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Chair

Mrs. Joy Smith

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● (1530)

[*English*]

The Chair (Mrs. Joy Smith (Kildonan—St. Paul, CPC)): Good afternoon, ladies and gentlemen. I'm Joy Smith, the chair of this committee. I want to welcome everybody here. We have a fantastic committee. There's no bias on my part.

I have to tell you that we've had the most extraordinary and fulfilling study on technological innovation and that we have heard so many new things at this committee this year.

We want to welcome you. I'm not going to be calling on you in the order that's on the order paper. I'll be doing it in a different way. You have a 10-minute presentation, and then we'll go to questions and answers after we've heard from all the organizations.

I'm going to begin with the Association of Canadian Academic Healthcare Organizations. I understand that Dr. Paige and Ms. Power are going to share their time. Who wants to begin?

Ms. Power, would you begin, please?

Ms. Chris Power (Chair, President and Chief Executive Director of Capital Health, Halifax, Association of Canadian Academic Healthcare Organizations): Good afternoon, and thank you for inviting ACAHO to contribute to this important discussion.

As noted, my name is Chris Power. I'm the president and CEO of Capital District Health Authority in Halifax and chair of the ACAHO board. I began my health care journey as a nurse.

I'm delighted to share the time allotted here today with my colleague, Dr. Christopher Paige, vice-president of health research at the University Health Network in Toronto.

ACAHO is the national voice of Canada's academic health care organizations; that is, the country's research hospitals, academic provincial and regional health authorities, and their research institutes. You may know our organizations for the patient care services they provide to you, your families, friends, neighbours, and communities. However, these organizations are also national resources and economic engines. They are responsible for hundreds of world firsts, innovative technologies and spin-off companies, lists of which we have provided to you in the package containing our brief.

For example, in my own region, one of our orthopedic surgeons, Dr. Michael Dunbar, provided the scientific basis for Halifax Biomedical, which makes tiny beads that allow for precise tracking of any relative movement in bones during surgery long before any other approach can.

One of our anesthesiologists, Dr. Michael Schmidt, helped establish DMF Medical Incorporated, a spin-off company that is now investigating several innovative approaches to protect against cognitive declines after surgery in the elderly.

Dr. Orlando Hung and industrial collaborators are developing inexpensive medical devices that allow for the safer placement of breathing tubes and that provide feedback on the flow of anesthesia medication in the veins.

With these and other examples in mind, we will propose to you that while our country's academic health care organizations have impressive track records, opportunities within our organizations remain unexploited. In our view, what we need in Canada is a national framework or mechanism that allows for the systematic identification of innovations from a publicly funded health care sector that has commercialization potentials; incents commercialization through adequate infrastructure support; and enables the strategic procurement of our own innovations to help generate revenues, bend the cost curve, and spread patient care solutions more broadly.

With this, I would like to invite Dr. Paige, vice-president of research at the University Health Network, to continue our remarks.

● (1535)

Dr. Chris Paige (Vice-President, Research, University Health Network, Association of Canadian Academic Healthcare Organizations): Thank you, Chris.

Hello to everyone.

For most of the 35-plus years l have conducted medical research, l've done it in academic health care organizations, where almost 80% of all medical research takes place in this country. Why? This is the research real estate, where the patients, health care professionals, and scientists work together to discover new ways to recognize, prevent, and treat disease. They attract top medical talent from around the world to Canada, and they partner with industry to increase treatment options and test new technologies. Increasingly, they are the basis for commercial activities that, in our view, will turn Canadian investment in health research into fuel for the knowledge-based economy and better health.

My organization, the University Health Network, is home to individuals who have produced history-making treatments and technologies that have changed the face of health care here and around the world. To meet our commercialization challenges, we have a dedicated staff of 12 professionals skilled in commercialization. For our size, this is half to one-third the number a similar institution in the United States would have.

We have also launched the Techna Institute to focus specifically on identifying unmet clinical needs and shortening the length of time it takes to develop and bring products to the market that address these needs. Again, this is funded through donations.

However, I think more can be done. Across our country there is reason to question whether the current model of benefits from academic health care organizations is sustainable and whether we are maximizing our potential.

We depend on charitable donations and foundation dollars to fund the infrastructure necessary to identify commercial opportunities. Our existing programs, while helpful, do not provide sufficient prototype development funding. In our brief you will find a full discussion of the barriers we would like to draw to your attention.

The experience of other countries can help us, however. The small business technology transfer program in the United States funds development of discoveries from the hospital/university sector partnered with small companies. The small business innovation research program, also in the U.S., is a similar program, designed to help the companies themselves.

Another approach may be the credentialling of research hospitals in a manner that ties responsibility for medical innovation to additional infrastructure support funding. This model is seen in the "comprehensive cancer center" designation in the United States. The additional funding, competitively won, would allow the development, application, and commercialization of technology advances.

1 would envision a network of 30 to 40 academic health care organizations across Canada developing and sharing innovations in health care delivery, and each of these acting as a local hub to disseminate evidence-based advances to every hospital in the country. This can be tied to an innovation fund, such as the national health innovation fund, that could also assist in leveraging specific funding.

If most provincial spending on health care is restricted to current practice, and federal funding is not tied to the expectation of innovation or improvement, we have a problem. No successful business, particularly not one with such a heavy reliance on technology, will excel without a rational plan to invest in change. That is what we need. We have the opportunity to do this in Canada. We should not leave it to chance.

Thank you.

● (1540)

The Chair: Thank you very much. That was extremely interesting.

Now we will go to Dr. Yousef Haj-Ahmad, president of Norgen Biotek Corporation.

Could we have your presentation, please, Doctor?

Dr. Yousef Haj-Ahmad (President and Chief Executive Officer, Norgen Biotek Corporation): Thank you very much.

Ladies and gentlemen, thank you very much for the opportunity. It's an honour to be here.

I would like to talk to you mainly about the commercialization of technology. Since we're living in an age of knowledge-based industry, I'll share with you my experience in Norgen and various other companies. I'll begin with a timeline. I've been in life technology and biotechnology from the early 1980s to the present. I earned my Ph.D. at McMaster University in 1986. I was a post-doctoral fellow in Labatt's research department, working in yeast. In 1988, I co-founded Procyon Biopharma with colleagues. Later on, I became a professor at Brock University, and 10 years later, I started Norgen Biotek.

Based on all these years, I came to the conclusion that we have lots of science to start a biotech in Canada. We're not short of good science and good scientists across Canada, but we're lacking in commercialization and successful commercialization. We have too many start-ups, but very few make it all the way.

I concluded that you need three key ingredients to form a biotechnology company, and I would like to talk about biotech; that's my area. You need good science, and there's plenty of good science and good scientists across Canada. You need good, experienced executive teams. Very often, those executive teams are very impressive. They call them high flyers. They come from big pharma. They recruit them to the biotech area, to start-ups. And of course you need the money from venture capital, and we do have plenty of venture capital—perhaps not as freely as we think; nonetheless, it's there.

This is the traditional formula. Over the last 20 or 30 years, we've encountered problems with this traditional formula, and you have seen many biotech companies go public. After a short while, they simply were on life support, and finally, they went bankrupt. What's the problem with science? Professors very often lose interest because they become marginalized as soon as they have venture capital coming in. The golden rule is, first, he who has the money rules. Second, the executives who run the company listen less and less to the scientists. The scientists lose interest in driving the science forward or taking it all the way to the end. The executives' primary focus is merely on raising money, polishing the story, and making more and more presentations to raise more and more money. The venture capitalist loses interest. After a short while, there is a lack of progress and they start to find an exit strategy. Very often, the exit strategy is to take the company public sooner rather than later. Most Canadian biotech companies go public much sooner than their U.S. counterparts. They initiate mergers and acquisitions with other companies. It may not be of great benefit to the technology, but it's an exit strategy for the venture capitalist.

Alternative funding strategies: obviously you can see the traditional one on the left side of this slide. I'm not going to repeat it. The one I followed for Norgen was based on experience and the dos and don'ts from my previous ventures with various other biotechs. Earlier, I relied primarily on parental financing, small business loans, and products and services. This isn't new. Biotech companies, like any other company, knowledge-based or non-knowledge-based, must have some sort of revenue, and this revenue must be deliberately designed to grow over time. You don't need to out-license all the technology. You could license part of your technology, but not everything. Part of it is to finance your growth. Of course, there are research grants. Our National Research Council has a pretty good funding program.

● (1545)

Here is an example of a possible problem: the growth rate versus the burn rate. Most start-up knowledge-based companies have a burn rate, which they characterize by how fast they are burning their cash.

Here I just used hypothetical numbers. As a start-up, you may raise $1 million in the first round and burn it in a few months. When you go back and start to sharpen your skills, you raise $5 million, and you burn that pretty quickly. Then you go for $15 million, and you burn that pretty quickly. But if you're producing and selling some sort of product from your knowledge—you have plenty of scientists—this growth rate will be sustainable, and one day you will achieve sustainability.

These are hypothetical numbers I have in here, but they are not too far from reality.

The Chair: You only have four minutes left, Doctor.

Dr. Yousef Haj-Ahmad: Perfect.

With this in mind, I set up the Norgen biotechnology company. We started in 1998. The company started in an old library and moved into a much larger state-of-the-art building. We're pursuing the commercialization of technology and the selling of products at the same time.

What is the main focus of Norgen Biotek? The umbilical cord of the company is products, sales, and services. That is growing very nicely, and it provides sustainability.

All four of the areas listed here—diagnostics on demand in resource-limited areas, point-of-care diagnostics, home testing, and prenatal diagnosis—are very important, and are the future for this century. They can be home runs for the company if any one of them succeed.

