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Chair

Mr. David Sweet

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● (1140)

[*English*]

The Chair (Mr. David Sweet (Ancaster—Dundas—Flamborough—Westdale, CPC)): Welcome everyone to the 46th meeting of the Standing Committee on Industry, Science and Technology. I'm going to introduce our witnesses, but I just want to give you a heads-up that we're going to try to squeeze in about 10 minutes of business at the end. Since we're already over time we'll need to clear the room effectively and efficiently afterwards.

Let me introduce our witnesses who are before us today. We have quite a diversity actually. From Google Canada we have Colin McKay, head public policy and government relations; from Canadian Manufacturers and Exporters, Martin Lavoie, the director of innovation and tax policy; and Wendy Cukier, vice-president of research and innovation from Ryerson University. I will go by order of precedence in our agenda here.

We'll begin with opening remarks of six to seven minutes, please, Mr. McKay.

Mr. Colin McKay (Head, Public Policy and Government Relations, Google Canada): Great, thank you very much, Mr. Chair. It's a pleasure to be appearing before the industry committee again. I'm super excited to discuss Google's approach to experimentation, innovation, and discovery with you today.

Last week, officials from Industry Canada suggested how to identify and define disruptive technology using descriptors such a rapid technological breakthrough with broad global application, significant economic impact, and importantly, significant social impact. That certainly describes disruptive technology but it doesn't begin to capture its potential.

Plentiful computing power can result in improved decision-making. Cheap sensors can produce more frequent and more accurate measurements in a number of fields. Robots can speed manufacturing processes and even improve surgery outcomes. These all have the potential to disrupt how we conduct our business and live our daily lives, which naturally makes us all a little uncomfortable.

Truly transformative change often requires vision and ambition. Transformative change is the difference between making things 10% better and making them 10 times better. As a researcher, a business leader, or a policy-maker you're often tempted to focus on the incremental change. You inevitably build from the existing solution, relying upon existing tools and framing your challenge with insight and assumptions informed by your personal experience. This naturally limits the impact of your work.

It seems like a logical approach, apply a little more effort, find some extra money and dedicate more resources to the problem. With hard work you will find efficiencies perhaps even arrive at insights to inform further work. We can all recognize this is a careful, measured approach to change.

At Google, however, we approach change in a number of ways. As a company founded and run by engineers we understand the impact of data science, massive computing power, and insights into consumer behaviour. These inform how we develop new products and improve existing products. For example, consider Google Maps and how it has changed and affected how we search for addresses, shops, and even property investments in the years since its launch in Canada in 2007.

At Google we naturally have a nuanced understanding of business risk but we also appreciate that sometimes you have to set audacious goals. When you aim for a tenfold impact you energize your workforce. Sheer ambition demands that they examine a challenge with a fresh set of eyes and that they aim for outsized technological, economic, and social change.

Ambition and investment at this scale can light a fire in the hearts of employees. It encourages them to believe that other seemingly impossible goals may also be possible. We refer to some of these projects as “moonshots”. In fact, we have an organization dedicated to ambitious goals: Google X. As Astro Teller, the head of the program, describes it, “Moonshots live in that place between audacious projects and pure science fiction.”

We've always had a focus on investing in the future. Our founders made this clear early on in their 2004 letter to initial investors. Here is just a short quote, “Do not be surprised if we place smaller bets in areas that seem very speculative or even strange when compared to our current businesses.” I think you'll agree that we've kept that habit and that inclination over the past 12 years.

More bluntly, Larry, our CEO, has said that, “If you’re not doing some things that are crazy, then you’re doing the wrong things.”

There was some discussion last week of the Canadian appetite for risk, of what might be slowing investments by Canadian businesses in ICT, or maybe the key to our slow-paced commercializing of both basic and advanced research.

I'd just be speculating on the reasons for this. The officials you heard from last week have a far firmer grasp on the statistics, but I can tell you that western society conditions us from an early age to be cautious, even risk adverse. Think of the advice we've received from parents, coaches, and cut-rate business books: walk before you run, slow and steady wins the race, and horribly, under-promise and over-deliver.

