. Long-term funding in area one, area two and potentially area three of your expertise.... It might take three to five years to get that to happen, but that's another way.

Once you have envelope funding and repeatable success that way, you build an infrastructure that can actually get more grants, find more companies and educate more students. You need a certain critical mass.

Jeremy at Loyalist will get that done, I'm sure. He's a great colleague of mine.

Mr. Ryan Williams: Yes, he is. He's a great guy.

My second question is this: How are you engaging the industry? What best practices do you have to engage the industry in the Niagara region?

Dr. Marc Nantel: Thank you for this, and through the chair—

Mr. Ryan Williams: It's through the chair, yes.

Dr. Marc Nantel: Sorry, I go to municipal meetings too sometimes.

There are many different ways. We have a good website that is known in Niagara. I sit on several boards. We have our staff on industry association boards. We go to industry association meetings. We make sure that we display our expertise and our equipment. Sometimes we even have press releases, obviously, when we have new funding or new equipment that we want to showcase. We have Twitter, Facebook, LinkedIn and Instagram. We try to reach people where they will try to reach us. Often it's the companies who call us. We're lucky—and it's a little bit in your case also—that in the Niagara Peninsula there are two institutions, Brock University and Niagara College. Brock University is just starting to get an engineering school. Whenever a company wants research in manufacturing, they call us. It's a question of making ourselves known out there actively, but also to be receptive to incoming calls, because you'll have some of those, and for that you need to build your infrastructure and be able to take those calls.

● (1920)

Mr. Ryan Williams: I have a last quick question. You're the rare example of a Canadian researcher. You left Canada for the U.S., but actually came back home. What do you think needs to be done to keep our science researchers and innovators here in Canada?

Dr. Marc Nantel: What got me back is when I had the impression that Canada was serious about research, that it wanted to invest in our facilities, in our experts. That's what got me back. My first grant at the college was from CFI. To me, it shows a dedication by the country. We had a ministry of science. That was a great thing, and I'd like to see it back, honestly. It sends a strong message.

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

Madam Chair, I think I'm at the end.

The Chair: Thank you so much, Dr. Nantel. Thank you so much, Mr. Williams.

It's really interesting testimony, and we're so grateful for everybody's time.

We'll now go to Ms. Bradford for five minutes, please.

Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.): Thank you very much. It certainly is a very interesting discussion this evening.

Dr. Nantel, we know there's a worldwide shortage of semiconductors, and it's really putting a crimp on the automotive sector and pretty much every manufacturing sector that involves tech at all. I know you've introduced the photonics program at the Welland campus of Niagara College. Can you elaborate on the importance of photonics towards the development and manufacturing of semiconductors? Do you think Canada is well positioned to be able to produce these at home, so that we'll not be held hostage to waiting on the Asian market to provide these for us?

Dr. Marc Nantel: Well, through the chair, that's a big question. Thank you so much.

Yes, I'm a laser expert. In the early 2000s I had a chance to establish two programs in photonics, one at Algonquin College in Ottawa and one at Niagara College, which covered various aspects of lasers, optics and photonics that are important for Canada. It's not just telecommunications, even though at the time it was all we read in the news—optical fibre telecommunications—but lasers and optics applied to lighting, to cameras, to biophotonics, so medical applications. It's a lot easier to point to something with photonics in it than it is to point to something that doesn't have any. My cellphone has an AMOLED screen. That's photonics.

From the point of view of semiconductors, what I know of semiconductor production is that they employ very strong UV lights and optics to reproduce patterns we want to put on the silicon in a very small area. We do have fabrication facilities in Canada. We have one in Bromont, Quebec. There is a centre called the Communications Research Centre, which I think used to get better funding, but could use some more, somewhere around Kingston, I think it is, but it works with institutions across Canada. That is about designing circuitry and making them happen on silicon.

We do have some good research facilities in Canada. It's a question of having production facilities. When it comes to making hundreds of thousands of circuits and stamping them out and putting them into millions of cars, what you need is more than just research facilities. You need industrial facilities that will take the research of our great Canadian universities and colleges and put that into actual practice in Canada. This sometimes takes a little longer.

I'm afraid I can't go into too much more detail as semiconductor production is not my exact area of expertise, but I hope I answered part of your question.

Ms. Valerie Bradford: I'm very familiar with Conestoga College, of course, because it's located in my riding. I know they do an awful lot of industrial research and in partnerships. Perhaps they're a competitor of yours.

I'm fascinated by your food and beverage work. You have the breweries. I think you started with the winery, and now have the distillery. The last time I was down there, greenhouses were looking at, perhaps, marijuana research, so you have the whole suite.

Are those in partnerships with private industry at all, or do you have your own brands?

● (1925)

Dr. Marc Nantel: Yes, and yes.

First of all, Conestoga is, rest assured through the chair, a partner of ours. They're a member of the Southern Ontario Network for Advanced Manufacturing Innovations, so they receive funding through us from FedDev and they are doing great things.

Every project we do is in concert with a company. There isn't one that we do just for the curiosity of the staff or faculty; in everything we do, there's a company involved. That's because, eventually, we want that company to take the results of the research and commercialize them.

In the case of our products, our wine, our beer and our distillates, those are made by students in their courses, and it's our own brand. That's part of the academic side of the house; it's not so much the research side. We do research in beverages, and I mentioned the distillate example with the “zero gin”. We do a whole bunch of other research on beer and wine, but these products that we sell are part of our academic delivery. Having stores on campus is partly to give students the real-world experience of having to take their product from the vine all the way to the cash register. It's also a way of making sure that we improve our brand in the region and we recoup a bit of the cost of these fairly expensive programs.

Ms. Valerie Bradford: That's very unique.

Thank you, I know my time's up.

The Chair: Thank you, Ms. Bradford, and thank you to all our witnesses.

