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Chair: The Honourable Kirsty Duncan





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Tuesday, March 21, 2023

• (1100)

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas (Rimouski-Neigette—Témiscouata—Les Basques, BQ)):** Colleagues, I call this meeting to order.

Welcome to meeting number 34 of the House of Commons Standing Committee on Science and Research.

Today's meeting is taking place in a hybrid format pursuant to the House order of June 23, 2022. Members may therefore attend in person in the room, or remotely using the Zoom application.

Today, we are going to continue our study of the support for the commercialization of intellectual property.

In order for things to proceed smoothly, I'd like to make a few comments for the benefit of witnesses and members.

Please wait until I recognize you by name before speaking. For those taking part by video conference, click on the microphone icon to activate your mike, and please mute yourself when you are not speaking.

For interpretation, those on Zoom can select, at the bottom corner of your screen, English, French or Floor. Those in the room can use the earpiece and select the desired channel.

I remind you that all comments should be addressed through the chair.

For members in the room, if you wish to speak, please raise your hand. For the members on Zoom, please use the "raise hand" function. The clerk and I will do our best to maintain a speaking order when appropriate. We thank the members for their patience and understanding.

In accordance with our routine motions, I am informing the committee that all of our witnesses have completed the required connection tests in advance of this meeting.

I now would like to welcome today's witnesses.

We are joined today by Ms. Gail Murphy, Vice-President of Research and Innovation at the University of British Columbia, and Mr. William Ghali, Vice-President of Research at the University of Calgary.

Each of you will have five minutes for your opening remarks.

Professor Murphy, you have the floor.

[English]

**Dr. Gail Murphy (Vice-President, Research and Innovation, University of British Columbia):** Thank you, Mr. Chair.

Thank you for inviting me to join you today.

As you've heard, I'm Gail Murphy, vice-president of research and innovation at the University of British Columbia. I'm also a professor of computer science and a founder of Tasktop Technologies, a 200-person software company recently acquired by Planview.

I'm joining you today from the traditional ancestral and unceded territories of the Musqueam people, for centuries a place of learning and discovery.

UBC is the second-largest research university in Canada, with nearly 70,000 students and more than 17,000 faculty and staff at campuses in Vancouver and Kelowna and sites throughout British Columbia.

UBC is consistently ranked among the top 50 in the world and attracts over \$700 million in research funding each year. UBC researchers are responsible for tremendous contributions in new technologies, life sciences, the environment, clean energy, public policy and economic growth.

UBC also ranked first in the world in the category of industry, innovation and infrastructure in the 2022 Times Higher Education impact rankings and has the highest number of active licences for intellectual property developed from research in Canada.

Research universities produce IP in many different forms, including patents, copyrights and trademarks. Different research universities approach IP differently. At UBC we have an institutional model in which researchers disclose inventions that are proprietary in nature to the university. The university then works with those researchers to find a way to mobilize the IP, taking into account personal preferences, the field of research and the economic sector.

Generally, IP mobilization happens through licensing, spinoff companies or knowledge exchange. At UBC, we successfully and continually deploy IP through each of these mechanisms. B.C.'s thriving biotech sector, as one example, is in large part based on our research mobilization success, such as the recent UBC spinoff company AbCellera, which currently has a market cap of over \$2 billion and more than 500 employees.

To give a sense of scale, last year UBC filed 353 patents, had 622 active technology licences and undertook approximately 1,400 sponsored research projects, most with industrial partners.

UBC is also exploring new forms of partnerships, particularly with large Canadian companies, creating more open-ended research collaborations to solve industrial challenges. As one example, a 5G partnership with Rogers has enabled projects in wildfire management, as well as in telemedicine, to be able to reach patients in remote and rural communities.

While we have seen success in generating and mobilizing IP, Canada can build on this by investing in four areas: people, partnership, pilot funding and patenting.

First, there's an urgent need for further investment in graduate students, as they are critical to moving inventions and ideas from the university into start-ups and Canadian companies. This was certainly true for the company I co-founded in Canada. In Canada, we lag in the production of graduate students and are simply not funding those graduate students at internationally competitive levels. We are at significant risk of losing talented young people to other jurisdictions. To attract and produce more graduate students, the federal government needs to increase both scholarship and tri-agency funding for research, most of which goes towards graduate students.

Second, we need to better and more completely support partnerships. While many helpful programs exist, gaps do remain. One of the key gaps is support for institutions to cultivate, develop and sustain partnerships, such as the one between UBC and Rogers that I noted earlier.

Third, there is an opportunity to fund the scaling up of proof-of-concept research results into pilot technologies that are appropriate for spinoffs and investor funding, by, for example, taking promising new chemical or biological processes from a test tube to something closer in scale to commercial production.

Fourth and finally, there is an opportunity to increase support for patent writing and filing at universities. While Canadian research universities are very well known for their ability to discover and to invent, we are limited in our ability to protect IP through patents due to a lack of funding.

I have had the opportunity to bring research results from software engineering, my research area, to the market, and one of the most rewarding parts of my career has been seeing our ideas really impact the business of software development. Collaboration between academia and the private sector is growing exponentially, but we need to move from a stream of ad hoc initiatives to a focused national imperative that properly and purposefully supports this work for a more resilient economy and thriving society.

• (1105)

Thank you for this opportunity. I look forward to your questions.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Professor Murphy.

Professor Ghali, you now have the floor for five minutes.

[English]

**Mr. William Ghali (Vice-President, Research, University of Calgary):** Thank you, Mr. Chair.

[Translation]

I am pleased to have had the opportunity to address the Committee today.

[English]

I am Dr. William Ghali, vice-president of research at the University of Calgary.

I am joining you from the traditional territories of the Treaty 7 first nations of southern Alberta. Calgary is also home to the Métis Nation of Alberta, region 3.

Like Dr. Murphy before me, I am a stakeholder from a Canadian post-secondary institution. More specifically, I am a vice-president for research, a role that oversees not only research but also my university's innovation ecosystem.

The backdrop of Canadian innovation and commercialization unfortunately isn't great. While Canada scores in the top 10 countries for basic research by various traditional measures, the impact of our innovations, assessed by metrics such as patents, licences and company creation, is modest.

Our post-secondary sector presents a paradox. Data show that our universities are sought after internationally because of the strong reputation of our educational programs. Our post-secondary research is also very strong, and we achieve internationally leading levels of scientific publication and citation per capita, yet, despite this, Canada lags in those previously mentioned innovation metrics. Why is this?

One challenge may be the sometimes competing missions of universities. Our provincially funded universities exist, after all, to deliver educational programs. We also need to retain our professoriate and uphold campus research infrastructure: laboratories, IT systems and so on.

In the face of budget pressures—and universities in several provinces have faced that—something has to give. In such situations, innovation expenditures are sometimes seen to be a luxury, nice to have but not necessarily must-haves. Clearly, there needs to be a change of mindset. Knowledge economies, in their fullest form, are fuelled by research universities if and only if the research in those universities is mobilized toward innovation.

At the University of Calgary, we have activated a number of programs that attempt to demystify and enable commercialization pathways. We have the Hunter hub for entrepreneurial thinking, which does exactly what its name suggests, campus-wide. We have an exciting cohort program called e2i, evolve to innovate, which exposes large cohorts to group innovation training, early-stage exposure. We have a more intensive and personalized academic entrepreneurs in residence program, which provides longitudinal mentorship to selected teams by experienced research entrepreneurs. We also have a set of UCeed funds, evergreening venture funds established through philanthropy.

Is it all working? Maybe yes. The University of Calgary has been number one in Canada in start-up company creation from the university for each of the last two years, according to AUTM, with about 20 new companies created annually. Many of these companies have gone on to achieve maturity and growth, create jobs and attract capital.

I know this is a parliamentary committee and questions of science policy are paramount here, and I think there is an important federal government role here. Several federal government programs are noteworthy. These include a number of PrairiesCan investments in my region and ISED's new ElevateIP program, for which the University of Calgary will be one of the hubs.

I'm also optimistic about the lab-to-market program announced in budget 2022. I look forward to hearing the specifics of that program. I also, of course, want to see the details of the new Canada innovation corporation, from which I hope there will be strong program connections with Canada's post-secondary sector.

In closing, I'll point to Singapore and Switzerland, two quintessential knowledge economies. In both, federal government funding plays a major role. In Singapore, the two major universities, NUS and NTU, have impressive tech transfer systems fuelled by substantial government investments. In Switzerland, two federally funded R and D institutions, EPFL and ETH, shine particularly brightly as innovation exemplars internationally.

I am optimistic about some of the trends I see, both nationally and, of course, at my institution. I am hopeful that this committee and the federal government will continue to explore ways to advance Canada's knowledge economy.

Thank you for your attention.

• (1110)

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Professor Ghali.

We will now begin the first round of questions.

Mr. Williams, you have six minutes.

**Mr. Ryan Williams (Bay of Quinte, CPC):** Thank you very much, Chair.

[*English*]

It's nice to see you in this role.

Thank you to our witnesses for joining us today. This is a fascinating study, and we're happy to have you both here.

IP commercialization in Canadian universities is often referred to as the “valley of death”, so I'm wondering if each of you could perhaps comment on where this great term came from. Why do we have such a tough time commercializing IP from our universities?

Professor Murphy, perhaps you want to go first, and then Dr. Ghali.

**Dr. Gail Murphy:** Thank you very much.

I think sometimes we overstate what you've termed the “valley of death”. I think we have many examples of where we are successfully moving new ideas and commercialization policy out into use within our economy and our other sectors.

There are places where there could be more support. Dr. Ghali mentioned a few of them. There are places where we need to have more ability to work longitudinally with companies in Canada to be able to move ideas into use. For our more entrepreneurial mind, it's spinoff individuals. There are significant challenges, as I mentioned, in moving research results from the lab into use by showing a capability of doing it at a pilot scale.

There are also challenges for those companies, particularly in the current climate, for raising their initial capital. The more capital-intensive your company is going to be, the more difficult it tends to be to grow in Canada, to put in place the infrastructure to be able to get your product into a commercial form.