The company is fully regulated, ISO certified, Health Canada approved, with CE-marked products. In terms of patented technology, we have over 20 patents already issued and 15 pending. We isolate DNA on protein from all kinds of specimens. The products are innovative and excellent in quality.

Who are our customers? With computer technology being the equalizer right now, we sell products all over the world to companies, to universities, and to institutions. We have distribution channels all over the world.

Last century, it was the century of physics and chemistry. This century will be dominated, as you already know, by the digital revolution and by biotechnology.

What is the world's most dominant language at the present time? You can't speak it. You can't read it. You need tools to read it. It's the strings of ones and zeros: that's the digital revolution. That's the age we're living in. It will dominate this century.

What is the other language? It's the code of life. It's also written by "A, G, C, T"—four letters—but they must be in base pairs: "AT" and "GC". Again, it's like digital.

Those two are the most dominant forms. Technology, specifically biotechnology, will transform lives, will transform companies, will transform countries, and will transform continents.

I would like to conclude by thanking the NRC for supporting our quest to develop diagnostics on demand in resource-limited areas. In my view, NRC-IRAP is the engine of technological innovation in Canada and should be supported as much as possible.

Thank you very much.

● (1550)

The Chair: Thank you very much, Doctor. That's quite an amazing presentation. Thank you for giving your insightful comments about the future.

We'll now go to BIOTECanada, to Mr. Andrew Casey, please.

[*Translation*]

Mr. Andrew Casey (President and Chief Executive Officer, BIOTECanada): Thank you, Madam Chair.

Thank you for giving me the opportunity today to testify about this matter which is of great importance to the members of BIOTECanada.

[*English*]

Today we are talking about technological innovation, with a particular focus on commercialization and venture capital.

By way of introduction, BIOTECanada is the national trade association representing the biotechnology industry in Canada. Our 250 members are across the country. They represent three distinct spaces within the biotechnology industry. The one we're here to talk to today, of course, is on the health side, but I also represent a number of members who are in the agricultural and industrial spheres. Each one of them sees enormous opportunity out there in the global marketplace. I'm going to dive into a little bit of that here this afternoon.

Looking at the global opportunity, it's an opportunity, but it's also a challenge. When you look at any sort of prognostication about the population and where it's going, we're looking at a population boom over the next 10 to 20 years that's going to take us to somewhere around 8 billion or 9 billion people in the world. We also know that in 1900 you were probably expected to live to around 48 years old, and now you're expected to live to about 80 years old. People's diets are changing. People are getting sicker and living longer. We have a huge health challenge in this world. We also have a challenge in terms of feeding those people, and driving economies that are able to survive in that bio-economy.

The industrial and agricultural side of my membership is playing an instrumental role in changing and transforming other industries.

The health side is an interesting challenge and opportunity, because on the one side, of course, it helps get people healthier, it helps prevent illnesses, and it helps prevents death. But it's also an enormous business opportunity. It's estimated that it's about a $1.6 trillion industry going forward, and growing. There is in there a significant opportunity for the Canadian industry. When I look across my membership and the industry more broadly in Canada, we're very well positioned to take advantage of that opportunity. We have a long history of innovation in this country, and certainly innovation in the biotech industry and sector more broadly, so we have a great opportunity.

If you look at the BIOTECanada membership, it is quite representative of a very diverse industry of innovation across the country. We're found in every region and every province of the country. There are small and larger clusters in each of the provinces that have developed expertise and innovation in research and development. The industry is very well positioned to take advantage of the opportunity. The challenge for us, of course, is that medical development and innovation is extremely expensive. If you take an average drug or medicine, it takes about $1 billion, give or take $200 million or $300 million on either side, to get it from a compound right down to where it's actually in a human body. There are different variations as well. If you go through clinical trials, that can take anywhere from $200 million to $300 million. It's very capital intensive, but it also comes with a lot of risk. You can take about 5,000 or 10,000 compounds, and of those 5,000 to 10,000 compounds only about one will emerge as being used on the human body. You can see along that path that a lot of them don't make it, and yet a lot of money goes into trying to figure out ways to get those into the human body.

As an industry we represent an enormous investment opportunity, but obviously there's a lot of risk that comes with that, and therein lies the challenge. We're a global industry. At the heart of it, we're essentially good ideas. Good ideas are very portable; they can go anywhere. What we need to do in Canada is bring capital to Canada. Capital is a global traveller, it's a world traveller, it likes to go to places where it feels welcome. If you think of it as a regular tourist, it wants to go where it can get free Wi-Fi, maybe breakfast in the morning, and the turndown service at night. You have to put out a welcome mat if you want capital in your country.

When you look at what's going on in the world, other countries see this $1.6 trillion opportunity as well and they're moving very quickly into that space. They're handing out the free Wi-Fi, the turndown service, and the chocolates on the pillow. We have to do likewise; we have to keep pace. What I'm talking about there are hosting conditions. Canada has to be as competitive as other nations in this sphere, in terms of creating hosting conditions so that capital wants to come here.

● (1555)

There are a number of ways that can take shape. Obviously, one of the ways to do that is through an intellectual property regime that is at the very least as competitive as our closest competing nations. We also have to put in place tax incentives and create other investment incentives that will draw capital to this country and investment in the industry.

The government has done a very good job of supporting the industry. We know it invests about $2 billion annually in support of innovation, and the industry certainly greatly appreciates that. We would suggest that we work more closely together, making sure those investments are done as strategically as possible, working closely with industry so that we're in more of a pull mode than a push mode. That's an area on which we could work closely with the government.

The $400 million venture capital fund that was put in place in the 2012 budget is extremely important for the industry. It's important for my small members as well as my larger members. We're working closely with government to find a way to make sure that the $125 million that was set aside for life sciences and clean technology can be accessed by my membership and my industry.

Last but not least, I want to point out that government, while a partner and an investor, is also an important player in the world of paying for the product that does come out of the industry. When looking at that, we have to be careful not to look at drugs as just a bottom-line budget item; we have to look at them more holistically.

This committee is very familiar, of course, with the development of the orphan drug national strategy. We're very grateful for the work this committee has done on that and the leadership it has shown. It's now in the very capable hands of the Department of Health and industry. There is a perfect example of how government can take a look at drug development, getting therapies and medicines to Canadians in a more holistic fashion rather than just a bottom-line budget item. For that, we're very grateful. We're working very closely with the government on this one and looking forward to some very successful outcomes, and certainly access to medicines for Canadians.

I will leave the committee with that.

[*Translation*]

Thank you again for this opportunity today. I am going to answer your questions after the other presentations.

Thank you very much.

[*English*]

The Chair: Thank you, Mr. Casey.

We'll now go to the Toronto Rehabilitation Institute-University Health Network, with Dr. Geoff Fernie.

I understand you have with you another gentleman, Mr. Promise Xu, junior commercialization officer.

I believe, Dr. Fernie, you are making the presentation. Is that correct?

Dr. Geoff Fernie (Institute Director, Research, Toronto Rehabilitation Institute-University Health Network): Thank you, Madam Chair.

Yes, the Toronto Rehabilitation Institute is a member of the University Health Network, so Chris Paige in the corner there is my boss. This is an unfortunate coincidence. I have to watch very carefully what I say.

Voices: Oh, oh!

Dr. Geoff Fernie: The Toronto Rehabilitation Institute is now Canada's largest rehabilitation hospital. It's also grown in less than a decade to be the largest rehabilitation research group in the world. That is due to many of you around the room here supporting the Canada Foundation for Innovation, CIHR, and NSERC over the years, so we're really talking from a position of strength about how to go to more strength.

I have to resist talking to you about the things that we make, the things that we do, but they're things that will all affect you, if not now, then at some point in your lives. They're not the traditional areas of focus that you've heard about in the past. We're developing very practical solutions to common problems—the common problems of how you get your mom up in the morning, get her dressed, and toileted, and bathed, and around, and how you keep an eye on the family when you're at work or when you're out somewhere.

We've successfully launched three start-up companies within the last two years, and we expect to launch another two more start-ups within this next year. So we're speaking from a position of experience, and experience in start-ups primarily, in working with small and medium-sized enterprises.

I think you'll all agree that a major reason why there is no crisis in health care caused by the growing elderly population is actually that lengths of stay in hospital have been reduced through the development of improved medical devices and techniques that permit far less invasive procedures. You can go in and have a heart operation and come out the same day, or at least the next morning. Things are changing. That's what has allowed us to control health care expenditures. Yes, I know they're ramping up, but they haven't gone wild.

What we've really done, as you well know, is we've shifted the burden of health care onto the families. The families are now the largest health care labour force that we have. In Ontario, for example, over one-quarter of families have been providing continuous care for the last two years. Most people would prefer to live in their own homes. The government would prefer that, too, because it saves us taxpayer money. However, familial caregivers are caring for sicker and more disabled people, and they're under growing physical, mental, and financial stress. There are a lot of people under these stresses. There's a huge demand for technology that facilitates greater independence for seniors and helps informal caregivers complete their tasks with greater safety and ease.

One point that I want to make is that it's very important to recognize that not all sectors of the health technology industry are homogenous. You can't treat them all the same, particularly in terms of investment needs for entry. My colleague Andrew has talked about the need for a billion dollars sometimes, or hundreds of millions, to invest in drugs. Actually, new companies in the fields that we work in can often get started with $2 million, with a follow-on of another $3 million or $4 million or $5 million. They're actually below the radar screen of venture capital. Venture capital isn't interested in investment in small companies. Small business opportunities, however, might be more appropriate for Canada since they require much more modest investments, and because they're below the radar screen, they need other mechanisms of financing. We're going to have to be creative.