We can get in two more. We'll hear from Monsieur Blanchette-Joncas for two and a half minutes, and then from Mr. Cannings for two and a half minutes.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Madam Chair.

Mr. El Zaïm, I will address you again. I would like to go into more detail on the subject raised earlier about studies and scientific publication in French.

You mentioned that Canada was known for its pluralism and that it was possible to study and publish in French. I want to understand the reasoning behind this statement, because I spoke with representatives of the Canadian Association of University Teachers who said that the data on this subject were quite striking. I'll take the liberty of presenting it.

The latest data from the Canada Research Chairs on French-language publishing indicate that publications by Quebec researchers represent only 0.5% of scientific publications in international journals. These statistics date back to 2014, and this figure may have decreased. However, research done in French represented nearly 10% of research in natural and medical sciences. Since 1980, there has been a drop of nearly 15%.

I want to know if the government makes it possible to be fair and include French in scientific and research studies and publications.

Dr. Adel El Zaïm: Thank you.

The problem of publishing in French has unfortunately always existed. Obviously, it is difficult to do less than zero. It is possible in terms of temperature, but not in the field of publishing.

Of course, the situation is difficult. We can't say that everything is published in French, far from it. We need help, and the government can help universities and publishing houses. It can further encourage open access publishing or open science, and it can encourage or even require publication in both of Canada's official languages.

Now, when a researcher wants to publish in the United States as Mr. Nantel has done, it must be done in English. Americans don't learn French and don't study in French. I am very divided, because, on the one hand, I feel enthusiasm, love and devotion for the French language, but on the other hand, I am aware of the reality of the market. Our governments could take steps to promote French.

Our university encourages the use of French and works with international organizations to ensure that French is given more prominence. We teach in French and publish in French. Indeed, in some areas, all the work is done in French, but the results are published in English.

The Chair: Mr. El Zaïm, I'm sorry to interrupt you, but your time is up.

● (1930)

[*English*]

We'll go to Mr. Cannings for a quick two and a half minutes, please.

Then it will be our second panel.

Mr. Richard Cannings: Thank you, Madam Chair.

I'm going to turn back to Dr. Nantel again.

I would love to talk about wine and cannabis, because they're both huge parts of the economy in my riding. Instead, I'm going to come back to this little issue around funding and money.

A few years ago you wrote in an editorial that "None of the great results college applied research achieves across the country could happen without the work of the research offices, and yet they are run on inadequate resources".

I know you've touched on this several times here this evening, but could you take a couple of minutes to expand on that and what we need to do as a federal government to help colleges do this good work.

Dr. Marc Nantel: Thank you very much, through the chair.

The university system has this great program called the research support fund. It helps universities fund their research offices and endeavours. Generally for every dollar they get from the tri-council, they get 40 cents on top, free, without applying much of a proposal, to run their research office, commercialization office, technology transfer office and these types of things.

Colleges do not get that. We don't have it. For some grants we can take up to 20% of the grant envelope and put it towards these types of expenses, but a lot of them are just project costs, grants that pay only project costs. I've got to run projects and I have no support to run the office of those who get the projects, take the company through the process and help commercialize the thing after the project is realized. That's what I mean.

That's what I meant a few years ago in that op-ed. We run on steam here—on the change in the sofa. Colleges are funded by the province to deliver student graduates to society. The research endeavour has to be a little bit more self-sustaining. It's hard for a college administration to say, I'm going to put *x* amount of money in the research office so they can do their great other stuff. We need better funding like the research support fund to support our offices. Like I mentioned, we write the grants, do the industry partner thing and hire the students. All of that's done by the professors at universities, not at colleges.

The Chair: Dr. Nantel, and Mr. Cannings, thank you.

We'd like to thank all of our witnesses. We're grateful for your time and expertise. It was a really good conversation. Thank you.

We will temporarily suspend before we go to our second panel.

It's my understanding that we will be losing Mr. Baldinelli.

We'd like to thank you for being a wonderful member, and we welcome Ms. Gladu.

We are suspended.

● (1930)

(Pause)

● (1935)

The Chair: Colleagues, I'd like to welcome you all back for our second panel tonight.

I'd like to welcome all of our witnesses. We are delighted to have you this evening.

From the Government of Quebec, we have Dr. Rémi Quirion, the chief scientist; from Synchronex, we have Marie Gagné, chief executive officer; and from the University of British Columbia we have Dr. Gail Murphy, vice-president, research and innovation.

We welcome you all. We'd like to hear statements from you all. Each of you will be given five minutes. When there is 30 seconds left, I will hold a yellow card.

With that, we will go over to Dr. Quirion, for five minutes.

[*Translation*]

Welcome, Mr. Quirion.

Dr. Rémi Quirion (Chief Scientist, Chief Scientist Office of Quebec, Government of Quebec): Thank you very much, Madam Chair.

I am very pleased to see you again and to be here tonight.

All things related to science and research in Canada have been close to my heart for some 40 years. I worked at McGill University for about 30 years and I have been the Chief Scientist of Quebec for about 10 years. Recently, I have also become the president of the International Network for Government Science Advice, which is an international network present in more than 30 countries.

Today, my remarks will focus on four themes: basic research, talent, scientific literacy, and the Canadian science and technology ecosystem.

The pandemic has demonstrated the importance of basic research. If we are to respond to the major challenges facing our society, whether it be pandemics, climate change, floods or cyber attacks, we need basic research. Where would we be today if we did not have mRNA vaccines? Some may think these vaccines were a bit expensive, but where would our economy and society be if we didn't have them?

These vaccines were developed through investments in basic research, investments that have been made for over 30 years. Investing in basic research always pays off, even if it sometimes takes a little time.

In Canada, the peak was 2% of GDP in 2001. In other words, 2% of Canada's GDP was invested in research and innovation. In 2017, it dropped to 1.67%. Since then, the total has risen a little. Indeed, in 2020, the peak was 1.84% of GDP. This means that we are trailing far behind the big leagues.