The final thing I would mention—

**Mr. Ryan Williams:** My main question in all of this is, how are you tracking this right now? Is there a way you're tracking the funding for commercialization? Do you check in with companies later? Do you track jobs? How are we tracking commercialization, as a whole, from universities?

**Dr. Gail Murphy:** We track both of those things.

As Dr. Ghali mentioned, there is also an organization called AUTM, which tracks licences and patents, but we also follow up with our spinoff companies to track the amount of investment over time and the number of jobs that were created in Canada.

**Mr. Ryan Williams:** Okay. Thank you.

Dr. Ghali, I know you have a spin on this. You talked about something that is really important to me—entrepreneurs in residence. Can you tell me how that program works, and how those mentors are involved with helping to grow companies?

• (1115)

**Mr. William Ghali:** Yes. Thanks for the question.

That particular program is one where one key element is the people who are the mentors in the program. These are individuals who have generated IP through research and scholarships at the university, and they have undertaken a journey themselves of commercialization or knowledge transfer that has, in some cases, created social enterprises and social innovations, but in other cases technology-based innovations.

Those mentors have one role that relates to simply spotting IP and speaking to colleagues in a generic way that there's a journey that could be taken, a career step they might consider that doesn't necessarily grasp onto a specific innovation or a specific IP element of interest. They are later involved in the actual mentorship of teams that have something they want to bring forward. They do have an intake where they consider the concept that a group has in mind, and if that concept is mature enough, it goes into the academic entrepreneurs in residence program.

If the concept is less mature, they are potentially diverted to our evolve to innovate program, which is a less IP-focused program. It's more about mindset and pathways.

**Mr. Ryan Williams:** Doctor, you talked about 20 companies being created annually. Is that normal for universities, or is that something you're excelling at, through AUTM, as you were saying, perhaps because of the entrepreneur in residence program?

**Mr. William Ghali:** Yes, I think there has been a change. For us, it is an increase over prior years. In earlier years, there were fewer than 10 companies formed. I don't think doubling happens coincidentally. Of course, I'm an epidemiologist in my research, so I have to be cautious with attribution, but I think it is partially because of the Hunter hub and the whole discourse around entrepreneurship, campus-wide, that has shifted the mindset.

I think it is the suite of programs. The academic entrepreneurs intervention, I think, is particularly powerful, as you've noted in your questioning, but so is the UCeed fund, which is an incentive, after all, to position oneself to go after money and to advance a concept. We also have our tech transfer entity at Innovate Calgary, which has had a significant enhancement in our institutional investments for lots of things.

**Mr. Ryan Williams:** I have less than a minute left for each of you, so I'll ask this very briefly.

Is there a federal policy regulation or piece of legislation that is hindering innovation for Canada right now? Perhaps there's some-

thing that the Americans, for instance, are seeing in the universities that we are not seeing in Canada?

**Mr. William Ghali:** Dr. Murphy, I'll let you speak first.

**Dr. Gail Murphy:** I'm not aware of any particular legislation. It is more of a mindset in Canada of, for instance, making sure that we buy from our Canadian companies that are starting out so that they have an ability to generate cash flow and revenue and continue their growth.

**Mr. William Ghali:** I also don't necessarily have a policy or legislation that hinders, but perhaps a culture of incentivizing and potentially some tangible programs that incentivize could be science policy considerations at this committee.

**Mr. Ryan Williams:** Thank you.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Williams.

Ms. Bradford now has the floor for six minutes.

[*English*]

**Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.):** Thank you, Mr. Chair.

My apologies for my laryngitis this morning. I will try to keep my questions short and hopefully your answers are long.

I'll ask these questions of each of you. Maybe Dr. Murphy can start.

What initiatives can be explored to strengthen links between research conducted in post-secondary institutions and Canadian industry needs?

**Dr. Gail Murphy:** Thank you very much for the question, and I hope you feel better soon.

I mentioned partnerships. I think partnerships are very important to form between Canadian industry and academic institutions. Not only are we able to take advantage of talented groups of individuals within the universities to help solve company problems, but the company also finds a source of talent to bring into their company later.

We tend to do the partnerships that I'm mentioning at the scale of the university. The company brings a set of problems, and then we work with groups of researchers in a foundry model to brainstorm different approaches to be able to forward the ideas of that company and then work collaboratively on them.

It means that we bring together multidisciplinary teams. We're finding that new partners are coming and saying that they would like a partnership model like company X had because they are seeing results from it that they are really interested in.

• (1120)

**Mr. William Ghali:** I would just jump in and echo Dr. Murphy. Partnership funding programs are something that I would welcome, speaking as an N of one, but also as a vice-president of research. We know that the NSERC programs and the alliance programs are very good for bridging researchers within post-secondary institutions with companies. There is a bidirectional consideration of strategically important research initiatives and questions.

In the health space, which is my own space, there used to be a program called the eHIP program—eHealth innovation partnership program—that looked for partnerships between health systems, industry and post-secondary institutions. Those programs are at that “valley of death” that was mentioned in the previous line of questioning.

I think partnership programs are really a valuable thing. There should be some fundamental science, of course, in the funding system that doesn't necessarily anchor in partnerships, but partnerships are powerful.

**Ms. Valerie Bradford:** Thank you.

What are businesses and academic institutions doing to support the commercialization of IP? What obstacles do they face in this regard? What are they doing to overcome them?

Dr. Murphy, do you want to start?

**Dr. Gail Murphy:** There are two different routes we take in working with industry.

Some of our projects are sponsored research where the industry is providing some funding, and perhaps some funding is coming from the federal government, and there's a project that is undertaken as a result of that. Mitacs programs are another example of this form of sponsored interaction. In those cases, there's really more onus on the companies to figure out how the new ideas and approaches might fit into their product lines and then take it forward. Often we're building on existing IP that a company has and we're helping to further that to the next generation.

The other category we've been referring to today is really in the spinoff of [*Technical difficulty—Editor*] companies directly out of university inventions. In those cases, or in many cases, the universities, as Dr. Ghali was mentioning, are trying to incubate and accelerate along the pathway. We also have entrepreneurship programs and accelerator programs to try to incubate it.

Where companies often face a challenge is making that jump from being within the university environment to being on their own and starting to grow into large companies. In general, in Canada, we see great success with our start-up companies. They get to a certain size, but then trying to grow into a much larger company is a challenge. Part of that is some of our industrial policy, in which there are cut-offs for the sizes of companies that are able to participate in certain programs. The more we can smooth that, the more we will be able to grow our companies more successfully.

**Ms. Valerie Bradford:** Yes, I think the ramping-up stage is always a challenge. Part of the ElevateIP program is, hopefully, to address that.

Dr. Ghali, go ahead.

**Mr. William Ghali:** I have the easier job, because I get to follow the wisdom of Dr. Murphy.

I do want to add one piece, which is that both of us here are from the post-secondary sector, in which, as I see the numbers, Canada is rather strong, both in public sector expenditures for R and D and in the performance of the post-secondary sector in terms of expenditures in research activity. In contrast, I see in the statistics for business enterprise expenditure on R and D that we are significantly lagging. It's when the public sector and private sector expenditures on R and D are combined that Canada falls in the OECD ranking of per capita expenditure.

**Ms. Valerie Bradford:** Dr. Ghali, I will let you answer the question first this time, because it builds on this.

Are there areas in which Canada is excelling in IP commercialization and areas in which we need to support it better, such as academia or certain business sectors? You were kind of alluding to that.

**Mr. William Ghali:** Yes. As to whether there are particular sectors, one area I could comment on, in which we have been quite active as a post-secondary sector, has been responding to the federal government's bioinnovation and biomanufacturing strategy and the investments that have been made just recently, which I think have been motivated by the pandemic and the realization that Canada was lacking domestic capacity to mobilize quickly for novel therapeutics, diagnostics and, most notably, vaccines.

I don't want to overstate the negatives, because there is a biotech and bioinnovation sector in Canada and there are investments being made now to try to bolster that through the Canada biomedical research fund. However, to answer your question, that is one domain in which I think the stress test of a global pandemic revealed that sector to be weaker than that of some other countries. I think we could look to what the U.K. achieved and what the U.S. achieved with the rapid mobilization of massive funding for vaccine development. Indeed, the two most notable vaccines came out of R and D in the U.S.

• (1125)

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Professor Ghali, I must interrupt you, as Ms. Bradford's six minutes are up.

Mr. Cannings, you have the floor for six minutes.

[*English*]

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

It's great to have the two witnesses here before us today. It's very interesting. I'm particularly happy to see UBC represented, my alma mater, where I worked for many years.

I would like to start with Dr. Murphy. We have heard about and you mentioned some of the initiatives and innovations that came out of the pandemic. You mentioned AbCellera, and there is my friend Pieter Cullis and his work on lipid nanoparticles. I think Precision NanoSystems is developing those things.

Could you perhaps use those researchers and the companies that formed out of their research, and where they are headed now, as an example of how they did it? Did they do it right? Have you learned something from that process? It's something I think we should all be proud of, but one of the things we are concerned with here is keeping IP in Canada as much as possible.

Perhaps you could expand on that story and say what we learned and where we're headed.

**Dr. Gail Murphy:** Thank you, MP Cannings. We are very proud to have you as an alumnus of UBC.

Let me briefly recap two stories that are related to the biomanufacturing and life sciences sectors. One is the company that I mentioned earlier, AbCellera, started by Carl Hansen at UBC for antibody therapies. An interesting aspect of Carl's work is that he incubated the technology at UBC for an extended period of time as he built AbCellera. It was a real case of where the Canada Foundation for Innovation infrastructure was used for both research and innovation. He was able to use that equipment to help further company ideas before they were ready to spawn off. They had a tremendous impact in the recent pandemic as well.

If we look at the lipid nanoparticle work of Dr. Cullis, that was simply stupendous. In large part, it's the reason we were able to deliver those mRNA vaccines into people—hundreds of millions of people worldwide as a society. One of the interesting aspects of his work is how long it took to get to a place where it could be commercialized. He recently cited, at the launch of our bio-hub, that it was a 25-year journey funded by the federal government that allowed the technology to develop to the point where it was ready, in this instance, to really accelerate the therapeutics that could be delivered out to not only Canadians but also the world.