We also believe in not rushing to license off our technologies to multinationals. It's too easy, and actually the return on the investment isn't that great. You get 5% royalty flow or something. We're really trying to get start-ups going and build wealth first, even if we exit later. Build wealth, build jobs, build a culture of innovation in Canada that we can live on.

● (1600)

I've listed some recommendations and tried to be wise. I've avoided any, except perhaps the last one, that would cost the taxpayer anything.

The Chair: We like you, Dr. Fernie.

Dr. Geoff Fernie: Thank you, Madam.

The first one is that Canadian research institutions should be encouraged to open their doors to involvement with small and medium-sized businesses. Government incentives such as tax holidays for start-up companies could be put in place and effectively implemented. It doesn't cost anything, because if they don't start up you don't have the tax. If an innovation comes out of a university or a research hospital, then give the company a bit of a break. It's not costing anything. You're just foregoing revenue for a while.

On the other side, business should be encouraged to interact with research. The new pilot program of tax credits to small and medium-sized business that came out of Tom Jenkins' report is a good incentive. It should be expanded with increased interaction, not only with universities but also with research hospitals. It is important that everyone in this room understand that research in health care is largely done in research hospitals.

Third, considerable engineering research is conducted within research hospitals and yet the Natural Sciences and Engineering Research Council funds must be administered by universities, and that's a bit of a nuisance. It is time to open access to NSERC funding to hospital-based researchers, in the same way CIHR operates.

Fourth, too often research proposals to NSERC are criticized for having too much health-related content. This may seem parochial to you, but it's a big irritant to researchers who bridge between engineering and medicine. These government agencies must be reminded that interdisciplinary research, crossing the boundaries of engineering and medicine, should be encouraged.

Fifth, and you've heard this before, our researchers should be rewarded for commercialization activities rather than penalized, as at present. Academic careers and grant funding are judged primarily on easily measured scales that score the number of publications and the status of the journals they appear in. How about this? Why don't we think about not just having a program of Canada research chairs, which is terrific, but about launching a program of Canada innovation chairs? So we set the tone. We set something that reminds the academic world that this is a worthy activity to aim for, that it has status.

Six, consideration should be given to increasing the budgets of the granting councils. Of course, you expect me to say that, but what about designating funds particularly for prototype-making and for intellectual property protection? This way, instead of being cut from the budgets, when you apply for the money they're in a special box. If your research is going ahead, you can apply for access to those targeted funds.

Seven, energy should be directed to reforms of government programs that encourage strategic procurement to encourage Canadian innovation. You heard this from Dr. Strangway the other day, and you heard this also from Tom Jenkins. There are opportunities, particularly in Defence and Veterans Affairs. Unfortunately, in health care, each province has its own program for approval of health devices. Maybe the Minister of Health might be encouraged to work through the FPT process to see if we can get some harmonization to improve this and get rid of some of the difficulties with interprovincial boundaries.

Eight, this one that might cost a little bit of money, but a new Canadian program akin to the small business innovation research program and the small business technology transfer program in the U.S. should be established, particularly to support small businesses and start-ups working with Canadian research and innovation centres. There are three fundamental characteristics that will make such a program successful. First is a real effort in keeping paperwork to a minimum. Researchers hate it, and it stifles innovation and loses opportunities. Second is a year-round and fast application and reviewing process that's relevant to commercial opportunities. Third, and most important, is a strong focus on strategically utilizing public procurement power to actively help small businesses find and secure early customers.

Done.

● (1605)

The Chair: Thank you very much, Dr. Fernie. You did very well. Thank you for your very important and very much cutting-edge recommendations.

Now, last but not least, the very important Business Development Bank of Canada, with Paul Kirkconnell, executive vice-president.

Mr. Paul Kirkconnell (Executive Vice-President, Venture Capital, Montreal, Business Development Bank of Canada): Thank you very much, Madam Chair, members of Parliament. Thank you for inviting us to talk about technology innovation. We're happy to do so.

I'll profile the venture capital operations of the BDC and how they support technological innovation in the health care sector.

[*Translation*]

As you know, BDC is a commercial crown corporation, the only bank in Canada that is exclusively dedicated to entrepreneurs. We have 28,000 clients, in virtually every sector of the economy.

[*English*]

A small portion of these 28,000 clients are building innovative companies, developing or disruptively applying leading-edge technology. These high-tech entrepreneurs have a high tolerance for risk and ambiguity. These are the businesses BDC venture capital supports.

The past decade has been very difficult for venture capital. The global financial crisis reduced the amount of available risk capital and exit opportunities, and overall lowered returns for venture capital. For instance, in 2010 the Canadian Venture Capital and Private Equity Association reported that venture capital firms invested $1 billion. In 2011 and 2012 respectively, venture capital investments were up slightly, at $1.5 billion each year. That might sound like a lot of money, but these figures are down from a high of nearly $4 billion in the late 1990s. And it’s not only money. To succeed, entrepreneurs also need expertise, mentoring, and networks. All are in very short supply.

A few years ago we did a root and branch study of the venture capital industry to see how we could help stimulate and strengthen it. Following this review, we began to reorganize ourselves in order to better support the Canadian venture capital ecosystem. Crucially, we’ve emerged as an honest broker, trusted to bring together a variety of potential customers, investors, and strategic partners. The road to a robust venture capital industry requires patience and perseverance. That is why I'm pleased to report that our new strategy appears to be showing results. But given the unpredictable nature of venture capital, the road to recovery will continue to be potentially volatile.

BDC's venture capital role in technology innovation is best understood as helping through targeted investments to bring about an industry-wide turnaround in Canada's high-tech entrepreneurs and their industry. We invest in three ways. First, we invest directly in companies through targeted internal funds. These include internal funds in health care, information technology, and energy-clean tech. Our knowledge of the health care sector is broad and deep. Our focus is to support innovation that improves health care efficiency.

Across the world, aging populations are increasing the demand for health care services, while younger people are dealing with chronic diseases like diabetes and obesity. At the same time, the supply of trained physicians and nurses is falling. Consequently, governments and hospitals are trying to make the most of their resources. They are focusing on efficiency and productivity and seeking innovative ways to improve delivery. Fortunately, we have the tools at our disposal that support a rethink of health care. The ubiquity of wireless, mobile, and cloud computing enable new ways of communication, interaction, and data analysis. Advances in genetics, genomics, and diagnostic technology are creating a deeper understanding of disease causes and enable faster and more accurate diagnoses.

Recall that today's entrepreneurs think globally when they scan for opportunities. Helping meet the global need for better health care services is a powerful incentive and way for Canada's high-tech entrepreneurs to succeed. To support Canadian innovation to expand globally, our health care fund will grow new companies and enter new markets.

● (1610)

The second way we invest is indirectly into funds, which in turn invest into companies. All of these funds have decision-making partners based in Canada. Many are managed by Canadians, and all invest significant capital in Canadian start-ups. We're also working hard to attract top-tier international VC funds to Canada that in turn commit to invest a large portion of their funds into Canadian technology. We hope the emergence of a greater number of large, skilled venture capital funds will help return the industry to profitability, thereby restoring investors' faith in the asset class. The recently announced venture capital action plan is an example of a step in the right direction to accelerate reaching that goal.

Third, our strategic investments and initiatives team helps seed very early stage entrepreneurs by mentoring them and helping them grow global businesses. Across Canada, we've helped establish some of the top private accelerators. These are three- to four-month programs where select start-ups are provided with intense learning opportunities to help them grow to a higher level. We've also recently announced a partnership with the Department of International Trade's Canadian technology accelerator, or CTA, program. With hubs set up in four U.S. cities, CTAs allow start-ups to make connections with potential investors in the U.S. Two of these CTAs are completely dedicated to health care in Philadelphia and San Francisco, while the CTA in Boston incorporates health care companies into its program as well.

In sum, we invest directly in companies, indirectly in funds, and strategically into the networks of mentors and investors that make the whole VC ecosystem work. One thing is certain: turning an innovative idea into a healthy company that brings benefits to Canadians—commercialization—is never straightforward or sure. It takes patience and perseverance, money, skills, and networks.

● (1615)

[*Translation*]

We, BDC, are doing our part to improve Canadian entrepreneurs' chances of successfully commercializing their ideas. It is what we are here for, and we do it in several ways.

Thank you.

[*English*]

The Chair: Thank you so much. That was a great presentation, very insightful.

We'll now go into our Qs and As, our seven-minute rounds.

We'll start with Ms. Davies.

Ms. Libby Davies (Vancouver East, NDP): Thank you very much, Madam Chairperson, and thank you to all of the presenters who are here today. I'm sorry if I won't get to all of you with questions; there are quite a few people here today, so it's going to be difficult.

As the chair said at the beginning of the meeting, it's been a very interesting study and discussion that we've been having about health innovation, trying to really follow the path of what's going on. I think you've helped illuminate some of that today, as to what resources are there and what's lacking in how we get to commercialization.

I'd like to begin with Dr. Paige from ACAHO. In your brief, you say we need a national framework that allows for systematic identification of innovations, etc. I think you're saying that we don't have that, that it's probably quite sort of patchwork. If I understand it, even if we had that, even if we had a system for clearly identifying what is being done, we still don't have the “how” of what kind of adequate infrastructure support is needed.

It's curious to me that a number of you have mentioned the Canadian Foundation for Innovation, NSERC. We've heard from the Business Development Bank. I guess I'm really grappling with what the gap is.

Dr. Paige, you mentioned two models, I guess, that you've looked at in the U.S. A couple of people mentioned those as well—the small business technology transfer program. I'm just curious to know what is it we're not doing or what do we need to do—particularly at the federal end—to fill those gaps?