When Google considers moonshots we aim to tackle big problems, big as in dauntingly huge, seemingly ageless in their existence, or of global impact. Our team of engineers, researchers, user experience designers, and other professionals attempt to identify and shape a solution to these big problems, a radical solution. Importantly, the science has to be there or at least the promise that the science will eventually arrive at a solution. There has to be evidence that with enough creativity, passion, and persistence we can arrive at a solution in the next decade or sooner.

In practice, what does this mean? It means smart contact lenses that will help diabetics monitor their glucose more seamlessly and painlessly than ever before; self-driving cars that will reduce injuries on the road, reduce road congestion, and even improve mobility for the elderly and disabled. It will mean novel ways to deliver the Internet to billions in the developing world without developing a 100 years' worth of disputes around poles, land rights, and conflicting technology; and—even I would say that this is audacious—creating a company whose explicit mission is to tackle aging.

● (1145)

There's always a reason for not setting audacious goals. SMEs think that these goals take money and resources that they don't have. Large companies shy away from the risk. Governments feel a pressure to use scarce resources to deliver demonstrable results, usually on short-term problems. Academics love long-term thinking but have largely defined their role as publishing and propagating ideas, not building the solutions themselves.

What's the danger inherent in this behaviour? Well, aside from continuing disappointment in our slow economic growth, we do not question the status quo. What do I mean by status quo? I mean that 110 years ago, cars were the toys of the wealthy. Forty years ago, computers were the size of a house and were purely a business tool. Twenty-five years ago, mobile phones were big, bulky, and expensive. Twenty years ago, Internet access was expensive and glacially slow. Ten years ago, video calls were expensive and difficult, and four years ago, we thought standing on a corner and waving our hand in the rain was the only way to get a taxi.

While we feel pressured by the rapid technological change that's enabled by the growth and power of the Internet, it's important to remember that this is an almost generational pattern, and every time society struggles to adapt to the social and economic impact of technological change. Almost as regularly, we attempt to apply existing regulatory frameworks to mitigate the perceived risk of new habits, new technology, and new solutions to previously intractable problems.

Preparing ourselves for emerging opportunities means embracing that uncertainty, not running away from it. Canadian companies are having an impact. Importantly, these sorts of technologies shouldn't be characterized as disruptive. They're being innovative, and at scale. These products, services, and platforms are attracting users and customers from around the world in markets that didn't exist five years ago, and were the stuff of science fiction 15 years ago.

As you continue this study, please remember this point. Truly transformative change demands an increased tolerance for risk, from researchers, from managers, from regulators. We need to provide innovative companies with room to explore, to develop new ideas, and to experiment with new products, while being protected from regulatory and business moves driven by risk aversion, uncertainty, or even pressure from existing stakeholders.

Thank you again for the invitation to appear today, and I look forward to your questions.

The Chair: Thank you very much, Mr. McKay.

Monsieur Lavoie.

[*Translation*]

Mr. Martin Lavoie (Director, Innovation and Tax Policy, Canadian Manufacturers and Exporters): Mr. Chair, ladies and gentlemen, thank you for inviting me to appear before the committee.

My name is Martin Lavoie, and I represent Canadian Manufacturers and Exporters. We are Canada's largest trade and industry association, representing nearly 10,000 companies across the country.

The manufacturing sector is going through tremendous change because of advances in what are known as “disruptive” technologies, but what I will call “advanced manufacturing” in my speech, because that is the term we use in our sector.

In our sector there are five main categories of disruptive technologies: additive technologies, more commonly known as 3D printing; robotics; automation; connected objects, or what we call the “Internet of things”; and new materials, including new nanotechnology applications.

[*English*]

First of all, I'd like to congratulate the Minister of Science and Technology, Minister Holder, for including advanced manufacturing in the science and technology policy back in December. I think it's a great vision. It's a recognition that advanced manufacturing is not only part of disruptive technologies but actually driving the innovation agenda in Canada.