I think you see that need for incubation within the university for both research and innovation, and also the need to really fund fundamental research, because we never know where the next discovery that's going to significantly impact the world is going to come from.

**Mr. Richard Cannings:** Thank you.

You also mentioned in your opening remarks the need for more funding for just patent production, I think, and how that aspect needs more funding. Could you expand on where that money is needed and what it would produce?

**Dr. Gail Murphy:** Absolutely.

At UBC, inventors' inventions are provided to the university, because we are institution-owned and it is an institution policy that we take towards IP. When they are disclosed, an analysis is done to determine what should be patented. Our patent budget is very

small. We stretch it in multiple ways to be able to file those over 300 patents that we filed last year. If we don't protect that intellectual property at its inception, then over time we lose the ability as a country to even think about commercializing that technology.

The more we can file provisional patents and do work on patent families to get those fundamental patents in place, the more our researchers and Canadians have an ability to think about how we can commercialize that further.

● (1130)

**Mr. Richard Cannings:** Just to expand on that further, I assume there's a time constraint too in that patent filing, because these researchers will want to publish their results. Once those results are published, I assume that patenting becomes more difficult.

**Dr. Gail Murphy:** Yes, it does. Indeed, we take care in making sure that all the research that's done at UBC is publishable and can be publishable. That is a goal that every researcher has and that every graduate student needs to be able to strive for. We need to be able to act quickly. It is not something where you can take years and years to think about filing a patent.

**Mr. Richard Cannings:** I have just one more follow-up on that, which is about the role that governments could play in government procurement. We were talking about vaccines. Where do we need more government activity in, say, producing vaccines compared with the U.K. example, when Canada literally failed in that regard to produce things at a real commercial level? Where do we need that government procurement?

**Dr. Gail Murphy:** What I know from the health system—I'm sure Dr. Ghali can speak more to this—is that Canada is one of the hardest places to have your invention taken up into the health care system. We need to be able to produce—which the biomanufacturing and life sciences strategy is taking a step towards—not only the vaccines but also the ingredients in the supply chain that go into the vaccine production. Then we need an ability to actually procure at some scale to be able to move that into use.

Before that step, we also need to be able to do early-stage human trials, which is not the easiest thing to do in every part of this country. I know that our researchers are working with Health Canada to be able to keep some of the regulatory changes that happened during the pandemic, regularize those and then move some of the therapeutics more quickly into Canadian use.



[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Cannings. Your time is up.

We will now move to the second round of questions.

Mr. Mazier, you have the floor for five minutes.

[English]

**Mr. Dan Mazier (Dauphin—Swan River—Neepawa, CPC):** Thank you, Chair.

Thank you to the witnesses for coming here today.

Dr. Murphy and Dr. Ghali, can you please table with this committee how much money your university has received from the federal government for research and how much your university has made from licensing intellectual property over the last five years? Can you table that report, please?

**Dr. Gail Murphy:** We could certainly get that information to you.

**Mr. Dan Mazier:** Dr. Ghali, could you, as well?

**Mr. William Ghali:** Yes.

**Mr. Dan Mazier:** Also, can you table with this committee what percentage of your IP has been transferred to Canadian companies and non-Canadian companies over the last five years?

**Dr. Gail Murphy:** We could certainly also do so.

I can say that with respect to licensing out to companies, we have two forms. There is sponsored research, as I mentioned, the vast majority of which is going to Canadian companies. For the second form, which is the spinoff companies, 92% of that went into Canadian companies and 8% went to U.S. and U.K. companies, where there was not as much ability to find the market and accelerate it in Canada.

**Mr. Dan Mazier:** Okay, if you could table those two reports, that would be great.

Dr. Ghali, I have a patent application with me here. The international publication date is June 11, 2020. The publication number is WO 2020/113310 A1. The applicants' names are Huawei Technologies and the University of Calgary.

How many patents has your university applied for with or transferred to Huawei?

**Mr. William Ghali:** That's also a question that can be answered in terms of the quantitative details after the fact. I don't have those numbers at my fingertips here.

I think your question is of course a very pertinent one, particularly in the current time, when there is a heightened attention to matters of research security. We are working under some new federal guidelines for safeguarding our research. Those guidelines are accompanied by new bodies that have been created within CSIS and Public Safety Canada to support post-secondary institutions in the consideration of research security and the management of risk.

• (1135)

**Mr. Dan Mazier:** That's good, Doctor. Thank you.

I have some more questions here.

Do you continue to work with Huawei in any form?

**Mr. William Ghali:** We don't at this time because of guidance that has come to us through the bodies I just mentioned.

**Mr. Dan Mazier:** Okay.

Dr. Murphy, I have a patent assignment agreement here with me. The conveying party is your university, the University of British Columbia. The receiving party is Huawei Technologies. I'm quoting from the assignment agreement: "We, the University of British Columbia, do hereby sell, transfer and assign to Huawei Technologies Canada...all our interest in inventions and developments relating to "Photonic Elements driven by Common Electrical Driver" including the inventions and developments disclosed in United States Utility Patent Application Serial No. 15/080,065...and We grant to the Assignee all right, title and interest in any and all intellectual property therein". The patent assignment agreement is dated July 2021.

How many patents has the University of British Columbia filed with or transferred to Huawei?

**Dr. Gail Murphy:** Again, I would be happy to table that quantitative information later.

I will say that as research security guidelines have evolved with the federal government, we have been changing our agreements in that respect and have moved to new standards.

**Mr. Dan Mazier:** Do you continue to work with Huawei in any form?

**Dr. Gail Murphy:** Yes, we do.

**Mr. Dan Mazier:** Thank you.

I have no further questions, Chair.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Mazier.

Mr. Collins, you have the floor for five minutes.

[English]

**Mr. Chad Collins (Hamilton East—Stoney Creek, Lib.):** Thanks, Mr. Chairman.

Welcome to the witnesses this morning.

I'll start with a question for both witnesses.

A previous 2017 study here in Ottawa focused on IP. It highlighted that private firms do not know what research is being performed at post-secondary institutions, what IP they hold and how to leverage it. One recommendation was to create a mapping program that would enable the private sector to better forge partnerships and links with post-secondary institutions.

I'll start with you, Dr. Ghali. Can I ask for your thoughts on that in terms of ensuring that with local partners, prospective investments could be made by the private sector? How does the university deal with that issue? What are your thoughts in terms of the federal government playing a role in being a sort of matchmaker to ensure that those private investments continue to flow to post-secondary institutions?

**Mr. William Ghali:** Thank you very much for that question. I think it's a really pertinent one.

As I said earlier, the partnership programs of the tri-council agencies are a valuable catalyst, because they explicitly connect universities with companies and they incentivize and subsidize those connections by bringing some public sector funding to the table that both the universities and the private sector partner can benefit from.

That said, there needs to be more direct university-private sector engagement. I think some universities are stronger than others. At the University of Calgary, we have ramped up our industry partnerships function. We don't want emails sitting in the inbox of an executive vice-president who's drowning in email. We need to have an office that can answer the same day, do some matchmaking of researchers with companies and have a dialogue of shared interests and shared challenges.

We talk a lot about push-and-pull in science. Actually, paradoxically, often it's the "pull" science, where there's an external partner engaging with universities and asking them if they can help, that can be most impactful, because the "valley of death" is already partially bridged when that's happening. So we are really trying to ramp that up. Can governments—plural—support that kind of industry-university bridging? I think they can, through potential creative programs.

I'll turn it over to Dr. Murphy, if she has anything to add.

• (1140)

**Mr. Chad Collins:** Thank you.

**Dr. Gail Murphy:** Just building on that, we also have extensive partnership work that goes on. I think there are two opportunities to further this.

There was, in the Liberal platform, a university knowledge mobilization and commercialization fund. I think if we were able to mobilize that, we would be able to have more universities engaging in partnerships.

The second is the new Canada innovation corporation, where there is an intent to help businesses grow. They can grow with the help of the universities. Making sure we're actually able to broker relationships between university researchers and those companies could help us take things out of the lab and increase that pull.

**Mr. Chad Collins:** Thank you.

By extension, I've had the opportunity to visit the McMaster Innovation Park, where they are leveraging private investment, but they're also leveraging municipal and provincial investments. What role can the federal government play in terms of incentivizing municipalities and/or provinces to make the same kinds of investments we're making here in Ottawa?

I'll start with Professor Murphy, if I can.

**Dr. Gail Murphy:** I think trying to get all levels of government working together is definitely a laudable goal and one we should continue to work towards. I would love to learn more from the McMaster model.

The more we can ensure that companies can grow in terms of planning of space of the municipalities, and then have provincial and federal governments, in particular, help co-fund the early stages of companies, making sure they have a place to start out, the more we will be able to maximize the investment that went into the federal research dollars.

**Mr. Chad Collins:** Dr. Ghali, I have about 30 seconds left on that issue.

**Mr. William Ghali:** Just very quickly, we're a beneficiary at this university of municipal funding through something called the Opportunity Calgary Investment Fund, which is for innovation programs. We have a provincial Alberta Innovates agency and a Ministry of Technology and Innovation that provide us with support in many areas, and of course the substantial federal government programs.

I like leveraging programs. I know that intergovernmental relations are sometimes stressed by those matching programs, but the notion of matching is a good one. We have provincially funded post-secondaries that rely heavily on federal government funding.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you Mr. Collins. Your time is up.

We will now move to the next round of questions, for which you have two and a half minutes.

Mr. Cannings, you have the floor.

**Mr. Richard Cannings:** Thank you.

[English]

Coincidentally, just before this meeting, I met with U15, the organization that supports and promotes research in Canada's largest research universities. It was mentioned that the report of the advisory panel on the federal research support system just came out. Of course, U15 has also been asking for increased support from the government for the whole research ecosystem in Canada. I've been advocating for better scholarship funding for graduate students. This report asks that more money be put into the tri-council to both hire more researchers and give them more funding so they can support grad students as well.