If you don't even have a way of identifying what innovation is being done, then we're in pretty rough shape, it seems to me. Otherwise it must be almost anecdotal.

Do people get together? Is there a way that this sector interacts, whether you're on the venture capital side or on the academic research side? What kind of interaction is there so that even those of you who are involved—never mind us as public policy makers—actually know what the picture is? What I am left with is that it's very fragmented. Am I right in that, and if so, what do we need to do?

Dr. Chris Paige: Thank you. You have hit a number of really critical points, and points where I think we can collectively do something together.

It is fragmented. A hospital like UHN, which is actually four hospitals, and Dr. Fernie talked about one of them, is a living laboratory where innovations are happening, but we don't have the systematic way of making sure every hospital in Canada knows about them as we produce evidence that this is a better way to do something.

In Ontario they created the ARTIC program, which was $7 million. Each hospital puts in what they think are the three most innovative ways of changing health care delivery—a competitive process. Each year one or two are chosen for funding, to take it from "there's good evidence" to "how to roll it out", in this case across the 25 academic hospitals in Ontario and then beyond. That happens only in the jurisdiction where the funding occurs. That could become a national program. That's where the federal government could have a huge impact by having an innovation fund that would allow discoveries like those to be judged and found worthy to be rolled out.

● (1620)

Ms. Libby Davies: Is there anything now that you could access federally to know what that picture is across the country, in terms of either innovation that's happening or funding? What kind of access do you have at all?

Dr. Chris Paige: In the academic hospital sector, that's what ACAHO does. All of the research hospitals in Canada are part of the ACAHO, and on a regular basis ACAHO collects information on such innovations. It would be one of the best ways of exchanging knowledge in that area. But the incentive to do so still remains quite small. The reason why I think just having the list would be important is people would see what's on that list and they would ask "Why aren't we doing this everywhere?" That would be one of the reasons why funding could be found to do it.

In many cases, those innovations are going to save money for the system, if only they could be shown to be effective, and we'll roll them out. We're pretty close to being able to do this. And on the part of the hospitals there is certainly a huge desire to be able to take what looks like the right thing to do and prove it's the right thing to do, provide the evidence, and then learn how to roll it out.

Ms. Libby Davies: In doing that, though, is there an environment of collaboration, or is it also very competitive as people guard what innovation they...? How do we deal with that?

Dr. Chris Paige: By and large, hospitals are in it for their patients. Innovations are discussed, and we do roll them out. I think the competitiveness is much less at this end of applied research, applied knowledge, than it is in some other places. No one's going to win a Nobel Prize for coming up with a better way to get your mother out of bed, as Dr. Fernie was talking, and yet it might be the most important thing to do. Right?

I'm not worried about the competitiveness. It's the incentive to be able to take those ideas, prove them, and then roll them out, which is why I like this credentialled hospital network concept, because that would get all the hospitals working together—a little bit of infrastructure money for all of them and they would then be responsible for getting those innovations out, or else they will fail in the next round of infrastructure funding.

The Chair: Thank you, Dr. Paige.

We'll now go to Dr. Carrie.

Mr. Colin Carrie (Oshawa, CPC): Thank you very much, Madam Chair. Again, it's another exciting round with witnesses. Each time I hear something, I don't know where to start.

We have heard about the challenges with technological innovation. I think you brought up how Canadians are living longer, and sometimes they are living longer with disabilities. I think around the table here we all have constituents who are struggling to stay in their houses. We have families struggling to help their parents and grandparents live with dignity.

I thought what I would do is start off by asking Geoff and Promise a question. I'm hearing from you that there seems to be a bit of a gap with our system now. We seem to have support for the big players, but you're saying there are a lot of these really small, on-the-ground players that might be helped. Do you have any statistics on return of investment when you invest in the big ones versus a lot of these smaller ones? There's always a limited amount of money, right? Let's say we're doing really well with the big guys, but we're not with the little guys. I'm curious. Do you have ideas or statistics on return on investment? How much money has been saved by some of these innovations? And I was wondering if you could give the committee an example of an innovation you have seen, because I know you are right in there with the engineering and stuff like this that has saved the system a lot of money.

Dr. Geoff Fernie: There are a lot of questions there, and they're all good questions. They really are good.

I'm not going to comment particularly on the return on investment in the larger sector. I do know that venture capital has run away, so I don't think it's been that spectacular. But among the small business sector, I think there are terrific opportunities, and there are companies that are succeeding. There are some that will fail, and that's the normal course of events; that's the culture you create.

As to the benefits to society, I can refer to various inventions that we've been involved in that have a social benefit as well as an economic benefit. For example, if you have a daughter who is thinking of going into health care, I would suggest you recommend she go into mining, because there will be a third less opportunity of her being injured as a result.

My team was largely responsible for introducing overhead powered lifts in hospitals, and we're still introducing a new invention to make this lifting totally effortless this year. It is a massive problem at home as well. Family members have very sore backs and give up, and people go into nursing homes and elsewhere because they can't cope at home.

There is money to be made there. There certainly is money to be saved there in the health care system.

My view is more that we need to be driving this through small business, through helping start-ups, through helping small and medium-sized entrepreneurs get into this game by doing it in a way that they can move quickly. They don't want to report and describe their projects in great detail to a national database generally. They want to move this month and stay ahead of the competition.

I think the SR and ED program is a spectacular success, despite all the criticisms that have been levelled at it. I think government and the bureaucracy have tried hard to make it work. It is still a bit of wordsmithing rather than real technology, which is why I'd like us to think about SBIR, or some other system, where there is review of the technological advantage and there is a lead through to procurement.

Dr. Paige recognized the ARTIC program in Ontario. Mine was the second project to be supported by that. The key was that of the 28 CEOs, 18 hospitals placed orders for our product. That's what allowed the company to launch.

So if we can be clever.... People will always quote GATT and NAFTA and stuff to us. They can't with Defence, by the way, and we do need better boots for the army, for example—really, seriously, we do. There are opportunities where we can cleverly work, government and bureaucracy together, with small business and drive that way into research to realistically get things done.

I hope I answered some of your questions.

● (1625)

Mr. Colin Carrie: Yes, there were a lot in there. I could keep going.

When you mentioned the eighth recommendation, you said:

> Third, and most important, is a strong focus on strategically utilizing public procurement power to actively help small businesses find and secure early customers.

You just mentioned that example, but do you have other examples of how you could see the federal government maybe doing that strategically?

Dr. Geoff Fernie: Yes, I just mentioned one. We mentioned Defence. Our soldiers, I am told, are wearing boots that have come from the sixties—mukluks. They have wet, cold feet, and we're telling them they're going to defend the north. Surely, here in Canada, we should be developing and making boots for our soldiers. There are so many examples of opportunities like this.

Another one is that I think we've developed the best way of ensuring that caregivers wash their hands. In North America it costs 1,000 lives a week. Why not have our hospitals buy that? It seems like a pretty straightforward thing to do.

We have to be more aggressive, I think. Certainly in the States they're aware of international trade agreements, but also companies are being born out of NASA, out of Energy, out of Defense, and now out of Homeland Security. There are a lot of opportunities.

Mr. Colin Carrie: I've heard over and over that in Canada we are the Boy Scouts. We obey the "rules" so strictly sometimes that we don't get those opportunities.

We've heard from different witnesses that sometimes Canadian scientists really do have a lack of access to risk capital to commercialize their products. I know that in 2012 the government put out $400 million for the venture capital action plan.

I wonder, Xu, if you want to comment.

● (1630)

The Chair: You only have about 15 seconds.

Do you have a quick comment?

Mr. Colin Carrie: Okay.

Is that addressing that issue at all? Is it helping?

Dr. Chris Paige: It's helping, but there are still many more projects that need that early stage funding than we have access to.

The Chair: Thank you. That's very stimulating.

Welcome to our committee again, Mr. Pacetti. It's nice to have you here. You're on.

Mr. Massimo Pacetti (Saint-Léonard—Saint-Michel, Lib.): Thank you, Ms. Chair.

Thank you to the witnesses coming forward. I'm not a usual member.

I have a few questions.

The first question would be to Chris and Chris. You talk about the national framework or mechanism, and you state three points. But I'm not sure I'm clear on this. At what point is money needed for innovation and at what point is money needed for infrastructure? Perhaps you can give some more information on that.

Ms. Chris Power: Perhaps I'll start, and my sidekick Chris might jump in.

It's safe to say we do need an infusion of cash or some investment in this particular area—infrastructure, in terms of the people on the ground with the expertise who can help with commercialization, with developing that whole thing. UHN is probably one organization that is fairly far along in its development, but if we look across the country, it's not equal in people's ability to have that kind of infrastructure in place to really move the commercialization to the next phase. Some of us are struggling hard on that front, learning from each other and sharing lots of things, of course.

Mr. Massimo Pacetti: Infrastructure would be a structure in place, not equipment or anything hard, visible, or tangible.

Ms. Chris Power: It would be both, actually, people with that knowledge to make it happen and also the capital equipment to move that forward.

Chris, do you want to jump in?

Dr. Chris Paige: As you probably know, hospitals actually can't spend their health budget on research, so we have to find funds from other sources to build the research laboratories, to equip them, to hire the scientists, engineers, and physicists, and to protect time for clinicians to work in those. That's where a lot of the innovation comes from. You need the infrastructure in order to have the innovation. Then, once you have innovation starting—

Mr. Massimo Pacetti: But when you talk about infrastructure, the hospital facilities are already there. Is the equipment already there as well to conduct the research, or is equipment needed to conduct the research?