In 2019, the average for OECD countries was 2.5%. More than a dozen countries invest more than 3% of their GDP in research. Finland, a small country, has just announced that it will invest 4% of its GDP in research and innovation. Surely, Canada can do the same. What we see is that the gap is widening between Canada and several OECD countries. Canada is becoming less competitive internationally in terms of research and innovation.

I was part of the Fundamental Science Review Panel, the Naylor committee, created by the chair of the Standing Committee on Science and Research over five years ago. In the Naylor report, we recommended significant reinvestment in basic research across the three Canadian granting councils. This has been done to some extent, but not enough. It is now estimated that the shortfall is about $1.3 billion if we are to be internationally competitive. This is a significant shortfall.

The good news is that in the last federal budget, the government committed to supporting 1,000 more chairs to attract young researchers from around the world and, of course, Canadians. They are going to need research grants. This will put even more pressure on the whole network. Currently, about two out of ten grant applications are successful. This means that eight out of ten grant applications are rejected, because our granting councils don't have enough money.

Another very important issue is the workforce. There is a labour shortage across Canada, whether it's college or university level labour. We need to find ways to convince young people from Canada and from all over the world to come here to receive training in research and innovation.

As far as training grants are concerned, they are not competitive enough. Excellence grants are around $18,000 per year for a master's degree and $25,000 per year for a doctorate. This is half of what many European countries offer. It was a very competitive field before the pandemic, and it's going to be even more competitive after the pandemic.

I have worked in the mental health field. In my opinion, brains are grey gold. That's where Canada's future competition lies. We must have the best brains to be sure to create wealth through new products and social innovation. We need to promote all scientific careers and leave no one behind.

● (1940)

We have made good progress in this area, but more needs to be done. The development of scientific literacy, that is to say, providing training and imparting knowledge about research and science from primary school onwards, as well as at secondary school, college and university, is probably the best way—

The Chair: Mr. Quirion, I'm sorry to interrupt you, but your speaking time is up.

Dr. Rémi Quirion: That's fine.

[*English*]

The Chair: Welcome. I know that people will have questions for you. Thank you so much for your presentation.

Dr. Rémi Quirion: There's no problem.

[*Translation*]

The Chair: Ms. Gagné, you have the floor for five minutes.

Ms. Marie Gagné (Chief Executive Officer, Synchronex): Who here knows about College Centres for Technology Transfer and Innovative Social Practices, or CCTTs? Raise your hand.

Unfortunately, I don't see many hands raised. That's normal, but it's also sad, because, according to the very same SMEs who are its main clients, CCTTs are a hidden gem.

Madam Chair, members of the committee, I will introduce myself: my name is Marie Gagné, president and chief executive officer of Synchronex, which is the network of 59 CCTTs in Quebec.

Let's come back to our initial question: what is a CCTT? CCTTs are college-affiliated research and innovation centres, and their clients are SMEs and organizations. The purpose of a CCTT is to meet a client's need to use or commercialize a new product, process or procedure. SMEs don't want to do research, and I would say that CCTTs don't want to do research either. They want to solve a problem, improve a process or develop a new product to be more competitive, more inclusive and more environmentally friendly, and applied research is the tool they use to do that.

I'll give you two examples. The first is a CCTT, the Innovative Vehicle Institute, in the Laurentians, working with Lion Electric to design the first fully electric school bus, helping Lion Electric to position itself as a North American leader.

Another CCTT, the National Centre in Environmental Technology and Electrochemistry, in Mauricie, has been working with Bio-K+ for over 26 years in the development of probiotics so that Bio-K+ could position itself as a leader in its field. It remains so today by distributing its products in Canada, the United States, Germany and China.

Why do CCTTs exist? The first CCTT was established 40 years ago in response to Bombardier's need for access to scientific and technical resources in Quebec's Lower St. Lawrence region. To differentiate itself, Bombardier needed access to applied research specialists to assist in the development of new products and processes. The collaborative effort worked so well that since then, 58 CCTTs have been established, bringing the total number of CCTTs in Quebec to 59.

Currently, 2,000 CCTT experts work with 6,000 companies on 10,000 innovation projects every year. Yes, to try it is to buy it. We have an annual budget of $150 million, 50% of which comes from clients, 30% from the government of Quebec and 20% from the Government of Canada. Each CCTT specializes in a relevant area based on its location, but also has a mandate to cover the whole territory.

CCTTs specialize in cybersecurity, civil security, emergency response, aerospace, artificial intelligence, telecommunications, clean energy, innovative vehicles, agriculture, food self-sufficiency, metallurgy, etc. As for societal issues, they also specialize in immigrant integration, indigenous issues, disability integration, gerontology, education, etc.

Moreover, CCTTs take an active role in developing a more innovative workforce by integrating students into their projects, which created a workforce that is more aware of the latest technologies and most innovative techniques.

Applied research is just as necessary as basic research. There is a real need to maintain a balance between the two types of research, to ensure that knowledge can be turned into collective wealth. To maintain the quality of life of Canadians, we must maintain and even increase Canada's international competitiveness. We must also adapt our technologies and practices to build a Canada that is more sustainable and respectful of its diversity and history.

Colleges, including CCTTs, by virtue of their applied research offerings and proximity to their regions and sectors, have an important and strategic role to play. Ninety-five per cent of the Canadian population lives within 50 kilometres of a college. This means that college research centres are key players in helping SMEs innovate more, as well as helping communities solve societal issues.

The CCTT model has had such a significant effect on socioeconomic development that, in 2010, the Natural Sciences and Engineering Research Council of Canada, NSERC, decided to create similar centres affiliated with colleges and institutes across Canada: Technology Access Centres, or TACs.