I'm wondering if both Dr. Ghali and Dr. Murphy could comment on that. We'll start with Dr. Ghali so that he can have first dibs this time.

**Mr. William Ghali:** It's still easier going after Dr. Murphy.

I'll just say that the report is very interesting. I think it has balanced consideration of funding, as well as of how the governance of the funding agencies is structured. It addresses major science infrastructure, which is an important challenge for all countries, not least for Canada. It also considers the connection between research and innovation, and the pathways to commercialization, which I know is the focus of this committee.

There are many interesting elements here, and I find myself largely endorsing this. I think you want to have a conversation at the U15 table in early April on what each of these elements means, but I think it's a very compelling document.

I'll turn it over to Dr. Murphy.

**Dr. Gail Murphy:** Yes, I agree that it's a very compelling document.

I'll pick up on one piece that you already mentioned, Mr. Cannings, and that is people. Perhaps what we haven't focused on enough in this discussion is that innovation starts with people and it continues with people until it is out there, being used, often by people as well.

It's about funding our graduate students, who are such an incredibly important conduit of the talent that we put out into the world and who are often the genesis of amazing ideas that become companies that help people like Professor Cullis, who developed lipid nanoparticles. We need to invest in people in Canada, and our current investment levels are substandard internationally. We're seeing drop-offs in our application rates. We will start seeing drop-offs in acceptance rates of bringing people into Canada, and in our own Canadians staying here to do graduate studies and then continue on into our economy.

I think it's fundamentally important that we consider the levels and the numbers of people we're supporting through any policies and programs we put into place.

• (1145)

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Cannings. Your time is up.

We now move to the next five-minute round of questions.

Mister Soroka, you have the floor.

[*English*]

**Mr. Gerald Soroka (Yellowhead, CPC):** Thank you, Mr. Chair. Welcome to the role.

Welcome, Dr. Murphy and Dr. Ghali. Thank you for coming today.

I'll start off with Dr. Ghali.

Canadian colleges have proven that applied research works in partnering with private business and allowing them to own their IP. Does that ever happen with universities?

**Mr. William Ghali:** Yes, absolutely. I think there are all kinds of industry partnerships. There are some in which an industry partner wants very early-stage concept discussion, and there might even be the co-creation of an IP pathway. There are other situations when the partnership is centred around an industry-owned technology and there is a desire to validate, refine and demonstrate impact in an applied sector. Our partnership agreements usually lay out the nature of the agreement. I think that would be true for our whole sector.

We're trying to be sophisticated, fast and customer-friendly as a university when we engage with industry, so that the experience for the industry partner is a positive one. I think we have some work to do in the sector, probably, to be very focused on customer experience, with the customer being industry partners.

**Mr. Gerald Soroka:** Okay. Thank you for that.

This is also for Dr. Ghali. Who are the members of AUTM, and how does this help the commercialization of IP in Canada?

**Mr. William Ghali:** You've caught me a bit off guard, because I don't want to—

**Mr. Gerald Soroka:** You can supply that information if you'd like.

**Mr. William Ghali:** Yes, I will.

**Mr. Gerald Soroka:** I would appreciate that in written form.

Dr. Murphy, you stated in your opening remarks that your company exited to Planview, which is based in Texas. What do you think we need to see in Canada to see more exits to Canadian companies?

**Dr. Gail Murphy:** Thank you for the question.

Yes, that was an exit after 15 years of growing the company in Canada, and it has retained significant offices and development within Canada.

One of the challenges is being in economic sectors that have the growth to be able to continue growing within Canada, and that have the market capital available and the customers available to continue to grow within Canada.

As we grow the sectors and as we grow companies larger and larger, we start creating that ecosystem. Within B.C., I think we're creating that system in biotech. We're seeing that companies are choosing to stay and people are able to move between those companies, providing some cross-fertilization.

**Mr. Gerald Soroka:** That's good to hear, to be honest with you.

Dr. Murphy, what is the single largest roadblock to inventors trying to commercialize their IP, and how do we fix it?

**Dr. Gail Murphy:** If there were only one roadblock, I think it would have been a lot easier of a problem to fix. I think there are different roadblocks for every sector. Some of the work that is going on in post-secondary institutions like my own and Dr. Ghali's is trying to understand where those roadblocks are and trying to start understanding how we can address them.

Some of them we've talked about a lot today: How do we get patents into place? How do we get pilots built to a size where it's interesting for investors in taking out into a company? How will we be able to get procurement so those companies can grow here in Canada and not face the challenges that I faced in my own company of international sales from day one?

**Mr. Gerald Soroka:** Okay.

**Mr. William Ghali:** I just want to add that one of the biggest roadblocks is failure, and failure is a predictable outcome in these pathways. That's why mentorship programs are so key to supporting resiliency: Step back and try again, modify your approach, etc.

**Mr. Gerald Soroka:** Thank you, Dr. Ghali, for that as well.

Do you think the roadblocks are through legislation that the government has handled, or are they because of lack of funding? Are those the primary ones, or would you say there are other factors as well?

• (1150)

**Dr. Gail Murphy:** I can go first, if you would like, Dr. Ghali.

I think funding is a huge one that I am hearing about often, the inability to have Canadian lead investors invest in companies at a risky stage and keep the company firmly anchored in Canada. A second one is simply ensuring that we have the sales and marketing people who have the expertise to grow the companies in Canada. Those are definitely two that I hear our companies are facing.

**Mr. Gerald Soroka:** Go ahead, Dr. Ghali.

**Mr. William Ghali:** In the second part of your question, you asked if it was a combination of factors. I think it's a combination of factors. It's not an easy space, and we know the pathways to commercialization have successes but also many ventures that fall off and don't make it. That's part of innovation ecosystems.

Nevertheless, I do endorse Dr. Murphy's comment that, of course, funding pathways are a big part of it. We have the programs that I mentioned, such as the UCeed program. I didn't mention CDL, the Creative Destruction Lab. We have a CDL-Rockies franchise, which exposes many of our university ventures to angel investing. Those funding pathways are helpful, as are government programs.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Soroka.

We will continue with questions. This is still a five-minute round.

Mr. Longfield has the floor.

[*English*]

**Mr. Lloyd Longfield (Guelph, Lib.):** Thank you, Chair. It's great to see you again, and you're doing a great job.

I'm going to start my questions off with Dr. Murphy.

I was co-founder of Innovation Guelph. It's an innovation ecosystem in Guelph. On the governance model, we have the University of Guelph sitting on the board of directors of Innovation Guelph, an innovation centre out of the University of Guelph, and the businesses in Guelph are also quite tied in with "created in #Guelph".

I've been to Innovation UBC, and tremendous work, as you said, is going on, particularly on lipid nanoparticles and other health innovations. The University of Guelph is doing innovation around corn-based nanoparticles that cancer drugs are attached to and then put into the body. The corn is absorbed by the body, and the drugs do their work on specific cancers.

UBC didn't know what Guelph was doing, and Guelph didn't know what UBC was doing. How do we develop an ecosystem in Canada where universities are aware of the research that's being commercialized where they could benefit from each other?

**Dr. Gail Murphy:** Thank you for the question.

I'm sorry; the lights turned off. We're very into sustainability here at UBC.

One of the challenges, as you said, is connecting the ecosystem across the country. We should also mention that UBC has created a database for people to be able to search across the federal agency databases and through patent databases for both researchers and companies to understand who's doing what within the country.

I think we need to train up our partnership people, the people who are supporting our innovation, to look for those connections. Once we make those connections, one of the places where we need to do better in this country is in funding collaborations across the country. We have various programs that come and go, but we need to be able to connect, as you said, and really understand where we can take those next steps together, so collaboration funding would also be extremely welcome.

**Mr. Lloyd Longfield:** That's great.

You mentioned earlier in your testimony the provincial funding. There's a whole provincial piece, and then there's the federal piece. Quite often there isn't a connection.

We do have programs like the Engage grants, and with IRAP as well. With regional agencies, we're looking at developing better communications. We have the Mitacs system. We do have federal programs that are common across university innovation ecosystems.

Could you comment on the benefit of those in the way they bring industry into the university innovation ecosystem?

**Dr. Gail Murphy:** Many of those programs help facilitate those initial introductions between companies and researchers and start off the ability to connect. I do think that for companies sometimes there are lots of people coming at them who say they have somebody who can help them in a university. The more we can coalesce some of those relationships, the better off we'll be.

We do have a great network across the country of both Mitacs business development and NRC IRAP individuals. We know that IRAP will be folded into the new Canada innovation corporation. As we do that, I think we need to make sure that we also have the connections into the universities. It's very difficult for someone outside to know the complexity of the university landscape. We have had success in having people who are dedicated to partnerships internally. That can help bridge that gap and get to the researchers, who are often extremely busy with both their research and their teaching commitments, to make sure we have educated Canadians.

• (1155)

**Mr. Lloyd Longfield:** Great. Thank you.

Dr. Ghali, I was also fortunate to visit Innovate Calgary to see what was going on there—incredible work in the different pillars that you're working on. Of course, energy transition is one of the key areas of development where industry is looking for support.

Sometimes the funding models of universities in Canada are in competition with industry getting funding from, let's say, government sources. I'm not saying the University of Calgary in particular, but the royalty streams that come from innovation or IP that's owned by the university, or the funding that comes to a university from industry to finance innovation.

Could you comment on following the dollar trail on innovation funding, and how the government can help to encourage investment from industry into the university network?

**Mr. William Ghali:** Yes, thank you.

I will just make one quick comment about our IP policy. We have a creator-owned IP policy at the University of Calgary. We received some strategic input from an investor community here in Alberta that suggested that historical levels of IP claimed by the university were too high, and indeed a barrier to company creation. One of the interventions that occurred a number of years ago was a change to the creator-owned IP and a rather small university claim in ventures.

To your other piece, I know you are a parliamentary committee where science policy is in play, as I said in my comments. With the private sector expenditures in R and D being so modest in Canada, I do wonder about tax incentives for increased private sector spending on R and D as a potential lever.

**Mr. Lloyd Longfield:** Thank you.

Thank you, Chair.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Longfield.

That concludes our first hour.