Dr. Chris Paige: Well, the hospital facility isn't there either—not to do the research. In some cases, you're right, if it's a clinical trial, the facility is there. But in many cases, you need additional diagnostic services, additional laboratory services, additional pharmacy services. You need all of this additional infrastructure to do the research, and that is not paid for by the health budget. That's a huge area where we rely on the federal government. This is where, as Dr. Fernie said, CFI has been critical, Canada research chairs have been critical, and CIHR. But still, they don't pay for the laboratories themselves; they don't pay for the people who work there.

Mr. Massimo Pacetti: Your recommendation would be that the government fund all of it.

Dr. Chris Paige: My recommendations have it being shared with other partners. But someone has to fund it.

Mr. Massimo Pacetti: Is there not matching federal funds available when the federal government provides money, depending on the program you're going to get?

Dr. Chris Paige: In some cases, like CFI, it's 40-40-20: 40% from the provinces, 40% from the federal government, and 20% from the institution. In other cases, like the research hospital fund, the provinces chose not to match that. In that case, the hospitals had to find the entire 60% match. So matching can be part of the equation, absolutely. But I think the federal government can play the key role of not getting into the health delivery side, which is provincial, but in the health innovation side, which allows us to actually, in the long run, give better health care cheaper, faster, and more effectively.

Mr. Massimo Pacetti: That is fine, but you're still asking for provincial dollars. At what point do you draw the line? At what point do you say that the federal government is going to hand it over to the provincial government? The provincial government is always going to want to have a say or some type of control.

● (1635)

Dr. Chris Paige: My proposal, which I've written about, is that if we had these credentialled hospitals and they had the infrastructure, the provinces would start funding those because they would start saving money as these health innovations change the health budgets. I think that has to be seeded by the federal government. I would say the first five years of a program like that would come from the federal government, proof of principle that it's working, and then the provincial governments would fund after that.

Mr. Massimo Pacetti: And take over the technologies and the innovation. Would you be able to resell that, or is it just the hospitals that would be the customers for that innovation?

Dr. Chris Paige: No. A lot of these things have huge commercial value. If you can de-risk it to the point where the private sector will take it, they have huge commercial value.

Mr. Massimo Pacetti: Where would the private sector be? Would it be outside the country or within the country?

Dr. Chris Paige: I'd love to see the Business Development Bank of Canada step into that. We'd be partnering with biotech companies that exist here already. We do a lot of partnering already. This is not something that happens exclusively inside the hospitals.

Mr. Massimo Pacetti: My next question is to Mr. Kirkconnell.

You gave some stats, but not too many. In terms of dollars, how much does BDC invest in innovation, as you called it?

Mr. Paul Kirkconnell: Innovation is a broad term because it would cut across different parts of our bank. I could speak of venture capital.

Mr. Massimo Pacetti: Okay.

Mr. Paul Kirkconnell: In this past fiscal year, we authorized $145 million in direct and indirect investment.

Mr. Massimo Pacetti: Of the $145 million, how much would be in the health care sector? A percentage.

Mr. Paul Kirkconnell: I don't have it here, but I can get that information.

Mr. Massimo Pacetti: Is that part of the strategic plan, how much you're going to put into innovation itself and then how much is going to go into the health care sector? Is that a year-to-year decision that the bank makes?

Mr. Paul Kirkconnell: It's part of our corporate plan, which is revised every year. But we like to think it's not a radical revision when we do it.

Mr. Massimo Pacetti: What's the total budget for BDC? It's in the billions, right?

Mr. Paul Kirkconnell: The total assets would be in the $17 billion to $18 billion range.

Mr. Massimo Pacetti: So $145 million would be just a fraction, or that's just a yearly—

Mr. Paul Kirkconnell: That's yearly versus total balance sheet. Also, on a bank loan there would be ten-to-one leverage. On a securitization there would be twenty-to-one leverage. On venture capital there's zero leverage.

The Chair: Thank you, sir.

We'll now go to Mr. Wilks.

Mr. David Wilks (Kootenay—Columbia, CPC): Thank you very much, Madam Chair, and thanks to the witnesses for being here today.

I will run the gauntlet across the line. Pardon me if I forget if you're a doctor or Mr. or Mrs.

Mr. Casey, you spoke about host conditions, and with regard to Canada you mentioned that we're more in a pull mode than a push mode. I wonder if you could define that a little more for the committee. How do we get from a pull to a push?

Mr. Andrew Casey: Thank you for knowing I'm a Mr. and not a doctor.

I think that's entirely correct. We've got a system where academic research drives stuff out without a lot of recognition of what the industry would like to see brought forward. If we could work more closely together at an earlier stage, that would be helpful. When you look at some of the programs that the government is supporting, they also are set up so that if you look at the CIHR, NSERC, and NRC, as my colleague noted before, there's a tie there that binds them somewhat in terms of working quite closely with academics. We would advocate that they work a little more closely with the industry. We could then develop ideas and identify the opportunities out there that the industry is seeing. A lot of my members are global in nature and are working quite closely with the smaller companies that Mr. Carrie referred to as well. There is an ecosystem whereby the larger companies are working quite closely with the small companies in this country.

To complete that circle would be to bring it all together at the academic or bench level, if you will, so that we take something out of the university structure and bring it to the commercialization phase as a collective, rather than just pushing it out there, like putting a baby on the doorstep and hoping somebody comes by and picks it up.

● (1640)

Mr. David Wilks: Thank you very much for that.

Mr. Haj-Ahmad, you mentioned out-licensing. You said in some of your products it was a kind of rollout and in others you held back. Could you give the committee some understanding of what that is, in particular maybe one of the licensed programs you used in out-licensing in a test period?

Dr. Yousef Haj-Ahmad: The technology I'm referring to is the isolation and verification of DNA, RNA, micro-RNA, from all types of biological systems. Very early on, I out-licensed to Agilent Technologies one particular application utilizing our technology, and I used the revenue from that out-licensing to fuel the company's growth. I turned around and licensed an additional application into toxin removal for injectables to another company and used that revenue to fuel the company's growth.

Very often, when you have a patent application, you have broad claims, and you cannot exploit all these claims as a small company. In my case, I exploited what we were good at. What we're good at is mainly producing tools for scientists all over the world. My employees are just scientists, and these scientists simply know how to do science in the lab. They put it in a box and we sell it. We commercialize tools. Our biggest purchasers of these tools are from all over, but mainly the U.S.

Mr. David Wilks: Dr. Fernie, I think I remember that—

Dr. Geoff Fernie: Not a physician doctor, a research doctor.

Mr. David Wilks: Near my home town of Fernie, British Columbia.

Dr. Geoff Fernie: Relatives of mine.

Mr. David Wilks: There you go.

I wanted to touch upon a couple things.

The Chair: You only have about 10 seconds.

Mr. David Wilks: I thought I had seven minutes.

The Chair: Sorry, I stand to be corrected. I told you it was a long day.

Mr. David Wilks: I want to touch upon a couple of things you mentioned with regard to the military. I think that's probably something that the whole panel could speak to a bit.

We seem to miss the opportunity sometimes. You used the words “guinea pig”. I can use that to some degree. My son is in the military and has served overseas. He mentions a couple of things all the time —that we're lacking in certain things that we could potentially use if someone would just allow us to use them, and they would love to be that person.

I wonder if anyone on the panel can speak to that, that we're missing the boat potentially in using our military—who so choose, if they're in battle or wherever they are around the world—to test products in conditions that may not be used by most Canadians.

Dr. Geoff Fernie: I had the fun of going on a helicopter mission in the worst snow storm this winter at night. It was designed to try to make me vomit.

The Chair: I guess you were in Winnipeg.

A voice: Did they succeed?

Dr. Geoff Fernie: No, they didn't.

But to experience the problems faced by front-line troops...they often feel ignored, as your son will have recognized. We're not talking about big strategic procurement and we're not talking about the F-35; we're talking about their food rations, their boots, their neck strain in helicopters, and equipment just to look after and protect our soldiers.

There are opportunities there, but the system seems to be fairly slow in processing, and of course we have the Canadian problem of wanting to make sure we are going along with the Americans and all the NATO allies all the time. It's sort of designed for failure.

I'll give you an example. A helicopter needs a cushion to sit on. It's very uncomfortable and you vibrate to death. It's taken a long while to develop the material for the cushion. It was presented at a meeting recently and one of the air crew opposite me said, “Oh, I'd like one of those”, and was told, “Oh, no you can't have that yet. It's got to go out to defence requisition.” I said, “I'll take it down to Spadina Avenue tonight and get it sewn up.” No, it was going to take several years to get the cushions.

There are many practical examples.

● (1645)

The Chair: I'm so sorry, but your time is up. We'll have to now go to our five-minute questions and answers.

We're going to have another doctor, a physician here. Dr. Sellah will begin.

[*Translation*]

Mrs. Djaouida Sellah (Saint-Bruno—Saint-Hubert, NDP): Thank you, Madam Chair.

I thank the witnesses for being here with us.

I don't want to be pessimistic, but since we began this study on technological innovations in the health care field, some months ago, the witnesses who come before us have all said practically the same thing, which is that Canada has good researchers, that is to say good scientists, and they are recognized internationally. We have also learned that Canada is rife with pilot projects, but that those who work on them work in isolation, and a novel idea could only with great difficulty become a flourishing business that could be of benefit to Canadians.

Today, while listening to your comments about commercializing these innovations and all of this technology, it seemed to me that this is yet another challenge.

What should the federal government do to find the missing link between an innovative idea and the applied use of that idea, for the greater benefit of Canadians?