● (1945)

Today, we believe that it is important to increase NSERC's core funding for applied college research.

A minimum of 225 TACs needs to be recognized, as initially planned for by NSERC, including the 59 CCTTs in Quebec. Each of them must be granted recurring annual funding of $350,000.

There needs to be an understanding that college research expertise operates in a self-funding system—

The Chair: Ms. Gagné, I'm very sorry to interrupt you, but you're out of time.

[*English*]

We're very glad to have you. We thank you for your perspective.

We will now go to Dr. Gail Murphy for five minutes.

Welcome.

Dr. Gail Murphy (Vice-President, Research and Innovation, University of British Columbia): Thank you, Madam Chair, for inviting me to join you today, and I thank the members for taking on this important work.

I'm Gail Murphy, vice-president of research and innovation and a professor of computer science at the University of British Columbia. I'm also the co-founder of Tasktop Technologies, an enterprise software company headquartered in Vancouver with over 200 employees. I am grateful and privileged to be joining you today from the beautiful, traditional ancestral and unceded territories of the Musqueam people.

I'll begin with a very brief introduction of UBC and its research enterprise. UBC is the second-largest university in Canada, with nearly 70,000 students and more than 17,000 faculty and staff at our large campuses in Vancouver and Kelowna and at research and learning sites throughout B.C.

The university is consistently ranked among the top 50 in the world, with particular strengths in innovation and research commercialization. UBC researchers attract over $700 million in funding each year, the second most in Canada, and are responsible for tremendous contributions to knowledge, technology, public policy, economic growth and social progress.

Many of the themes you've discussed at this committee resonate with me in my roles as a vice-president of research, a professor and as a tech entrepreneur. I've been watching closely as countries around the world are making ambitious, new investments in science and research, recognizing the benefits of more highly skilled workforces and how advanced research helps fuel competitiveness and growth, not to mention the importance research for tackling pressing issues like pandemics and climate change.

Thanks to investments from successive governments and actions taken in recent federal budgets, Canada has positioned itself well, but as a number of my colleagues have highlighted, we now risk being left behind if we're not able to continue to attract and retain top talent while other countries accelerate and intensify their investments.

Support for Canada's research enterprise is ultimately an investment in developing Canadian talent and the expertise of our people. Exposure to and engagement with research and the scientific process is a critical experience that equips individuals to be innovators throughout their lives and their careers. When done right, the resulting skills help advance knowledge, develop new technologies and solutions and equip people with a readiness to try the new and re-examine conventional wisdom. Equipping Canadians and especially our youth with these competencies is particularly important for our country as we tackle the great challenges of our time, from meeting climate and environmental targets to building an inclusive, green and innovative economy and enhancing the health and wellness of Canadians and our communities.

For example, through the Stewart Blusson Quantum Matter Institute at UBC, faculty, students and staff are engaged in initiatives that build interest in quantum science and encourage participation from diverse groups of students. This has included K-12 outreach, undergraduate scholarships and mentorship programs, and all of these have a special attention on reaching students with identities that are currently under-represented in the sciences, including indigenous peoples, women and girls and people of colour. The institute has engaged over 3,500 students in the past five years.

Another example is my own experience building a Canadian tech company. The knowledge on which we built the company came from NSERC-funded research that enabled us to think broadly about problems facing software developers while NSERC further supported our early stage formation through the Idea to Innovation program. Continued innovation at the company was fuelled in part by industrial undergraduate research grants.

My two other co-founders in Tasktop include a Ph.D. student from UBC and a master's student from the University of Victoria. Our first hires were graduate students from UBC, and the company has been fuelled by a steady stream of talent from Canadian institutions.

While I echo calls for funding levels that ensure Canada's core research granting programs remain globally competitive, I would also like to bring closer attention to programs that support students and make opportunities to pursue advanced study more accessible. Funding amounts for graduate student scholarships, for example, have not changed in nearly two decades, which, in inflation-adjusted terms, means a 35% decline. At the same time, Canada ranks 28th in the OECD in graduate degree attainment. As we seek to improve access to opportunity and support diversity, increases in the number and the value of these awards are critical.

● (1950)

We also need to expand undergraduate student participation in advanced research. Earlier and deeper experience in research will help our students develop their curiosity and talents, which will serve them and Canadian society very well as they pursue their careers.

I hope the committee finds these contributions to its study helpful. I thank you for the opportunity to speak with you and to address any questions you may have.

The Chair: Dr. Murphy, thank you.

On behalf of the committee, we'd like to thank you all again, Dr. Quirion, Ms. Gagné and Dr. Murphy. You have an interested group in this committee.

We will now go to the first round of questioning.

Mr. Tochor, you have six minutes.

Mr. Corey Tochor (Saskatoon—University, CPC): Thank you kindly, Chair.

Thank you to all our witnesses today. It is an honour to be here, with all the knowledge and intelligence that is on display with the presentations. We're very blessed by that.

Dr. Murphy, I'd like to start with you. You touched a little bit on the pandemic and some of the challenges that brought, but even more urgent and more timely right now is the tension in eastern Europe. I'm wondering what your thoughts are on the potential impact on research. What could possibly happen with some of the siloing effects from the tensions in eastern Europe? What might that mean for research here in Canada? Do you have any comments on the potential drawbacks—or maybe even some of the potential upside with some of the Ukrainian community coming to Canada?

Perhaps I can get your general thoughts on that, Dr. Murphy.

● (1955)

Dr. Gail Murphy: Thank you for the question.

I think that we will see a lot of the potential impacts that we saw during the pandemic actually continue. We saw an interruption in the ability of graduate students who might be coming from other locales to come to our country and be able to pursue their studies here. We saw the lack of an ability to collaborate internationally. In some jurisdictions we saw a lack of access to large research facilities in some cases, etc.