Why do we call those technologies “disruptive”? First of all, they represent nothing less than a fundamental shift in the paradigm of fabrication. Take, for example, additive technologies. You're basically going from a subtractive method of fabrication to an additive method of fabrication. Right there is a major shift in the way you think about product development. More importantly, it not only changes the way you make things but also the way you design things, because 3-D printing allows you to design parts, components, or products that you would not be able to fabricate under traditional methods, such as cutting, drilling, or CNC machining.

They're also disruptive because they are reviving industries in Canada and elsewhere that we thought were pretty much gone forever. The best example I can talk about is probably printable electronics and their applications and what we call the “smart” textile industry. How many millions of people in Canada worked in the textile and apparel industry in the past? Ten years ago, who would have invested in an apparel facility in Canada? Now we're seeing, with those integrated sensors and smart textiles, a lot of entrepreneurs going around with new business ideas that have a lot of potential here because of this technology. In one way, it's disruptive not only because of the method of fabrication but also because it's reviving industries that we thought were gone.

I would like to congratulate the National Research Council for making the printable electronics flagship program a reality in Canada. I think it's a great vision. This is certainly an area where Canada can be leading globally.

There's a third reason why they're disruptive, and it has much more impact than what I just talked about. They've really changed the way we look at economic development and entrepreneurship. ln recent years we've seen the emergence of what we call the “maker movement”. It's pretty much a cultural transformation where people now have access to affordable means of production. The maker movement is a cultural movement, but concretely, they get implemented through what we call “makerspaces”. Makerspaces are physical locations where you put a lot of advanced manufacturing equipment such as 3-D printing, laser cutters, electronic boards, water jets, or whatever. People buy a membership, and they can use the facility to access the machines and maybe prototype new products.

More importantly, it also allows those makers to get together with other makers and do co-development of products. A lot of the people you see on *Dragon's Den,* for example, are members of makerspaces from across Canada. I looked at how many makerspaces we have, and I found about 50 in Canada. The most well known is AssentWorks located in Winnipeg.

I don't know if anyone here is from Winnipeg. If you ever have a chance to visit them, I strongly recommend that you do so.

Concretely, the maker movement here in Ottawa offers a very good example of how disruptive technology such as 3-D printing can actually fuel entrepreneurship. In 2012, grade 9 students from Ashbury College in Ottawa started their own 3-D printing business in a science class from an idea that they had to build customized iPhone cases for their friends. After developing a business plan, the students got seed funding from their school's entrepreneurial competition, which allowed them to purchase a small 3-D printer. They set up their business making customized iPhone cases for their friends, and they were selling them through the Internet. They were 16 years old. That makes me think about how disruptive it could be if every 16-year-old kid in this country had access to a makerspace in their high school. It would be totally disruptive.

ln conclusion, I would like to point out a couple of policies that we may want to talk about during this meeting that are actually affecting the adoption of those disruptive technologies, especially within SMEs. As I said earlier, the recognition of advanced manufacturing in the science and technology strategy was a good thing. However, something that has hurt the capacity to adapt those technologies is the elimination of capital expenditures under the scientific research and experimental tax credit. This elimination took place earlier this year, in January. When I talk to the people who actually sell the 3-D printers or sell advanced pieces of equipment, they tell me it's eliminating an argument for them to actually accelerate the adoption of those technologies, especially within SMEs.

We'd like to congratulate the leader of the NDP for making the commitment to look at how we could reintroduce a tax credit for the capital expenditure in advanced manufacturing. I invite all parties to look at ways in which we could develop a tax structure that would actually accelerate the adoption of those technologies. It doesn't have to be through the SR and ED program. It could be through another tax structure.

Thank you very much. I look forward to your questions.

● (1150)

The Chair: Thank you, Mr. Lavoie.

Now on to Ms. Cukier.

Professor Wendy Cukier (Vice-President, Research and Innovation, Ryerson University): Thanks very much.

I want to echo the other panellists' comments about how pleased we are that the committee is looking at these issues and also that we have the opportunity to speak to you today. I will try to restrict my comments to some high-level issues that I would like you to keep in mind. I didn't have time to submit a brief, but I will provide a follow-up report that gives more detail. I think other witnesses have talked a lot about specific technologies and specific examples. There are some broader policy-related issues that I would also like to discuss.