My question is addressed to anyone who feels they can answer.

[*English*]

The Chair: Who would like to take that question?

Dr. Haj-Ahmad.

Dr. Yousef Haj-Ahmad: That's a very good question. In my experience of over 30 years of being a professor and an entrepreneur and of running a biotechnology company, starting up a fuel biotechnology company, I have found that the NRC's IRAP is the most innovative machine to fund research in Canada. It's not just the money; they also have the people in it.

In my view—I'll just be very brief—this definitely can push innovation in Canada much more rapidly than this new program that is being created overnight, into which are parachuted so many people to administer it who don't know what to do, and in which lots of money is wasted.

The Chair: I think Dr. Paige would also like to comment.

Dr. Chris Paige: This is really an excellent question. My response would be that the government should not think there's just one thing that government can do to solve the problem. It's a complex problem at many levels, and the federal government can be effective at several. We've mentioned infrastructure; we've mentioned the innovation fund; what my colleague just talked about with IRAP is also important. I think it's a suite of services that meet the needs at several different levels. There's not going to be just one answer to that question.

The Chair: Do you want to make a comment on it, Mr. Kirkconnell?

Mr. Paul Kirkconnell: I could address it. I agree with the last comment, that it will be many different solutions.

From a venture capital point of view, the venture capital action plan, as we understand it, is being rolled out. Time will tell, but it looks as though it's a step in the right direction. The venture capital strategic investment plan, which is for much earlier-stage projects and which we will be implementing at BDC, also seems to be a step in the right direction.

I would say—and it's a little bit along the lines of what you're talking about—that people tend to talk about venture capital as if it were engineering: if you do this, do that, or pull this lever, it's fixed. It's probably more like biology: you do a little bit of this, a little bit of that, and the whole ecosystem reacts back at you, and then you have to figure out what you're going to do with that reaction. It's going to be more of an evolutionary process in the right direction.

Frankly, at least for venture capital, I'm hopeful—this is not a prediction, and I have no crystal balls—that we might be going in the right direction.

● (1650)

The Chair: Very good. Thank you so much.

Now we will go to Mr. Brown, please.

Mr. Patrick Brown (Barrie, CPC): Thank you for all the commentary so far.

I have a general question to the panel.

I would suggest that our investments in technological innovation are also huge and have a huge potential for job creation. I want to touch upon that angle a little bit. I think of the Juvenile Diabetes Research Foundation, which did the clinical trials on an artificial pancreas in Hamilton and Waterloo. Seeing the hundreds of jobs created in those two cities was quite impressive.

Maybe you could touch a little upon that benefit, when a government invests in technology innovation in health care—whoever wants to go first.

The Chair: Who would like to start that?

Dr. Haj-Ahmad, go ahead.

Dr. Yousef Haj-Ahmad: There is much more to it than putting out a product. There is a tremendous amount of benefit in the training, not only studying things but doing things practically, with hands-on experience. For instance, a small company like Norgen probably has had at least 100 people with practice in doing things hands-on walk through its doors over the years, so definitely there's a tremendous amount of benefit and skill in the labour force.

Dr. Geoff Fernie: I dream that, one day, everyone who gets a master's degree in my institute has enough to start a company. They may not succeed, but we'll support them and have mechanisms to support them that won't include venture capital—it will be too small for that—but it will be a development of high-value jobs.

We teach business students, engineers, and clinicians, all together, to work together to create that kind of culture. There will be a lot of high-value science jobs. Manufacturing is a little tougher because we have to be competitive—and we're still trying to find ways to do that because it involves automation, which involves access to capital—but the designers, the people who run the company, the IP is owned in Canada.... That's the future.

The Chair: I think Ms. Power wanted to also comment, Mr. Brown.

Ms. Chris Power: If you look at the investment in research and innovation in any of our areas across this country, you will see an enormous return on investment through a variety of things. As part of ACAHO, we've done these studies across Canada to look at the impacts of that investment in research and innovation. Whether it's start-up companies, clinical trials, and everything in between, it is enormous and a wonderful return on investment. In all of our centres, thousands and thousands of people are employed in this kind of work.

Mr. Patrick Brown: On that point, I'd suggest that's the type of thing we should be looking at more.

In my riding, there was a company—Southmedic—that does masks. They had a plant in China. They moved back to Canada with an Industry Canada loan—that they're going to pay back—but they created 60 jobs in my riding. Those are, I think, the dream spin-offs that are well-paying jobs, too, high-value science jobs, as Geoff said.

Sorry, Paul, I think you wanted to add something.

Mr. Paul Kirkconnell: I'll add a comment about your unfortunate desire to not have venture capital because you're too small. I'm going to go back to my example of venture capital as a biological entity. You are now seeing the whole definition of what is "at scale" in venture capital. We used to think we understood that. It was going to be the $200 million fund, and if they couldn't put *x* millions to work —

The Chair: Could you make all your comments to the chair, please, not to each other? Thank you.

Mr. Paul Kirkconnell: Not to each other, okay.

It used to be the case that if they couldn't put $10 million or whatever to work, it wouldn't be interesting. We're now seeing the development of what traditionally would have been viewed as very small venture funds of $15 million, $25 million. They're targeting just the types of opportunities my colleague to the right was describing.

The Chair: You have forty seconds.

Mr. Patrick Brown: We had a doctor come in and say that the regulation of medical devices is actually quite good in Canada. Is that your general impression? Have we done a good job of keeping down the red tape?

● (1655)

Dr. Geoff Fernie: Yes.

Mr. Patrick Brown: Seeing that I have essentially no time, I don't think I can expand upon that.

The Chair: Essentially, no.

Now we'll go to five minutes for Dr. Morin.

[*Translation*]

Mr. Dany Morin (Chicoutimi—Le Fjord, NDP): Thank you very much, Madam Chair.

My first question is for Mr. Haj-Ahmad.

I very much liked the part of your presentation where you showed us slides that illustrated the run rate of these young companies that develop a new service or product. This requires a great deal of money, at several stages in the process. To my mind, it is comparable to the situation of entrepreneurs who work in the same type of sector. The reality on the ground is quite comparable for young innovative companies, whether in the health sector or other sectors.

These young enterprises and entrepreneurs have trouble making ends meet on a daily basis. There are a lot of lean years, a lot of financial insecurity, before they can move to the next stage. It was also mentioned a little earlier that seeking funding from numerous organizations demands a lot of paperwork.

Moreover, the Canadian brains who design these innovative products wind up losing their intellectual property. In many cases, they sell it to a larger business. In one way, that is a good thing, since that is how things are done in the free market. However, they do so mostly out of disappointment. They want to finally make some money, but this prevents them from bringing their projects to fruition, from going from being small players to being medium players, and then big ones. We often witness this cannibalistic effect.

Would you have any solution to propose to allow them to distance themselves from that model, something that would help these young businesses to develop naturally?

Dr. Yousef Haj-Ahmad: Thank you for your question. My French

[*English*]

is not very good, but I understand your questions. Let me respond in English.

Definitely the current model of raising money and starting a small biotech company—I'm talking about biotech—is as presented in the slide: you raise the money through round one, round two, round three, and it keeps on going. People keep going back to the well for more and more money, and they keep burning more and more money. The more money they raise, the more money they burn.

Of course, we see that finally they just want to get out of it. The scientists, the people working in the company, lack security; they know that if they don't get their next dollar, they're all going to be out of jobs. So they're all looking for another job here or there. In my view, this is very important.

Start-up venture capital companies are somewhat guilty in this, because that's what they want: they want a good team to present good science, first; and secondly, they want them to focus on one thing. Obviously, simply by running this kind of company, you're gambling with the lives and the jobs of everybody working for you, because it's all or nothing: you either make it or you go bust.

The model I'm suggesting is simply that it's great to aim high, but you have to think about today and tomorrow. You have to have both the steak and the sizzle. You can't have it all just by saying, we're going to go ahead and make a billion-dollar product and from now until then we're going to starve.

I think that's very important.

My colleague was talking about BDC. I think BDC can play a much more important role, similar to an NRC-IRAP, if they put some team in place to look at intellectual property.

We are living in a time, for example, in which there is a knowledge-based industry worldwide. This knowledge-based industry has formed, but we don't have anything in Canada to evaluate intellectual property. My bankers, including BDC, came to Norgen. They valued the chairs and the tables, the hard assets. They understand those; they gave me money for the tables, the building, chairs, and computers. But none of them gave me a single penny on 25 patents. That is a shame.

In my view, BDC can definitely take a lead, or NRC can take a lead on what the value of these patents is. That would help lots of companies, because there is a tremendous number of patents out in every university.

● (1700)

The Chair: Thank you.

Now we'll go to Mr. Lobb.

Mr. Ben Lobb (Huron—Bruce, CPC): Thank you, Ms. Chair. We're having a good discussion today.

Dr. Fernie, I wanted to ask you if you could expand on a comment. You said we should build wealth first. You mentioned that in your comments. I just wondered if you could expand on that. I think you're talking about start-up companies or whatever. What does that mean?

The Chair: Dr. Fernie.

Dr. Geoff Fernie: I don't remember saying to build wealth first, but it sounds like a good idea.

Mr. Ben Lobb: Well, I wrote it down.

Dr. Geoff Fernie: I'll take it to heart. I'll tell you something—

Mr. Ben Lobb: It seems this city has that effect on people.