I don't have any data at hand with respect to what we might be accessing in countries close to where the conflict is currently occurring, but with these kinds of conflicts I think it does cause all of our researchers concerns about travel, about interactions and about their graduate students. There are a lot of effects for our researchers who have family embroiled in the conflict. That has a significant effect on an individual's ability to think creatively and to undertake the deep thought that can be involved in their research. It's something that is on all of our minds to make sure that we're supporting our colleagues through these very difficult times.

Mr. Corey Tochor: Are there any Russian state software companies that would raise flags if you would see them associated with any research in Canada?

Dr. Gail Murphy: Nothing comes to the top of my mind. A number of individuals in different parts of the world contribute to open-source software. That might be an area in which there needs to be more thought.

Mr. Corey Tochor: You talked a little bit about how some of the funding levels haven't kept up with inflation and about some of the changes with the crisis in terms of the pandemic and whatnot. Are there things we can do better to ensure that the research continues in future crises? The last two years has taught us a little bit to expect the unexpected.

Are there ways in which we can be proactive in thinking about how we can protect the research that's done in Canada?

Dr. Gail Murphy: Well, I would like to thank the Government of Canada, because during the pandemic specific supports were provided to the research environment where we were able to continue to fund especially graduate students and post-docs, and also to start up research infrastructure again after the pandemic allowed institutions to begin to open a little bit more.

I think ensuring that there is some long-term, fundamental base funding that allows us to keep our large infrastructure running, whether it's at a university or a college or a government lab, is really important. For many of these kinds of facilities, you cannot just turn them off and then start again. You really need to keep things flowing on a regular basis.

We need to ensure that our youth really are continually engaged in these endeavours. We need to ensure that they have access to funding for student summer programs, and that if they start a master's program, they can finish that program. They'll have that funding, which is really important to enable engaging them and allowing them to increase their skills at a time when we know that this is all about having advanced technology to in part deal with a crisis, whether it's conflict, whether it's the climate or whether it's the pandemic. The ways in which we're finding out how to get out of these situations are often through advanced technologies, but they also have to come with that social science lens of research.

Mr. Corey Tochor: Yes.

Dr. Gail Murphy: It's things like understanding how to get over vaccine hesitancy, how we can, with conflicts, understand the history of those regions so that actions that we might consider taking are informed by what has happened in the past.

Mr. Corey Tochor: History doesn't often repeat itself, but it often rhymes. I'm a big believer in learning from past rights and wrongs of humankind that are out there and which, unfortunately, I think we're seeing a bit of in eastern Europe.

I think I'm almost out of time, but just quickly, on the resilience question, in general, what else can we do for the resilience factor of a research facility?

Dr. Gail Murphy: In general, in particular, many of the facilities are working on that five- or six-year flow of funding that you've heard about. Often that's not enough time if you're talking about a particle accelerator or you're talking about a synchrotron. You really need to be able to plan 10 or 20 years ahead to make sure that you have things in the right state.

● (2000)

Mr. Corey Tochor: Thank you so kindly.

The Chair: Thank you so much, Mr. Tochor. I appreciate your questions.

With that, we will now go to Mr. Collins for six minutes, please.

Mr. Chad Collins (Hamilton East—Stoney Creek, Lib.): Thank you, Madam Chair; and welcome to all the witnesses here this evening.

My first question, through you, Madam Chair, will be to Dr. Quirion. It's addressing one of his last statements about scientific literacy and the importance of it.

Almost from the start of the pandemic, the joint efforts of all levels of government, municipal, provincial and federal, were challenged and in some cases undermined by misinformation on social media or in other places.

I've been an elected official for 27 years now, and in all that time, I've welcomed opinions that differ from my own. I like my opinions and my comments and thoughts to be challenged by others, so feedback from my constituents has always been very important to me.

Through the pandemic, I heard some very disturbing comments, whether through the election process or through the last couple of weeks here in Ottawa with some of the events that we recently had to deal with. There were comments such as “You're listening to the wrong doctors,” or “You have the wrong information that you're using as a government to address the pandemic.” There seems to be a real resistance to science, whether it's the use of masks or the importance of vaccinations, and those comments stand in the way of our getting back to some sense of normalcy.

What can the federal government do as it relates to making investments or policy changes that combat misinformation? How do we appropriately respond to a shift in attitudes that question the validity of scientific evidence, and in some cases, the scientists who are helping us through the pandemic?

Dr. Rémi Quirion: Thank you very much for the question. It's a big one and, of course, there is no easy answer.

Overall, I think we have had a challenge over the past couple of years with the pandemic, in which science was very much at the forefront and in the press every day. A lot of scientists in the press were much more visible, and sometimes there is a contrary type of argument. Of course, we knew nothing at the beginning about that virus, the behaviour of the virus and how to develop vaccine drugs that would diminish the effect of the pandemic, so there was a back and forth with little information. Maybe the general public started to say, “What is that?”

I think that what we have to do now and do much better at the level of the federal government, for example, is first of all for the tri-council to support research and explanations of the scientific methods, so basically to have citizens involved in research projects, what we often call “citizen science” or “participatory science”. For me, it's not the result of today that's important; it's more the process of science so that everyone understands a bit more how you build science one little piece at a time. I think that's critical.

Another critical aspect—working very closely with the province—is education. General education is key, but so is education in science from primary school. You start simple, but the principle of science is that kids enter science as a young generation. They are bright. They are very curious. I think we need to make sure that we foster that more and more in the future, with a very strong collaboration between the federal government, provincial governments and cities, to make sure that you put science there, that you explain science to kids and explain science to citizens.

In addition to that, and given what happened for example in Ottawa over the past few weeks, is that we need to have social scientists on board—I think Gail mentioned that—to be able to understand a little bit of how society, how our democracy, evolved with time, because there is some danger. I have been a bit anxious about this for the past couple of years now. We see that social media goes so quickly and that you can rally people from all over the world on a very bad piece of information. I think we have to make sure that social scientists are at the table with, for example, experts in public health and virology if we're talking about pandemics, but also experts in climate change. How do we make sure that we can explain to our citizens that climate change is very important? What does it mean for me on my street and my family?