My sincere thanks to the witnesses, Ms. Murphy and Mr. Ghali.

We will now suspend briefly to bring in the next panel.

• (1155)

(Pause)

• (1200)

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** I want to mention a few things for the benefit of the new panel.

Good afternoon and thank you for joining us.

Please wait until I recognize you by name before speaking. If you are on the video conference, please click on the microphone icon to unmute yourself. When you are not speaking, your mike should be on mute.

Those participating via Zoom can access interpretation services at the bottom of their screen, by choosing floor, English or French. Those in the room can put in their earpiece and select the appropriate channel.

A reminder that all comments by members and witnesses should be addressed through the chair.

Now, I would like to welcome the witnesses. We have Baljit Singh, vice-president of research at the University of Saskatchewan, and Kathryn Hayashi, chief executive officer of TRIUMF Innovations.

We'll start with opening remarks. You will each have five minutes.

Professor Singh, you can go first.

[*English*]

**Dr. Baljit Singh (Vice-President, Research, University of Saskatchewan):** Thank you very much, Mr. Chair, for this opportunity to be in front of this committee. It's quite a privilege. I hope that some day, I will get a chance to visit with the committee in person, as well.

I am speaking from the Treaty 6 territories and the homeland of the Métis, where we continue to advance our indigenous engagement with the communities in this province.

I also thank the committee for taking this very important question for discussion. At the University of Saskatchewan, we have been engaged in moving intellectual property or knowledge for the benefit of the end-users and in the service of prosperity of our province and the country.

Recently, there was an advisory panel that was struck by the honourable ministers of ISED and Health Canada, Minister Champagne and Minister Duclos, respectively. I had the privilege and honour of being a member of that seven-member panel. We were deeply engaged in the discussion on moving intellectual property to commercialization. That report was released yesterday, which the committee has already seen.

I'm going to speak in two parts. First, I want to share some examples of where we have been very successful in moving intellectual property to commercialization, and a couple of points that come to my mind as to how we can strengthen the system further.

The Province of Saskatchewan was created in 1905, and the university was established within two years of that to strengthen and grow the agri-food production system in the province of Saskatchewan. The university's College of Agriculture created a system called the "better farming train", whereby the researchers from the university went to the farmers directly, where they were tilling their land, to provide the latest knowledge in agronomy, watering, crop science and harvesting technologies. That has led to what we have today, which is a multi-billion dollar agri-food enterprise in our province.

Within that period, the university created a crop development centre, which, from 1971 until today, has released more than 500 varieties of crops. If you figure it out in a timeline, that's one new variety every month or month and a half. It's no wonder that in western Canada we are a powerhouse when it comes to food production systems. This was a collaboration among the university, the producers and the federal and provincial governments' investment in the agri-food knowledge discovery system.

The second example, to really flesh out the point, is the collaboration that happened between multiple universities and led to the creation of a vaccine against a virus that affects pigs. However, before that, there was a step when discovery science came into play, which is so well funded by our tri-council in our country.

Researchers at the University of Saskatchewan discovered a virus, which led to the development of a vaccine in collaboration with Queen's University Belfast in Ireland and Ohio State University in the U.S. That vaccine technology was purchased by a company in France. Although we got more than \$100 million in royalties to the university and the inventors, the job creation took place in France. We need to think about an ecosystem in this country that goes from end to end, in which we can take our intellectual property and develop the jobs in Canada.

There are two or three points that I want to make to advance our discussion. Number one is that we need to keep making investments in our federal research support system that we have in this country. I believe, based on the discussion we have had over the last year, that countries like the U.S., Germany, Norway, France, In-

dia and Brazil are moving ahead at a very fast pace when it comes to making investments.

Number two is that the ecosystem we need to create with the universities' creation of intellectual property can be strengthened in two ways. One is that a middle tier, where we go from technology readiness level 3 to level 7, needs to be somehow created so that small and medium economic enterprises can work with the university through a support system from the federal and provincial governments.

The other investment is in the training of researchers, graduate students and young researchers, so they can keep an eye on their inventions and know how to connect them to the private sector through commercialization pipelines that we can establish and support within our country.

• (1205)

Therefore, the training and retention of young minds and the strengthening of support for TRLs 3 to 7 are how we can connect that piece.

Mr. Chair, I will stop here, and I look forward to the discussion with the committee for the remainder of the time.

Thank you.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Professor Singh.

Ms. Hayashi, you have five minutes. Go ahead.

[*English*]

**Ms. Kathryn Hayashi (Chief Executive Officer, TRIUMF Innovations):** Hello, Vice-Chair and committee members. Thank you so much for inviting TRIUMF Innovations to appear before you on this important study.

My name is Kathryn Hayashi, and I am president and CEO of TRIUMF Innovations, the business interface and commercialization arm of TRIUMF, Canada's particle accelerator centre.

Before I begin, I would like to acknowledge that TRIUMF is located on the traditional, ancestral and unceded territory of the Musqueam people, who for millennia have passed on their culture, history and traditions from one generation to the next on this site. TRIUMF's home has always been a seat of learning.

Located on the campus of the University of British Columbia, TRIUMF is a world-class subatomic physics and accelerator facility that, using world-unique infrastructure, carries out fundamental science and applied research that is changing the world.

TRIUMF's network of innovators, which includes 21 Canadian universities, is constantly developing new tools and techniques that push the frontiers of knowledge. These scientific innovations hold immense promise for the world beyond the lab, including the marketplace. Our dedicated team of business and technology transfer professionals at TRIUMF Innovations connects scientific inventions and ideas from particle detectors to isotope manufacturing systems and the innovators behind them to opportunities in the private sector.

TRIUMF Innovations acts as a connector to the business world by providing market opportunities for applied technologies that emerge from the TRIUMF network by streamlining access to our world-class expertise and infrastructure, and by connecting our researchers and technologies to the world via industry partnerships, company creation and licensing.

The work of TRIUMF is sometimes seen as merely theoretical with little practical impact. The truth is that our work is often applied in ways we cannot foresee at the outset, with often surprising commercial and societal benefits.

During the COVID-19 pandemic, TRIUMF used learnings from research looking for dark matter, which included experience with gas handling and control systems, to help engineer and produce low-cost COVID ventilators through partnerships with other Canadian institutions, Italy and the United States.

Another real-world application is seen in our spinoff company, Ideon Technologies, which uses muon detectors originally developed to study fundamental subatomic particles as part of a new technology that provides X-ray like visibility up to one kilometre beneath the earth's surface. By detecting muons and using proprietary algorithms to produce 3D maps, Ideon helps exploration geologists more accurately identify new material and metal deposits, allowing companies to mine in a greener, more cost-effective way.

Ideon is the lead for a unique digital supercluster project with a world-leading consortium that includes Dias Geophysical, Fireweed Metals, Simon Fraser University, Mitacs and Microsoft.

None of these advancements would be possible without first providing the necessary funding and resources to the fundamental research being done at TRIUMF as well as the funding to enable our researchers to devote more focus and more applied activities to successfully develop and commercialize intellectual property. Future success will require even broader collaborative research and funding approaches across disciplinary boundaries.

As part of our recently released 20-year vision, we are continuing to focus on what we do best, translating fundamental science to real-world applications. We are excited about the opportunities for TRIUMF to drive further scientific breakthroughs and solutions to complex challenges facing Canada and the world, ranging from climate change to health to quantum and green technologies.

TRIUMF's newest capital investment, the institute for advanced medical isotopes, will provide academic and industry partners with world-leading capacity for new isotope research and clinical applications, and forms an important building block in our growing national medical isotope ecosystem.

In summary, our team at TRIUMF and TRIUMF Innovations continues to work tirelessly to translate Canadian scientific IP to real-world applications. Through our partnerships, we are bridging the gap between applied and theoretical research and tangible innovations.

As you continue to study the commercialization of IP as well as your study into big science in Canada, we look forward to hosting you at our facility in Vancouver and showcasing the amazing work we are doing to drive innovation.

Thank you, and I look forward to the committee's questions.

• (1210)

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Ms. Hayashi.

We'll now begin the first round. Everyone will have six minutes.

Mr. Williams, go ahead.

**Mr. Ryan Williams:** Thank you, Mr. Chair.

[*English*]

Ms. Hayashi, thank you for being here today. This is fascinating information.

I want to start with this: How does Canada, first of all, become number one in medical isotope IP creation?

**Ms. Kathryn Hayashi:** We have an incredible base to build on. Canada has been a leader in this space for decades. I say that quite seriously because I think that Canada is a small country on this stage, but we punch above our weight in the medical isotope space.

We have decades of investment in cyclotrons and reactors across the country that give us an edge that we can leverage in a booming sector. We're seeing advances in radiopharmaceutical development that are really changing the way we treat cancer. Medical isotopes used to be used for imaging, which is also an extremely important part of health care, but when you have isotopes that are playing a role in treating cancer that is otherwise untreatable, those are exciting developments.

Canada is poised with the components of an ecosystem all the way from research through to commercial supply and radiopharmaceutical development to really take our place on the global stage.

• (1215)

**Mr. Ryan Williams:** A lot of witnesses in the past have talked about how the Americans have a robust VC system. They have more of an ability, it seems, to take risk when it comes to investing.

When we have IP developed, we see medical isotope production systems ready in Canada and we have companies that have started up and are growing, are you seeing from your industry that we have enough risk-takers, investors and VCs in Canada? Are a lot of these coming from overseas or from the U.S.?

**Ms. Kathryn Hayashi:** I think it's a common feeling that we have a shortage of risk capital in Canada. It is a key component. As some of the other witnesses have talked about, it's not the only component, but it is a key component in that valley of death that early-stage technologies face.

Many Canadian companies have to build consortiums of investors that include investors from outside of Canada. That's the current reality of risk capital in Canada, but I think anything we could do to strengthen that base in Canada will help the whole ecosystem.

**Mr. Ryan Williams:** Do you have any specific recommendations that you've heard from your industry or that you have personally on how we can increase risk capital in Canada?

**Ms. Kathryn Hayashi:** It's been studied for a long time. I think that having government matching or tax incentives will attract more of those capital pools to be built in Canada and to continue to grow.