Dr. Geoff Fernie: Here's a thought: IRAP is a terrific program, but it is available to companies that already have revenues, and we're talking about doing start-up. If we want to build something from the start, we need something that allows us to get hold of the money to do the job. A tax credit later on isn't particularly helpful. At least it doesn't do the whole thing

To build from the beginning and to build it well first, we need to probably do what they do in the States. You can start an enterprise, and people do start an enterprise through the SBIR and those programs, where the money comes in to match milestones. You can build steadily one step at a time, and they follow right the way through to help you get your customers. Maybe that's what we were talking about.

If I haven't answered your question, I apologize.

Mr. Ben Lobb: That's good.

Dr. Haj-Ahmad, I have a question for you. I think what you're trying to say, and maybe I'm saying this the wrong way, is you have to have some sort of a saleable product or saleable vision to get this thing rolling. You can't just dream for 10 years and fall flat on your face. You have to have something to sell or a reasonable expectation that you're going to sell something in the first three years before you can dream of the pie in the sky.

Is that what you're saying?

Dr. Yousef Haj-Ahmad: That is absolutely correct. That's exactly what I'm saying. You may start generating small revenue, and that small revenue over time will grow. You could sell both a product and also services. In a biotech company, there are highly educated individuals. They have lots of talent—people with a Ph.D., an M.Sc., an MD. They can provide the service to other companies worldwide.

Mr. Ben Lobb: I can connect with this because I worked for a software company. They started with six, and now they have 600. They have 300 developers working there now full time. They did the very same thing that you did. They had a saleable product or a reasonable expectation of a saleable product in the near term, and as the business grew, more and more R and D took place.

Am I wrong in saying this? Why is it that this particular sector doesn't do a good job of this? Why is that?

Dr. Yousef Haj-Ahmad: You mean the biotech sector?

Mr. Ben Lobb: Yes.

Dr. Yousef Haj-Ahmad: The scientists lose interest pretty quickly, very shortly after the VCs enter. Secondly, the venture capitalists themselves, because of a lack of progress, also start to think about exit strategies very quickly.

Mr. Ben Lobb: This leads me to the thought—and this was number one on your possible problems—that the professors may lose interest. If they don't have the money to put behind it, if they need venture capital, isn't it reasonable that they should have to give up a piece of the pie?

Dr. Yousef Haj-Ahmad: Certainly.

Mr. Ben Lobb: I don't want to slam any of the professors here, but there are some professors who have a problem with that, aren't there?

Dr. Yousef Haj-Ahmad: I agree with you. The professor must be much more committed, and the VCs must also be more committed, to the success of the venture. They cannot have it front-end loaded. They cannot start making half a million dollars from the day the company starts. They have to make money later on when the company succeeds, not in the beginning.

● (1705)

The Chair: Can we let Dr. Paige comment? He's been trying to get your attention, Mr. Lobb.

Dr. Chris Paige: This is a really important set of questions, but I would say that no one size fits all. It depends a lot on the company. The model that's been presented is an excellent model where both services and products can be developed. Sometimes we have start-ups where that's not possible. You're absolutely right: the professor has to give it up. But some professors want to be involved, and others don't. As an organization, it's our responsibility to make sure that the discovery moves out. If the professor wants to make the discovery and leave it alone, he or she will get less, but we'll still run with that by getting the right people involved.

Mr. Ben Lobb: Can I ask a quick question? I know I'm running out of time.

The professors who are doing this research, do they teach classes as well, or are they strictly focused on doing research?

Dr. Chris Paige: In a hospital sector there's much less teaching involved. They do a little bit of teaching, but it's mostly research. It's not all research on what they're discovering.

The Chair: Thank you very much.

Thank you, Mr. Lobb.

Mr. Kellway, it's your turn.

Mr. Matthew Kellway (Beaches—East York, NDP): Thank you very much, Madam Chair.

Thanks to all of you.

The picture that seems to be emerging after all the discussion we've had so far, whether you're looking at private sector entrepreneurial activity or at hospitals, is that there's an enormous unexploited opportunity for innovation.

The finger seems to be pointing at you, Mr. Kirkconnell, since you're the representative here of venture capital. Dr. Fernie even tried to let venture capital off the hook by saying there is some stuff that's too small, and you've said that's actually not the case.

I understand the high capital requirements, and there was some suggestion that the problem was high risk too, but after all the discussion it seems as if return on investment is pretty secure. There are going to be some failures here and there. If you can disabuse me of that impression, please do. But it just seems as if there are great opportunities out there for people who apply the right skills and the knowledge—not just looking at the chairs and tables, but understanding the business and the science to get out there and start making lots of money out of health care innovation.

Mr. Paul Kirkconnell: Oh, would that it were so easy.

If you look at the last 10 years of performance in the industry, you would be disabused of the opinion that IRR or return on investment is secure. The industry hasn't performed particularly well. I think the industry is evolving to new models that will address some of the high-capital, high-risk return, home-run models.

Some of them involve the smaller funds, targeting smaller applications that you can get. You can't put as much money to work, but you can get very high IRRs, and you're seeing more and more of that. I think in pure biotechnology you're seeing more investing and repurposing of molecules or of proteins. In other words, you have the safety data, the first clinicals didn't work out, but it's a much cheaper, better, easier path to market if you can find a different application. It's not just sitting there to be taken.

I think the current class of venture capitalists, if I can refer to them that way, are the survivors of the last 10 years. They tend to be fairly aggressive managers of risk. That's good, and it's going to be good going forward.

The last thing I would say is that we shouldn't confuse—because they are completely different questions—investing equity into the development of innovation of companies and using IP, an intangible asset, as security for a loan, the way you would a building or chairs or what have you. I think that was the example given. Those are just very different financial arrangements.

Mr. Matthew Kellway: Dr. Paige, Ms. Power, or Dr. Fernie, how do I square that circle? Or am I misunderstanding something? I'm under the impression that coming out of UHN, for example, there's lots of opportunity for innovation here, and perhaps a closer relationship with venture capital would reap great rewards.

● (1710)

Dr. Chris Paige: Again, I sound like a broken record. There's not just one way of doing it. Access to venture capital is good, and the higher the risk venture capitalists are willing to take, the more they're going to look at us. But we want to de-risk our products for them, and that's where government plays a huge role. The grants have stopped funding it; it's no longer something interesting from the point of view of basic science. You just have to do the next two years of development work to de-risk it to the point where the private sector wants it, either a big company or a start-up with some investor dollars. You can't say there's just one thing that needs to be done.

The Chair: Mr. Kirkconnell.

Mr. Paul Kirkconnell: I'm a Mr., yes. In venture capital that's a rare thing. Most of us are doctors.

First, I would agree that closer collaboration, the interaction in the cafeteria, is important. You want to encourage that sort of thing. I'll just leave it there for the moment. I was about to take you off to a bad place.

The Chair: Ms. Block.

Mrs. Kelly Block (Saskatoon—Rosetown—Biggar, CPC): Thank you very much, Madam Chair.

I would like to welcome all our guests here today. It has been a very good discussion, and this has been a very lengthy study for our committee, but one that has served to identify many of the opportunities and challenges that we regularly face when it comes to technological innovation in the health care system. We've covered topics and had witnesses talking about subjects from juvenile diabetes all the way to end-of-life care. I think most recently, in the last number of meetings we've had, there has been a common thread, highlighting the need for us to build capacity and high functioning alignment among researchers, industry, providers, consumers, and maybe I'll throw in educators and investors, and maybe that's implied in some of the other categories.

You've highlighted recommendations. You've talked about some incentives that could be in place. Mr. Casey, you talked about hosting conditions. I'm wondering if there are implied barriers in your recommendations. If not, what are some of the barriers we face in building a high functioning alignment among these different pieces? Perhaps I'll leave it at that and ask any of you to answer that question.

The Chair: Mr. Casey, would you like to comment on that?

Mr. Andrew Casey: Yes. I wouldn't say there are barriers. I would say we need to be very vigilant, because some of the other comments are exactly right. There are a number of different ways to skin this cat, if you will. No magic bullet is going to solve all this.

When I talk of hosting conditions, what I'm talking about is all the different levers that governments—I say "governments" in the plural because it's not just at the federal level, it's also at the provincial level—have at their disposal to nurture the industry in the country. I have 250 members, and there are more than that in this country who would tell you, and in answer to some of the other questions, that there is a thriving sector in this country. We have a long history of innovation in this country. My member companies and others that are not members of my association have done phenomenal work. They've grown companies of all shapes and sizes. Some have grown to be enormously successful.

I'll give you one example. Enobia is a company that developed an enzyme replacement therapy for bone disease. They developed that from the bench and sold that property for a billion dollars—that's with a "b"—and that money is now going to get reinvested into the economy and start up new companies.

There are very successful models. We've done it successfully in the past, and we have to be sure we're keeping up with the competition out there. We have to punch above our weight. Canada is a small country. We're not a big enough market to drive a lot of the decisions that are being made on a global scale, so we have to find new ways to attract investment. It's sometimes not good enough just to "keep up with the Joneses". We've got to get ahead of them and become more attractive for capital.

The Chair: Would anyone else like to comment?

Dr. Paige.

Dr. Chris Paige: I would totally agree that the industry is stronger than people think it is, but I will still talk about my disappointment in seeing potentially very important products not receiving funding at that level between when the academic funds stop and when they're de-risked enough for industry to take over. We need something like an innovation fund that can accelerate something from the lab, I'll call it, into the marketplace.

I think an acceleration fund is absolutely essential.

● (1715)

The Chair: Mr. Kirkconnell.

Mr. Paul Kirkconnell: Maybe it doesn't meet the accelerated fund example, but by way of example, one of the things we've done with graduates coming out of accelerators...classically, people who've started some sort of engineering-type IT project get accelerated, they graduate, they're not venture ready, and what happens then? In a number of those programs, we're putting a convertible notes program in place whereby we can provide them with capital, $150,000, or $250,000—it's different by program—small amounts of money. For young start-ups those small amounts of money can fill those gaps, and I would say, to the example of punching above our weight or whatever, we're the only institution in the world that offers anything like that, and people are copying us.