Otherwise, it's too abstract, so we have to change the way we do it as scientists.

● (2005)

Mr. Chad Collins: Thank you, Dr. Quirion.

I don't have much time left, Madam Chair, but could I ask a question of Dr. Murphy very quickly?

Do you have any advice on how the government can get more women involved in science and research? What progress has been made, and what needs to be done?

I know I have only about 30 seconds left, or less.

Dr. Gail Murphy: Very quickly, I think we are all making progress across the country, and the dimensions project that was introduced is helping us think through it to actually do the background research within our own institutions about the barriers that keep individuals from entering into research. Often it's getting people involved in paid ways as opposed to asking them to start through volunteering their efforts, and making sure they have opportunities that they see in the future.

The Chair: Thank you so much, Mr. Collins, for your questions.

It's been a good discussion tonight. I think we all really appreciate this.

[*Translation*]

Mr. Blanchette-Joncas, you have the floor for six minutes.

Mr. Maxime Blanchette-Joncas: Thank you, Madam Chair.

First of all, I would like to say hello to the witnesses joining us this evening.

I'll start with you, Mr. Quirion. Thank you for joining us. I'm always happy to see you.

I would like to talk about the Naylor report, which you know well, since it's the work of a committee that you sat on and which was struck by the chair of this committee.

I would like to review with you the ground that Canada has covered since the release of the Naylor report. Based on your analysis, how does Canada rank as we come out of the pandemic? What should be its priorities in terms of research and development?

Dr. Rémi Quirion: Thank you for the question.

I am very proud to have helped draft the report, which is important for science and technology in Canada. Various recommendations were made in it.

In particular, I'm thinking of the creation of a federal position that is roughly equivalent to my position in Quebec. Mona Nemer is currently the chief science advisor of Canada. She is a great colleague, and I work with her a lot.

Furthermore, we recommended that there be more co-operation between the three federal research councils and that research programs result in the creation of widely varied multidisciplinary teams, with researchers in health, engineering, mathematics, social sciences and the humanities. In that respect, we have made great progress.

We have also made a lot of progress on the principles of equity, diversity and inclusion.

Where we still have significant challenges to overcome, as I mentioned in my opening statement, is support for basic research in Canada. We are lagging by percentage points compared with other countries in the world, such as the United States, France and Germany, but I also mentioned smaller countries like Finland. There is work to be done on this issue.

Progress also needs to be made on the Canadian funding ecosystem for research and innovation. Even I find this ecosystem complicated, and I have been immersed in the field every day for 40 years now in Quebec and Canada. I often liken it to a jigsaw puzzle. I'm not talking about something easy; it's a real jigsaw puzzle. It is sometimes difficult to understand how things work. It's like a new jigsaw puzzle that you receive as a gift: when you open the box, you think that there are far too many pieces, but when you start working on it, you realize that some pieces are missing. In Canada, we have added a lot of pieces, but the work is often done in silos.

I think that it's time for a new follow-up to the Naylor report. A small group of experts could determine what we really need, what is missing, and which pieces don't fit together well in the Canadian research and innovation ecosystem. That type of committee could issue short-term recommendations and then become permanent and oversee how Canada compares with the rest of the world on science and technology. That's something that is still missing today.

● (2010)

Mr. Maxime Blanchette-Joncas: Thank you very much, Mr. Quirion.

I would now like to turn to Ms. Gagné.

Thank you for joining us this evening and for explaining the CCTTs, the college centres for technology transfer and innovative social practices.

I have several questions for you about the CCTTs. You will therefore be able to provide us with more details.

In your opinion, have the federal government and its funding agencies fully understood the unique nature of the CCTTs? How is this understanding or lack thereof reflected in the funding structure?

Furthermore, is the project-based funding that the CCTTs have access to sufficient?

Ms. Marie Gagné: Thank you very much, Mr. Blanchette-Joncas.

Is the unique nature of the CCTTs fully understood? I would say that college research is still quite unknown. Is this research well funded? I think that we still have ground to cover.

As was explained earlier, college research is conducted under a self-funding formula. Certainly, if we want to maintain capacity, infrastructure and critical mass, we will need both core funding and project-based funding. The more core funding there is, the more project-based funding needs to keep pace.

Applied research is necessary and useful. Small and medium enterprises account for over 80% of the economies of Quebec and Canada. We need to help them innovate more, and that is done through applied research, with colleges as local hubs.

Concerning college research, CCTTs are relatively unknown, even though all of the technology access centres are inspired by the Quebec model. Therefore, I think that it is high time that this research be funded at a level that reflects the socio-economic spinoffs that it creates in all regions and ridings of Canada.

Mr. Maxime Blanchette-Joncas: Thank you very much, Ms. Gagné.

Concerning support for research, there is a lot of talk about the indirect costs of research. In your opinion, does the federal government provide enough funding to cover the indirect costs of research? What impact does that have on your organization's research activities?

Ms. Marie Gagné: I would say that the Government of Canada does not recognize the indirect costs of research at the college level. We do not have access to any funding for the indirect costs of research. However, it is important to understand that they're what helps to maintain quality research, infrastructure, research ethics committees and all of the intellectual property policies. We're talking about all of the costs that are not borne directly by projects.

With the Quebec government, through the ministry of the economy and innovation and the ministry of higher education, we conducted a study on the college research system—

The Chair: Ms. Gagné, I'm sorry to cut you off, but we're out of time. Thank you.

Mr. Maxime Blanchette-Joncas: Madam Chair, could we ask Ms. Gagné to provide an answer to this question in writing? It could then be sent to committee members.