A lot of firms have trouble continuing to kind of re-up on their investments. They may come in early, but then not have the capital to continue investing. Particularly in the radiopharmaceutical space, where it takes many hundreds of millions of dollars to develop a successful product, they need to be able to continue to reinvest along the way.

**Mr. Ryan Williams:** Thank you very much.

Mr. Singh, you talked about a seven-member panel that you've been involved with on IP commercialization. You said it was released yesterday. Is that correct? I haven't seen the study. I don't know if many members of the committee have. Could you submit that report to the committee?

Maybe I'll ask you right now, sir, to give us a quick summarization of that report. What were the biggest findings of that?

**Dr. Baljit Singh:** The report was actually focused on federal research support systems and, within that, there's a component of study and recommendations focused on how to connect our innovation, our inventions, to commercialization, because when we had consultations across our country, people from the private sector also came to speak to the panel.

The report was released yesterday, as I said. It's on the website. I will be very happy to submit the report to the committee.

For example, as previous panellists this morning have said, we have the basic elements of the system in place. One of the chal-

lenges in Canada, which is a large and diverse country, is the connectivity of the system, of the various elements to each other. How do universities create business-facing entities within their environments so that private sector investors can come looking for a technology at the university and the universities can talk to the private sector, simply creating a database where people can search for the patents, connect with each other and go from there.

As for the lack of risk capital investment in our country, I believe, considering the size of the country, we may have some appropriate amount of investments available, but I think the role of the federal and provincial governments is to tie it together into a package by creating incentives and blended funding. The speed with which we can create the blended funding to invest in our technology is something that we need to tighten up, and that's one of the recommendations we have made in the report.

The second part within that is the training program. I think in our universities we need to create an investment so that graduate students, post-doctoral fellows and newly recruited professors are much more savvy and flexible and keep an eye on commercialization and creating an economic advantage for our country when they create a technology.

I think that ecosystem connect is something that we were focused on, and in the next steps on the report we have submitted to the federal government we would really like to see some action on that.

These are the two points, based on the recommendations, that I submit to you and the committee.

**Mr. Ryan Williams:** Thank you.

Mr. Chair, do I have time left?

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Your time is up, Mr. Williams.

Thank you.

We now go to Ms. Diab for six minutes.

• (1220)

**Ms. Lena Metlege Diab (Halifax West, Lib.):** Thank you, Mr. Chair.

Welcome to the witnesses joining us this afternoon.

[*English*]

Let me just first ask you this, Mr. Singh. You were asked by Mr. Williams about the report that was just released yesterday. You talked about your university in Saskatchewan being a powerhouse in food production systems and the collaboration that you have seen in order to get the university to that stage.

Can you elaborate a little bit more and tell us if there are other places in Canada that are doing similar things? What collaborations do you have outside of Saskatchewan within Canada?



**Dr. Baljit Singh:** Respectfully, are you asking about the agri-food system or the broader question, please?

**Ms. Lena Metlege Diab:** It's the agri-food system.

**Dr. Baljit Singh:** I think in Canada we can be so proud of our agri-food production system, plants and animals both. From Prince Edward Island to the University of British Columbia, whether we look at the veterinary medical faculty at the Université de Montréal or the agriculture college at Laval or at Guelph or Manitoba, you just name it, if you look at the growth of our country, which grew out of a land production system-based economy, and where we are today, I think the role of the veterinary and agricultural colleges is very clear.

When we look at the Ontario Veterinary College or the Ontario Agricultural College, their contribution to turning Ontario into a production house when it comes to pork, to poultry and to the plants system is clear.

Take the example of Saskatchewan over the last 115 years and its creation of knowledge, which was in response to the challenges that our farmers faced. This has really galvanized our food production system, not only on the sustainability front, where we sustain our land, we're stewards of our water resources and we're stewards in environmental care, but actually, about \$18 billion in food production exports come from the province of Saskatchewan.

Now again, if I may say, it is about connectedness. Once we have connected the end-users to the people who are discovering new knowledge, then the cycle keeps on amplifying itself over and over again. Within that space there are developments. For example, the creation of the superclusters or the global clusters. Within the ecosystem of Saskatchewan now we have Protein Industries Canada, our global cluster. Now that's where we are trying to convert our agri-food product into a protein product at the end of the day that the world needs in greater and greater amounts, from India to Africa to Bangladesh and anywhere else.

The evolution of our agri-food production system over the 115 years in sophistication and investment I think shows how we can do better from discovery to the economic product at the end of the day.

**Ms. Lena Metlege Diab:** In Nova Scotia we have the agricultural college, for example, that's been doing really good things.

How can we better collaborate, co-operate and work together across the country so that we learn best practices? That's one question.

The second question is this: In terms of research processes for academics, when do you believe researchers and academics should start engaging with commercialization and intellectual property, if at all?

**Dr. Baljit Singh:** That's a good question. Thank you.

To the first part of the question, I'm a veterinarian by training. I have taught in Prince Edward Island. I have visited that beautiful college in Truro, Nova Scotia. Specifically that college has made contributions to agri-food policy in our country in a significant way. I'm very proud of the work that happened at Nova Scotia Agricultural College, which is now part of Dalhousie University. It's truly a jewel in our country.

The colleges across the country are connected already through a deans council, which meets every third or fourth month. I used to be a member of that council. We would exchange ideas, programmatic information and information on how to work together with federal and provincial jurisdictions.

The second part of your question was at what stage. It's never too early, because sometimes it is having an eye on the discovery of new knowledge that makes a difference. How do we protect that intellectual property? How do we put a patent on it? Before it disappears anywhere else, how do we work with the private sector to mobilize it?

That's where, respectfully, I was making the case of speeding up our education system for graduate students and new professors, to sensitize them to the idea of intellectual property, because that would be a multi-billion dollar enterprise coming out of that piece.

Radioisotopes—

• (1225)

**Ms. Lena Metlege Diab:** Thank you very much for that.

Very quickly, I just want to congratulate you for all the work that you folks are doing to bring everything to light.

Maybe I'll just give you a few seconds to talk a bit about the SNOLAB facility. I'm sure my colleagues will ask about it.

**Ms. Kathryn Hayashi:** SNOLAB is one of our sister labs in Canada. They do remarkable work. If you ever get a chance to visit, you should.

It is a lab that is deep underground. It shares a mining space with an actual mining company, and the kinds of experiments they do there are remarkable. They have giant detectors they've built underground that they're trying to detect rare particles with. That's the magic of science.

I do think this idea of providing those brilliant researchers with bandwidth, time and funding to turn those brilliant minds to real-world problems is something that we're very interested in.

We have had experience with the old NCE CECR program—the centres of excellence for commercialization and research—which provided funding to TRIUMF Innovations to focus on developing technologies with real-world applications. That's where Ideon was born.

We also had the good fortune of being part of an NRCan ITAP project, which brought together TRIUMF as well as—

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Sorry to cut you off, Ms. Hayashi, but Ms. Diab's time is up.

We now go to Mr. Cannings for six minutes.

[*English*]

**Mr. Richard Cannings:** Thank you.

Thanks to both the witnesses for being here today.

I'd like to start with Dr. Singh.

You mentioned, I think, 500 varieties that your group has had patents or some IP protection on over the last years. I come from the Okanagan Valley, where we have the Agriculture and Agri-Food Canada research station. I'm very familiar with its development of tree fruit varieties. For instance, whenever I go travelling in the world and I see cherries for sale, I always ask what kinds of cherries they are. They're almost always cherries developed not only in Canada but in that research station in Summerland.

I want to get a sense of the history of protecting IP for these varieties. One of the most common cherry varieties is Lapins. It has no patent protection; it's used freely around the world.

I know, for the last 20 years or so I think, the Canadian government has been patenting those varieties. Perhaps you can talk about the history of protecting IP on the production of new varieties of plants and anything else for our agricultural sector.

**Dr. Baljit Singh:** As is the case with intellectual property protection, it has evolved over the last many decades to the point where the germplasm of the plants and animals is considered a national treasure and a resource. Countries are becoming quite protective of the germplasm.

In Saskatchewan, at the University of Saskatchewan, most of the varieties we own were released directly in partnership with producer groups for them to cultivate across the country. There was no record of intellectual property protection on them.

Over the years, the crop development centre, in partnership with the producer groups, for example, whether canola, lentils or wheat... Now we work in partnership with them to protect the seed lines, the variety lines, which are housed at the crop development centre in partnership with the producers, and we release to them directly. The control of the release of those varieties is still in partnership with the CDC and the producer groups.

The intellectual property piece is still done, because producer groups are the ones taking the varieties from us, particular producer groups. They're releasing it to them.

The exact number of the varieties that we might put an intellectual property or patent on is something I can't recall right now, but I will be happy to submit a one-page brief to this committee in a matter of days, within the week. I will be happy to do that.

• (1230)

**Mr. Richard Cannings:** Do you know if there are any differences between putting IP protection on or patenting varieties of living things versus the other inventions and innovations we've been talking about here over the last few weeks? Are there certain things we should be aware of, the timing of this, how it's done or who does it, so that we can get a sense of how we can best protect these Canadian innovations?

**Dr. Baljit Singh:** One difference I can speak to is the way we produce our crops compared with creating a product in a factory. For the seed lines or the varieties, the cultivars that we have are eventually turned into a seed. The seed is released through a regulatory mechanism after it has been approved by the Canadian Food

Inspection Agency, for example, or Agriculture and Agri-Food Canada. Then it is released into the market.

The sale overseas and in other countries of that seed we might produce, again, if possible, is transferred over to the seed production companies that sell it globally under licensing from the inventors.

Again, I don't have the full details on it, but I will be very happy to submit a brief to the committee.

**Mr. Richard Cannings:** Thank you.

I'll turn now to Dr. Hayashi.

I'm really looking forward to a visit to TRIUMF. Hopefully we'll be allowed to travel and see your facility again. It's been many years since I've been there.

We just heard from Dr. Murphy of UBC, vice-president for research and innovation. How closely do you work with UBC as a whole in your work, especially with regard to IP development?