The Chair: Thank you.

Mr. Lizon.

Mr. Wladyslaw Lizon (Mississauga East—Cooksville, CPC): Thank you very much, Madam Chair.

I would also like to welcome all the witnesses who came here this afternoon.

Many of you mentioned the difficulties or barriers, whether they're local or interprovincial, in implementing any commercialization. If I can ask you something a little bit in reverse, when you decide to do the research on a certain topic, are there communication lines open? How do you check whether there is something like this already, or maybe there's somebody else working on the same topic? Basically, what I'm asking is, are there cases where sometimes we're trying to reinvent the wheel?

The Chair: Dr. Paige.

Dr. Chris Paige: Much less so than what you might think, for two reasons. One is, in this age of Internet and PubMed searches, one really has at one's disposal a vast body of information from all around the world. At the research level, I think you really are aware of what's going on.

When you get to commercialization, the first thing our commercialization office does, if we bring a disclosure to them, is try to find out if there is competition. Is there space in the market? Is somebody else doing that? Although you don't know everything in the commercial world because some of it is not public, I don't think reinventing the wheel is one of our barriers here, or that we're wasting a lot of money reinventing the wheel.

Mr. Wladyslaw Lizon: Would anybody else like to comment?

Dr. Geoff Fernie: Yes, I would reinforce that. Success rates now are well below 20% in federal granting agencies, and without idiots applying.... I mean, really top-rate scientists are applying. One out of five gets funded, so I don't think there's much chance of you getting funded for something that's already been done somewhere.

What is a little irritating and disappointing at times is that you might be turned down on the grounds that this is really development and not research. That's something that I find happens to me occasionally. The cost of prototypes and things like that are easily excluded. That's where it comes back to this agency, which maybe takes things a bit more to the applied side.

The Chair: Does anybody else want to make comments?

Mr. Casey and then Mr. Kirkconnell.

Mr. Andrew Casey: I would echo the sentiment that we're probably not in a world where we're trying to reinvent the wheel. I would say, though, that we have to be cautious not to be afraid of some failure. You can turn that around and become overly cautious because you're afraid to fail.

I think if you look at our industry, there are a number of tries that just didn't work, but that research went on to become something else spectacular. If you take it at face value and say, we don't want to go down that path because somebody already looked at it, I think we run the risk of missing out on something. The world changes so quickly that there are opportunities out there we could miss if we're not a little more open to trying new things and taking a second look at some therapies.

I'll give you one concrete example. AZT was a drug that was developed for cancer and did not really perform up to expectations. The new wheel, if you will, ended up being one of the most successful drugs for AIDS and HIV, and it's the AZT drug. That was somebody who came back at that one with a fresh approach, a fresh look, and that's research and innovation at its best.

● (1720)

The Chair: Mr. Kirkconnell.

Mr. Paul Kirkconnell: I would just, one, echo that we have to embrace failure.

The other thing is that big pharma is far more open today than they were certainly when I was there, in terms of what they're looking for. They will give you the road map for what they're looking for, whereas 10 years ago it was a deep, dark secret. Now they invite VCs and academics to come over, and they'll tell you what they want.

The Chair: You have very little time, about 20 seconds, Mr. Lizon, if you want to make a comment. Sorry about that.

I think, Dr. Paige, we do have 20 seconds, if you want to make a final comment.

Dr. Chris Paige: I will just say that we've heard of push and pull, and both things happen. We have scientists who work with industry because they want to make one of their machines better, and we have the engineers who can do that. Some of our most successful products right now are software improvements for companies that are selling the product. At the same time, the discovery comes from us and then we have to bring in the money. Both of those things are happening.

The Chair: Thank you, Doctor.

Now we'll go to Mr. Pacetti.

Mr. Massimo Pacetti: Thank you, Chair.

I just want to ask a couple of quick questions.

Mr. Casey, for BIOTEC, is it an annual $400 million that you get, or is that what the fund has right now?

Mr. Andrew Casey: That's the entire fund. It's $400 million—$125 million was set aside for life sciences and clean technology.

Mr. Massimo Pacetti: How much for life sciences?

Mr. Andrew Casey: It was $125 million for life sciences and clean technology as a bundle.

Mr. Massimo Pacetti: Okay. Is there a return on the life technology? Do you determine what a return is, or how do you determine your projects?

Mr. Andrew Casey: No. Essentially what the government is doing is putting funds into a VC and hoping to leverage private sector funds that will exceed that by I think a third or three times that amount. They would be the first in, first out, so it de-risks it. It's essentially a way to reinvigorate the VC fund for the industry, or the funding in the industry.

Mr. Massimo Pacetti: Who decides how to distribute the money? Is it BIOTEC itself?

Mr. Andrew Casey: I wish it were within my purview to do so. No, the way it's being structured is still in development. We're working closely with the Department of Finance, and the minister has put in place a senior representative from the industry to basically define the parameters and how it can best be structured, because every industry is different.

When you look at our industry, it's a global industry; you have headquarters in a number of different countries around the world. Our presidents and CEOs who are representing those companies here in this country have to go back to those head offices and say this is why they need to invest some more money in Canada; there's a new fund, and they have to explain it. We're in the process of basically defining how it should work so that it best suits our needs.

Mr. Massimo Pacetti: Again, would it be based on research? Would it be based on development? Would it be based on hiring *x* number of researchers or buying *x* number of—

Mr. Andrew Casey: I have not seen any definitions like that attached to it. I think you want to have it as flexible as possible so that it can run in a number of different directions. You don't want to have it driven by pure job numbers or geographical locations.

I think you want to make sure that it recognizes that we're all competing in a global economy and that these decisions are being made on that global basis. So you have to find a way to make it as flexible as possible.

Mr. Massimo Pacetti: Is it going to be up to the applicant to find a matching dollar or...?

Mr. Andrew Casey: Absolutely. The industry is going to have to come up with some money, yes.

Mr. Massimo Pacetti: Thank you.

Mr. Haj-Ahmad, for me, when I envision research in biotechnology, I envision a scientist saying, you know what, we need to find a little green or blue pill, or whatever, to find a cure for cancer. And that's all that person is going to do.

Now you turn around and say they should be doing something else so they can earn money while they're looking for a cure for cancer. How do I reconcile the two? Maybe you were lucky, or are you one of the few lucky ones?

Dr. Yousef Haj-Ahmad: That's a very excellent question. I've asked this question very often. If there's a will, there's a way.

They need to completely overlap, because otherwise you're simply diluting your effort and you cannot succeed. What you're good at, that is the area where you could commercialize, one. Second, you could bundle a few patents; you have one patent and you bundle it with the others, and they support each other—

● (1725)

Mr. Massimo Pacetti: So as you're doing the research, you're coming up with a new discovery and a—

Dr. Yousef Haj-Ahmad: Very often I've noticed it's a one-trick pony: one patent, one company. That's not good enough. Sometimes it is fine, but sometimes you could bundle a couple of patents together and you'd have an overlap with the two.

Focus is our number one issue. Right now, for example, we're focusing on diagnostic and demand in a resource-limited area. Okay, it's a resource-limited area. Where in Canada? Up north is resource limited. If you collect a sample and you want to ship it, you have to ship it by airplane down south to diagnose somebody. Diagnosing somebody on site, by a nurse or by an individual, is resource limited. We'll be able to prescribe medicine precisely and quickly.

This technology can be provided to the military. The U.S. military is very much interested in this area. You could also use the same thing in a resource-limited area in the middle of Africa. It could be in the Amazon rain forest, being able to do very advanced diagnostic. Why did we choose this? Because of sample preparation.

Mr. Massimo Pacetti: But even that takes money, does it not?

Dr. Yousef Haj-Ahmad: Yes, sample preparation is at the heart of good diagnostics. So we generate enough revenue to finance this kind of research. There's no way we could have done it 10 years ago.

The Chair: I hate to interrupt you, but we only have a few seconds left.

Dr. Paige, I think you wanted to make a comment.

Dr. Chris Paige: The comment is that organizations like research hospitals need to be responsible for moving these forward. We have some scientists who are good entrepreneurs, who can raise money, who come up with the idea, and have taken products straight through to being sold in the clinic—the little blue pill. It takes a long time, but it has happened. We have other scientists who have come up with an amazing discovery that we know is the basis of a platform technology that will have commercial venture. They're not interested in going any further on that. We find the people, then, who can take it further because we don't want to let that technology fail. Again, there's not one size that fits all in this industry.

The Chair: We're pretty well out of time, Mr. Casey. Do you have a quick comment?

Mr. Andrew Casey: Thank you for your indulgence, Madam Chair.

Very quickly, the car was a wonderful invention, but the assembly line was one of the processes that allowed the car to be commercial. Likewise, in our industry, I have a number of member companies. I'll give one example, which was working on a molecule and it was using 3-D modelling on computers. It's now selling the 3-D modelling as a process to other companies, as well as working on its molecules. So it's two bits of intellectual property that are worth value, but one is also driving revenue that allows the other to develop.

The Chair: Thank you so much.

This has been an extraordinary group of people who we've brought together today. You've been amazing in terms of some new ideas, new insights, and new advice. We appreciate that very much as a committee.

I want to thank you for taking your time and bringing your expert analysis of technological innovation here to our committee.

I want to thank all the committee members. Your questions were amazing.

We will adjourn. That will give you a chance to say a quick thank you to our guests.

Thank you.