[*English*]

The Chair: Absolutely.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much.

[*English*]

The Chair: Thank you, Monsieur Blanchette-Joncas.

Now we will go to Mr. Cannings for six minutes.

Mr. Richard Cannings: Thank you, Madam Chair.

I'd like to thank the witnesses again.

I'm going to start with Dr. Murphy. It's nice to have someone from UBC here, my alma mater. It's not only that, but also that I worked there for 17 years in the department of zoology. I have a lot of fond memories of that, but it was a long time ago so things have changed, I'm sure.

You seem to be an ideal person to ask about innovation, the fundamental research piece and then the innovation that can and should follow on from that in many cases.

My friend Pieter Cullis has been in the news with regard to the mRNA vaccines and the basic research he did. I don't know if the innovation for the vaccines was developed there or if any development like that happened, but I'm wondering how much of that kind of innovation goes on at UBC now, or at any big university. How important it is to the university and the researchers?

● (2015)

Dr. Gail Murphy: A lot of this kind of research goes on, and thank you for mentioning Dr. Cullis' work. He developed the lipid nanoparticle coding for the mRNA vaccines. Dr. Cullis would be the first one to tell you that it is built on 40 years of research funded by the Government of Canada. It was fundamental basic research when it began and over the years, as they started to see different kinds of applications, it became somewhat more applied and then moved out into an industry start-up to further develop it.

That's one story that's similar to many stories at UBC which have gone from basic research within the lab to actually changing the course of a particular industry sector. Another example would be Carl Hansen's work on antibodies for various different kinds of diseases, including SARS-CoV-2, and he has taken that out in a start-up that is now a billion-dollar company named AbCellera.

I could go on and on with those stories. What is important with them is they started from curiosity-based, investigator-led research that was fundamental. No one saw those particular uses when these individuals were trying out things that people had never thought about doing, then through many years, they were able to take it forward and started to work with different types of partners to investigate how things could be applied.

One of the hard things to understand about the research landscape is that we need that whole spectrum. It's an ecosystem approach to really get through to the innovation capabilities, and that's not only at the universities. It's our college partners, who are producing talented individuals who can help run the manufacturing plants or do the biomanufacturing, etc. It's our people in art and design colleges who can help interpret descriptions of research results to provide to families with autistic children.

What we have to look at is the entire ecosystem that helps feed into innovation, and recognize that we need to fund different parts of this overall ecosystem and pipeline.

Mr. Richard Cannings: You really emphasized how important it is to support students in all of this. You mentioned that scholarship and bursary funding has been stagnant for 20 years. I've heard that from student groups I have met with.

Does it seem to you that perhaps we've forgotten that really basic foundation of science and have been distracted by the shiny new things that are happening at the other end of the spectrum? How important is it to get those scholarships and bursaries up so that students stay in Canada? I've talked to students who have gone to the United States because that's where they can get scholarships that they can live on.

Dr. Gail Murphy: I will speak to this question partly from having been a federal government-funded student who went to the U.S. to do my Ph.D. and came back. I was also a federally funded undergraduate student in research who, first of all, went to industry before going back to graduate school.

What's important is really enabling our youth to follow those questions they might have thought about when they were younger. They suddenly get into an institution where they have an opportunity to follow some of those questions. It's not that they will necessarily become the Nobel laureate, but they will become individuals who think about problems critically, who have an opportunity to understand how to take various sources of information, trade them off against each other and understand what might be actual reality in the information they're being presented with. They will be able to really take that forward to industry, to not-for-profit and into government service and use that questioning mind they've developed through these research projects to help further our entire society.

I think it all starts at the beginning. Dr. Quirion mentioned going into primary schools. That kind of funding of outreach to schools, our science facilities and our museums are always to ignite in our youth, who are our future of Canada, that opportunity to know that they can learn new things that they can take into actually changing the course of how people live and work.

I think we have lost sight of the need to start that pipeline and fund our students.

● (2020)

Mr. Richard Cannings: Thank you.

The Chair: Thank you so much, Mr. Cannings, and thank you to all our witnesses.

Now we're going to go into our second round. These are for five minutes. We're going to start with our new member. We welcome you, Ms. Gladu.

You have five minutes, please.

Ms. Marilyn Gladu (Sarnia—Lambton, CPC): Thank you, Chair, and thank you to the witnesses for being here.

Since it is my first time, I must say what an honour it is to be here and to be continuing the work we began when I was first elected. I worked with the chair and I was the critic for science. We were trying to determine what to do to help science in Canada. We wanted to see where Canada could lead and how we could maintain that position. We wanted to see where we needed to maintain research and science so we could support our GDP and where we really needed to partner globally in order to afford to be able to do some of the open science and larger research. Then we wanted to identify some of the barriers that we've talked about tonight in terms of resources, like the brain drain and trying to get more women into science, engineering and math.

My first question is for Dr. Murphy.

You talked about research and the difficulty with commercialization. I do see that a lot of the research we do in Canada ends up, at the end of the day, being commercialized in another country. What are the barriers? What things should we be doing to try to keep the research that's happening turning into commercialization here in Canada?

Dr. Gail Murphy: Thank you for that question.

One of the important things to do is to make sure all of our researchers have access to knowledge about what intellectual property is. It's not just patents. It can be trade secrets. It can be other forms. Sometimes individuals don't know how they might actually take forward some of the ideas they have that could actually find their way into commercialization streams. There's a big part to education.

There's also a need to ensure that we're connecting the right people within our communities and educating the broad spectrum of people needed to take something from being an idea into being a product.

One place where things perhaps fall apart a little bit in Canada is that innovation gap that is often spoken about. If you're developing a new chemical process, this might be the funding to do something at scale, but not at production scale. It's taking it from what happens at a lab bench into something a little bit bigger in some sort of plant where you might be able to try something more at scale.