**Ms. Kathryn Hayashi:** Of course, we work very closely with our member universities. As we're on the UBC campus, we interact with UBC significantly.

One of the great resources that we have been interacting with is their Creative Destruction Lab program, which I think was mentioned in the earlier session. It brings together a remarkable community of innovators, investors, researchers and trainees all trying to find commercialization paths for innovative new technologies. We've found some excellent connections and investors for our spinoff companies through the Creative Destruction Lab program at UBC.

Of course, whenever we have a project that has IP potential, one of the things we always do is create a project agreement wherein it's very clear how the IP is handled, who will be taking the lead on commercialization of that IP, how the funding will work or whether there are project milestones, clearly laying out project budgets, funding sources, etc.

I think we have really developed a good working relationship with UBC and our other partner universities in technology innovation.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** You have 10 seconds left, Mr. Cannings.

[English]

**Mr. Richard Cannings:** Okay. Thank you.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you.

We'll begin the second round now. Everyone will have five-minute turns.

Go ahead, Mr. Lobb.

[English]

**Mr. Ben Lobb (Huron—Bruce, CPC):** Thanks very much, Mr. Chair.

My first question is for Ms. Hayashi. It's in regard to the isotopes.

I'm pretty sure I saw a video of you at a dinner one time. It was in regard to your work with Bruce Power. I was just wondering if it is correct that TRIUMF has a working relationship with Bruce Power and the medical isotopes they produce in their reactors.

**Ms. Kathryn Hayashi:** We do in a way. We are all part of the group that is working on the Canadian medical isotope ecosystem proposal that is part of the strategic innovation fund stream five, which is for building new national ecosystems. That is what we have been hard at work doing for the past few years.

Bruce Power is one of the main partners in that effort. They have a project that's really unique. It takes the reactors they use to generate power and uses them to co-produce medical isotopes. Their part of the project is really innovative. They also have a really important reconciliation component that involves the Saugeen Ojibway nation. We're very excited about medical isotopes playing a role in that relationship.

We did do.... Actually, it wasn't us. A group of independent filmmakers made a 10-minute film talking about actinium-225, which they call the rarest drug in the world. That has gone viral a little bit, so people tell me all the time that they saw me in a video.

It is true. The promise of medical isotopes and what they could mean for Canada, both for health and for economic benefit, is really important. We're hoping that our strategic innovation fund proposal will be finalized in the coming weeks.

• (1235)

**Mr. Ben Lobb:** Yes, it really is impactful. We had a Movember event last year, and there was an individual from Australia who was livestreamed from there. He was talking about a Canadian isotope that would be used for his prostate cancer treatment. What's happening really has stretched around the world.

There's one other question I wanted to ask you. I'm sure this has come up in conversations through the years. Does Canada need to look at the way we do our accredited investor? Do we need to look at different ways, so people who maybe don't have the means of income or total investment dollars can still participate in some of the venture capital project early-stage funding rounds, which aren't available to them because they aren't accredited investors?

**Ms. Kathryn Hayashi:** That's a really good question.

Part of the rationale behind accredited investors is that they're investors who have a lot of investment experience or a lot of capital, so it's not jeopardizing their retirement savings to participate in an investment.

I think we do have to continue to find that balance of coming out with the right end points. Having a fund that would perhaps have professional managers who understood the space but could deploy other types of capital into the system is a really exciting idea. We're starting to see a little bit of it, with more specialized funds being developed.

There's certainly much more of that in the United States, but exploring how we could bring that to Canada in a targeted or focused way is a really exciting idea.

**Mr. Ben Lobb:** Dr. Singh, with you out in Saskatchewan, what are some areas that are, I guess you could say, chronically underfunded? What are great ideas at the university, specifically in agriculture, that just always seem to come up short in funding? Are there any out there you can identify?

**Dr. Baljit Singh:** I couldn't put my finger on any specific piece, but overall there is a feeling that in Canada we have underfunding of our research system and of the connections between basic science and the applications for commercialization.

For example, to add to what has been said about TRIUMF, the University of Saskatchewan has a cyclotron. We produce isotopes that contribute to Canada's capacity as one of the major countries producing radioisotopes. We also have Canada's only synchrotron, Canadian Light Source, which is situated at the University of Saskatchewan.

When you look at the discovery science and the papers that are coming out, I think the connecting piece is not as robustly funded and it's not as robustly connected. There might be a suite of programs at the provincial level or at the federal level. Those are not deeply connected with each other.

The last point I would make is that I think there's a need for the universities to have a fund directly at their disposal that they can provide to the inventors, at a very early stage, when they find something truly interesting. The reason I'm asking for that is that, when an inventor discovers something, it takes a long period of time to get the funding to move it to a TRL 1, 2 or 3. If the universities had a purse of money, they could quickly invest in that product while they're looking for additional funding or creating connections with the private sector.

Those are a couple of ideas I'd like to submit.

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Lobb. Your time is up.

Next we have Mr. Lauzon for five minutes.

• (1240)

**Mr. Stéphane Lauzon (Argenteuil—La Petite-Nation, Lib.):** Thank you, Mr. Chair. I want to say what a great job you're doing in the chair's stead.

I'm going to start with Mr. Singh.

You talked about the successful commercialization of IP. I want to come at it from the standpoint of small and medium-sized businesses. They are a big concern of mine because you find a lot of them in rural and remote areas. I'm somewhat of a spokesperson for them.

I'd like to know how small and medium-sized businesses could work more directly with universities.

Remote areas don't have universities or CEGEPs, so businesses have to turn to equipment suppliers, which do the research for them.

There are small businesses with the IP rights for incredible innovations, businesses that have grown from two to 100 employees, businesses that have invented a number of products and techniques you may not even know about.

What can be done to improve the relationship between universities and those businesses, which don't have a place in the ecosystem?

[English]

**Dr. Baljit Singh:** Thank you very much. I think that question is of deep importance to our country. As large as our country is, we have only 37 million people spread across a large land mass.

For the polytechnics, for example, there is a very critical role when it comes to working with the small and medium-scale businesses, whether they are in the city or at a remote location.

When I was making my submission about the disconnect or better ways to connect our system, again I was thinking about the province of Saskatchewan, which has very few people spread out in large municipalities. How do they reach out to the inventors in the communities, who may not have direct access to Saskatchewan Polytechnic or the University of Saskatchewan, for example?

I think that again leads us to the idea of the role of the provincial and federal entities to create that awareness and create the forum where the businesses are located, so those in remote communities can come to the universities and polytechnics to refine the product or add the last technical piece to the product. They could really work with the universities' incubators to take their product to the market.

The University of Saskatchewan, to fulfill that need, just created an incubator house, which is very busy. For the last 12 months we've had dozens of teams that have been learning from the incubator how to pitch their product, how to create the product and how to move it to the market.

I think it's an ongoing effort, but we will win this game if we can create that true connectivity among the federal, provincial and city levels of government and working with the universities and the polytechnics in this country, because isolation does not help us.

Again, I look forward to the guidance from this committee and the government as to how we can support such a mechanism to connect with the sectors. I think I was giving an example of the farm train in the twenties from the University of Saskatchewan. Maybe we need to reinvent something like that, through the modern ways of communication, like video conferences, for such entities.

[Translation]

**Mr. Stéphane Lauzon:** You established living labs, in a way, and you received federal support through that type of programming.

In the report you forwarded to us yesterday, you make recommendations and you talk about the fact that today's critical challenges transcend national borders. You recommend a mechanism built on culture change. I really find that fascinating.

What type of culture change should be fostered to support IP commercialization?

You have 50 seconds to answer.

[English]

**Dr. Baljit Singh:** Thank you very much.

One of the changes in culture is the way we view intellectual property and the way we can make investments. The recent investments in biomanufacturing hubs in our country is really to offset the challenges we felt during the pandemic. We had no biomanufacturing capacity in our country. That's a national sovereignty issue.

I think that by working together with the universities and the private sector and bringing companies like Moderna or Sanofi into our country, we can really have a mechanism to take the new vaccines, produce them in Canada and sell them around the globe, creating jobs and prosperity for our own people and protecting the health of animals and people in this country.

The Vaccine and Infectious Disease Organization at the University of Saskatchewan has produced and marketed six or seven vaccines that are the first of their kind in the world. That is emerging as Canada's pandemic centre. We are so thrilled to be partnering with four of the biomanufacturing hubs that were announced in our country.

Again, as I keep requesting of everyone, collaboration is the key for us if we're going to deliver on the promise that Canadians want from us.

• (1245)

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Lauzon.

We are continuing with the rounds.

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

**Mr. Richard Cannings:** Thank you.

[English]

I'm going to turn to Ms. Hayashi again.

You brought up something during your introductory statement about the importance of the basic research. TRIUMF is thought of as very basic research in looking at the basic particles that make up the universe, but you connected it with some very real developments in innovation. I'm just wondering if you could expand on that.

Maybe I misunderstood you, but I thought you somehow connected dark matter research with COVID ventilators. I'm not sure if I got that right. Maybe you could expand on that in particular, because I'm very curious about it, and also on the broader picture of how important it is to support and fund the basic research to develop the IP that we're talking about here today.

**Ms. Kathryn Hayashi:** It really is remarkable how, for those basic research ideas that seem very esoteric, like “We're looking for neutrinos in a giant water tank in Japan”, we can take that detector technology that we use to keep the water clean in those giant tanks and turn our attention to, “Could we make a clean water monitoring system that would ensure remote communities and first nation communities have clean water?” That's a new idea that's come from a very basic research project.

The COVID ventilators came from a lot of the equipment that has to be designed and built to do research into dark matter, which involves creating vacuums, valves and all these sorts of technologies. When the Italians literally were dying because they didn't have enough ventilators, they asked us for help and to work with them on creating a COVID-design ventilator. All of our experts in gas movement and valves got together. They worked with the Italians and the Americans and very quickly designed and built one, and then found a manufacturing partner and also a funding partner in the Government of Canada. I think we started in March 2020 and by the fall of 2020 had delivered hundreds of ventilators to the government. That was really when the lightbulb came on as to how we can take these very brilliant people who have these fundamental research technologies and we can deploy them in new ways.