There are a number of places where we could fund different kinds of infrastructure to help in that translation. We could also fund the kinds of people you need to develop skills that are not just the research side of the skills, but the skills for seeing what the product could be out of that research, doing the product fit, building out the marketing and expertise in terms of running a company.

It's difficult to put all the pieces together within the ecosystem. We're seeing various organizations, like the Creative Destruction Lab, help in that kind of translation by having mentors available for young project teams to understand what that transition might look like.

There are various items within the ecosystem that we might be able to fund to help more of our research ideas find their way into commercialization.

Ms. Marilyn Gladu: That's very good. Thank you.

For Ms. Gagné, I'm very impressed with the 59 different CCTTs. I went online and looked at all of them. I know NSERC was trying to create something similar. You mentioned the CATs.

What are the things that are keeping us from achieving the success that you've had, and how could we accelerate the success that you've had?

[*Translation*]

Ms. Marie Gagné: You need to understand that, in Quebec, the CCTT system is extremely structured, organized, complementary, dynamic and collaborative. I think that the same thing needs to be done across Canada, so that it's not just a Quebec network but a Canadian network where technology access centres, CCTTs and the university sector would all be interconnected.

Ms. Murphy spoke about commercialization. If we want to further commercialize innovations and improve commercialization, the link between basic research and more applied research is extremely important. We also need to find ways of making the entire ecosystem more fluid and funding projects that are outside the framework of regular programs. Projects are increasingly complex and multidisciplinary. It is important to encourage collaboration between the various research stakeholders. Of course, the crux of the issue is money, so this research needs to be funded.

● (2025)

Ms. Marilyn Gladu: Thank you very much.

[*English*]

For Dr. Quirion—

Are we out of time?

The Chair: Ms. Gladu, I'm sorry, and it's your first time, too.

Ms. Marilyn Gladu: I always have more questions than I have time for.

The Chair: We're glad you've joined us.

We will go now, for five minutes, to Mr. McKinnon, please.

Mr. Ron McKinnon (Coquitlam—Port Coquitlam, Lib.): Thank you, Chair.

Ms. Lena Metlege Diab (Halifax West, Lib.): Sorry, it's my turn.

The Chair: Oh, sorry. We're going to Ms. Diab, for five minutes, please.

Ms. Lena Metlege Diab: Thank you very much, Madam Chair. I appreciate the opportunity to ask questions.

Thank you so much to all the witnesses who are with us today.

[*Translation*]

Mr. Quirion, I have a question for you.

As you know, our committee has already heard from the chief science advisor of Canada, Mona Nemer. You say that you have an excellent relationship with her.

What are the differences between your role and hers?

How do you work together? Do you share information?

Dr. Rémi Quirion: We share many secrets, but I can't talk about all that this evening.

Seriously though, we have a great relationship.

Concerning the differences between the two roles, I personally am an adviser to the Quebec government on research and innovation, and I also chair the Quebec funding agencies, so the Québec Research Funds. It's somewhat equivalent to the three federal funding agencies. We have roughly the same three agencies in Quebec. We are complementary. In Quebec, we support students a lot through scholarships and we have a lot of strategic clusters like networks. Ms. Nemer does not have that mandate, which I think is a bit unfortunate. When someone has not only a mandate as a government adviser, but also a more active role in research programming, it helps put into action some of the ideas that the individual might have or the suggestions that they receive from the research community, the private sector or government. In that respect, there is a difference between the two roles.

During the pandemic, we worked together closely. As I said earlier, we didn't really know what was possible, before this infamous pandemic. Much work is done internally, in the Quebec government, but I also work with Ms. Nemer, with colleagues from the funding agencies and with the Public Health Agency of Canada.

Ms. Lena Metlege Diab: Thank you very much.

[*English*]

Dr. Murphy, this question was asked, but I'd like to ask it again of you. As a woman on this science and research committee and as somebody who is trying to understand a bit more and really would like to see a lot more females involved in science and research, I think it's tough enough for boys to be in that, let alone females or diverse representation, and so on.

I come from Nova Scotia. We've just reached a population of one million. I have 10 universities in Nova Scotia and a Nova Scotia community college that has 14 campuses, so we're very rich in education.

From your experience, given the fact that you said you're the second largest university in Canada, what I'd like to know from you is, what else can you offer us? How can we get more females or more diverse people involved in research and in science?

Dr. Gail Murphy: Thank you.

I think I mentioned the dimensions program, which was started by Madam Chair, and which is just in its pilot phase now. I think it has 17 institutions across the country that are gathering information about what the barriers are. We're all going to be developing practices that can help. The changes that have been made to many of the programs, the changes and attention that have been given to equity, diversity and inclusion have meant that at UBC many of the new hires in science are women. I think where we struggle a little bit more is actually with more diverse groups. More attention is being given to that as well now, but it takes a long time to start changing the faculty complement. If we can start to ensure that our undergraduate populations are very gender-balanced, which they are in many cases, we start seeing that not every program, but many programs, have improved. It takes a long time.

Where we're seeing the biggest barriers are really for people from diverse cultures and backgrounds who might be first-generation university students who aren't necessarily attuned to how one might get involved in research. That's where I think focused attention could really help ensure that we have the input to the pipeline to enable that over time, so that they become the leaders in technology, the leaders in companies, the leaders in academia.

● (2030)

Ms. Lena Metlege Diab: Thank you very much, Dr. Murphy.

The Chair: Thank you so much, Ms. Diab.

Dear colleagues, we've come to the end. I really want to thank all of our witnesses. We thank you for your time, your expertise and the information you've shared with this committee. It will really help us as we build the future of science and Canada.

To our colleagues, if I could borrow two minutes of your time, we do have some business to take care of.

Thank you to the witnesses. We say goodnight to all of you.

[*Proceedings continue in camera*]