An example is neutron detection. Apparently, neutron detection is something that is very important as a proof of concept for fusion energy. We have a collaboration with a fusion energy company to help them determine whether their fusion energy technology is actually really working. We also do proton and neutron radiation testing so that companies like Cisco can ensure their components will withstand radiation in the upper atmosphere or in space.

There are all of these things that we can use these fundamental technologies for, and I think the really exciting part is that, when we give our researchers funding and a bit of bandwidth to focus on more applied technologies, really exciting ideas can come. That's something we're going to be focusing on in the future: How do we get funding to allow these brilliant researchers some time, focused bandwidth and some personnel to turn their minds to more applied problems?

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Mr. Cannings.

We now go to Mr. Mazier for five minutes.

[English]

**Mr. Dan Mazier:** Thank you, Chair.

Dr. Singh, can you please table with the committee how much money the university has received from the federal government for research and how much the university has made for the licensing of intellectual property over the last five years?

**Dr. Baljit Singh:** I will be happy to do that. We will submit it to the committee today.

**Mr. Dan Mazier:** Ms. Hayashi, could you do the same?

**Ms. Kathryn Hayashi:** Yes.

**Mr. Dan Mazier:** Thank you.

For the both of you, can you table with this committee what percentage of your IP has been transferred to Canadian companies and non-Canadian companies over the last five years?

Dr. Singh, being from the farm all my life, I'm very interested in agriculture development, especially when it comes to seed production. You talked about “never too early” as far as getting involved in IP protection. If I'm hearing you right in your testimony and your comments, we need to have a different approach when it comes to IP protection, or at least in getting the value of IP here in Canada. I'm wondering if you can expand on that a little bit more.

Right now we have a system where we're still very focused on the jobs parts of it or actually putting people in big plants and stuff like that, but for the intangible kind of assets that are out there right now, which are proving to be of greater value, such as intellectual property, I think Canada is really falling short.

I don't know if you could expand on that or if you could comment on that. Maybe we need to have a different look at how we protect intellectual property in Canada.

• (1250)

**Dr. Baljit Singh:** Thank you very much.

May I request that you speak to one or two intangibles that you think we need to look at?

**Mr. Dan Mazier:** What are the intangibles?

**Dr. Baljit Singh:** Yes, you were mentioning that there are some intangibles that we need to keep in mind when we look at intellectual property.

**Mr. Dan Mazier:** It's everything from the information...even what we learn here in Canada, and then you give that information back to, say, the seed developer, in the agriculture point of view.

**Dr. Baljit Singh:** Thank you very much.

I think the intellectual property piece is always under flux with the new legislation and the legalities around it. On the same point, there's our ability to identify a piece of knowledge that could have a material effect on the prosperity of Canadians, whether it's through job creation, protecting the health of the animals and the humans in this country, or by creating royalties from the products that might be produced in some other jurisdiction and brought back to us. Sometimes I believe that an intellectual property piece could also advance Canada's diplomacy around the globe, in the countries where there a food security challenge or a water security challenge.

May I give you an example?

The discovery at the University of Saskatchewan of the virus I was referring to that affects pigs is called circovirus. A few years later we figured out that this virus is actually causing a disease in the pigs. Once we developed the technology to produce a vaccine, it was purchased by a company that is based in France. Still, through the production of the vaccine, not only did we protect the health of the pigs in this country, which is a multi-billion dollar export, but we also were able to generate about \$100 million in royalties for the inventors and for the university, to further flow back into research ecosystem.

I really agree with you—

**Mr. Dan Mazier:** Would you use royalties in the same way with intellectual property then? Is that how you're viewing that when you talk about royalties?

**Dr. Baljit Singh:** Yes, I'm talking about royalties as a benefit of the intellectual property. That's one of the benefits when we create a protection on a piece of knowledge.

Sometimes when we are working with producers to solve a problem on the farm, we may just generate the knowledge, give it openly and not create a patent on it, so that it's available to the Canadian farmers without any worry about the use of that piece of knowledge.

**Mr. Dan Mazier:** I guess I'm wondering.... There's good support for universities as far as innovation and invention, but not much on economic development. How do we hang on to that intellectual property?

Ms. Hayashi, I don't know if you have anything to add to that.

**Ms. Kathryn Hayashi:** I think there's almost a feeling that, once you patent something, it's ready to go. There's so much more to making something commercially successful than simply filing a patent. I think that's exactly what you're talking about.

We really need to find those resources to put people on projects to accelerate them. Most researchers don't have the skills or expertise to immediately start a successful company. How do we connect them with the right people to add to the team to advance that technology?

That's the space that TRIUMF Innovations is in. It's providing business development support and providing the people who are going to figure out what companies are in this space, call them or receive calls from companies that are interested in working with trials, and then work to translate that.

I think this is what Dr. Singh was talking about with culture change. The academic culture and what academic researchers focus on are quite different.

• (1255)

[Translation]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Sorry to interrupt, Ms. Hayashi, but Mr. Mazier is out of time.

Go ahead, Ms. Bradford. You have five minutes.

**Ms. Valerie Bradford:** Thank you, Mr. Chair.

[English]

Thank you to our witnesses. Please excuse my laryngitis voice today. I'm sorry. I know it's very annoying.

Ms. Hayashi, you made reference to the Creative Destruction Lab. It seems a bit of an oxymoron. I haven't had a chance to see this, so could you just elaborate on what goes on there and what kinds of things you're creatively destructing?

**Ms. Kathryn Hayashi:** It's a really remarkable program that started off in Vancouver and then sort of went viral. Now there's a Creative Destruction Lab Rockies, there's one in the Maritimes and there are subsections for health sciences, space and quantum. The idea obviously has a lot of interesting momentum behind it, but basically it gathers together mentor investors. This is a really key thing.

When we sent our start-up company into the Creative Destruction Lab, they said they didn't really want to go into another accelerator where somebody would tell them how to write their business plan one more time. I said, no, the difference is that the people involved in this are investors, and after every round, the investors at the table are asked if any of them is still interested in working with this company or how many people are still interested in potentially investing in this company. If nobody puts up their hand, the company is exited. It really forces people to look at really tangible things, not theoretical things. It's not "Does somebody want to invest in this company?" It's "Do I want to invest in the company? Does my colleague want to invest in the company?"

We've seen a lot of investment come and a lot of the companies really being incented to make the milestone or do the work to get to the next meeting, because they know that investment dollars are literally at the table when they're speaking to the investors. I think it's a really interesting model, and I would encourage you to take a look. I'm sure we could get you invited to the UBC one if you would like, but there are other ones across the country.

It's a really interesting and successful piece. We've made excellent contacts that have helped us with not just one technology but now looking at new technologies, and the contacts we've made there are helping us with things like "You should talk to so-and-so" or, if this is a mining technology, "Let me introduce you to somebody." It's really wonderful networking.

**Ms. Valerie Bradford:** It's more like a pitch program. We have some hubs and things like that here in Ontario. It sounds as though it's kind of like pitching and trying to connect with investors and partners.

**Ms. Kathryn Hayashi:** It is a pitch program. I think the subtle difference is that the investors are there to invest in those technologies. The idea is that, by the end of the program, some of them will have invested in the technologies that have been successfully advanced through the program.

**Ms. Valerie Bradford:** Okay. That's great.

The next question is for Dr. Singh.

National security and patents transferred to foreign countries have been raised previously. Under the Investment Canada Act, investments from foreign investors are subject to ICA review, including those in sensitive sectors, which receive enhanced scrutiny. Our government has introduced Bill C-34, which updates the national security review process of the ICA by including a new requirement for pre-implementation filing that would seek to prevent the transfer of IP and other sensitive information before a review is completed. This would prevent the company from closing a transaction before the review is completed and, therefore, stop any transfer of sensitive IP and other sensitive information.

Can you comment on the importance of this sort of review?

**Dr. Baljit Singh:** We continue to work with the federal government on any directions on the security of our research, the knowledge we create and the knowledge we organize with any particular entity. Guidance and advice from the federal government are always sought. I would say this is a very new landscape for the universities. We are learning how to do better and also how to comply with all of the new requirements that are coming through. There are quite a few conversations on that.

What we need to figure out, within that space, is how not to lose time, ability and speed when we have something very sensitive that we need to mobilize somewhere. I think we are in the early stage of this particular new environment of national security and the security of our research enterprise. We are looking after three or four medical research facilities at the University of Saskatchewan—from vaccines to a synchrotron to a nuclear cyclotron, and we continue to work together with the federal government. Again I will submit that speed is the key. We need to find a way not to slow things down any further from where we are.

• (1300)

**Ms. Valerie Bradford:** Thank you so much for that feedback.

Those are all of the questions—and voice—that I have.

Thank you.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Thank you, Ms. Bradford.

That concludes the question and answer portion.

I want to thank the witnesses who joined us for the second half of today's meeting.

Ms. Hayashi and Professor Singh, thank you for being here and sharing your insights. You can leave the meeting now.

[*English*]

**Dr. Baljit Singh:** Thank you so very much for this privilege.

**Ms. Kathryn Hayashi:** Thank you very much.

[*Translation*]

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Honourable members, we have to deal with something before we end today.

Last week, the clerk sent out a draft budget for our study on support for the commercialization of IP.

Does anyone have any questions about it?

Can I have a mover so we can adopt the budget?

**Mr. Stéphane Lauzon:** I move that the budget be adopted as is.

(Motion agreed to [*See Minutes of Proceedings*])

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** Before I let you go, honourable members, I want to tell you that we received Mr. Champagne's written response to a question he was asked when he appeared before the committee on February 2. It was sent out to the committee members during today's meeting.

Do I have the committee's consent to post the minister's response on the committee's website?

**Mr. Stéphane Lauzon:** I didn't see the minister's response.

I think we should look at it first and discuss it at the next meeting.

**The Vice-Chair (Mr. Maxime Blanchette-Joncas):** That's fine. The committee's desire is my command. We can certainly discuss it next time.

We meet next on Thursday, March 23. The notice of meeting will be published very soon.

The meeting is adjourned.







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