There are a couple of important concepts that I think we have to reinforce because they really would go a long way to shaping policies that would address the innovation gap. It's very important in my mind to differentiate between entrepreneurship, which challenges the status quo and creates something new, and innovation, which requires the adoption and use of those new things in some way to transform systems, businesses, or consumer behaviour. You can have entrepreneurship and you can have lots of wonderful technologies, but if you don't pay attention to end-user needs, to organizational issues, and they're never used, you do not reap the benefits.

I would argue, in terms of the policy frameworks, in terms of where we invest research dollars, that there is quite appropriately a great deal of focus on developing technology, and there should be, but we need to put more focus on how to actually roll those technologies out effectively, whether it's a combination of tax credits, training, or some other things I'll discuss. I think that's critically important.

There's a second thing that I think is very important, and this comes from not just doing research but working very closely with business leaders, community organizations, and so forth. We have to think about impacts, even though it's very hard to predict what the impacts will be. Early in my career I worked with the Institute for the Future in Menlo Park, California, and I worked with Don Tapscott, who wrote all sorts of books, and I would say that they were good at anticipating change but probably no better than *Star Trek*. If you actually think about how the world has changed, some of the technologies you've been hearing about, whether it's mobile computing, additive manufacturing, or virtual and augmented reality, much of that was prefigured by science fiction. So I'm not saying that it's easy to anticipate what is going to happen, but we have to try.

McKinsey has done a really good study, I think, of disruptive technologies and tried to identify some of the potential impacts.

Again, disruptive technologies are not the same as advanced technologies. Not all advanced technologies are disruptive, and not all disruptive technologies are particularly complex. To be disruptive, the technology has to be applied to change fundamental business models. That's basically the definition. For example, I would argue that robotics, in and of itself, is not disruptive. Robotics has transformed the automotive industry for many years. Taking robotics and introducing it into the hospitality industry then becomes very disruptive because that's an industry that, up to now, has not used robotics. I think it's important to really keep a focus, not just on developing these technologies but thinking about how they will transform how we live, play, and work.

I also don't want to be alarmist, but I think we have to think, not just about the potential advantages but the potential disadvantages. The good news is, the recent study by Frey and Osborne, which looked at the impact of computing on jobs, did not suggest that politicians were an endangered species. However, they did say, through a detailed analysis, that 47% of the current jobs in the North American economy are potentially at risk. That's fundamental.

● (1155)

Of course, there are opportunities for new kinds of jobs as well, but we have to look at both sides of the equation and that has implication for policies, that has implications for how we invest, and that has implications for how we train and educate our students.

I want to read from a couple of things, and this is the first.

We have historically felt that low-skilled jobs might be vulnerable, they might be outsourced, that low-skilled auto workers, for example, were sort of the inevitable casualties of automation in the manufacturing sector. I think we will hear more about how that is, perhaps, a real misconception. But many have thought that highly educated knowledge workers weren't at risk. The Associated Press has announced that the majority of U.S. corporate earnings stories for their business news report will eventually be produced using automation technology. This is a major publisher.

To free journalists to spend more time on things like beat reporting and source development, they discovered that automation technology from a company called Automated Insights would allow them to automate short stories of 300 words to 500 words about the earnings of companies, and instead of providing 300 stories manually, they could provide up to 4,400 stories automatically for companies.

Diane Francis, the journalist, sent this article to me. It says people who think journalism is not in trouble need to give their heads a shake.

The second point that I think is critical is that research is the foundation of innovation, without question. We may not be getting the outcomes we would like from all of our research investments, and there are reasons for talking about that further, perhaps in the questions.

Ryerson, certainly, has invested heavily and has many of the technologies you've heard about—cloud and context-aware computing, advanced manufacturing, virtual reality, and so on, but again, those technologies are not in and of themselves disruptive. We have to look at their applications.

One of the ways Ryerson has done that is by challenging the traditional paradigm of lab to market. We completely support the importance of foundational research, but lab-to-market models, where you assume that scientists and researchers will develop things that will be commercialized, is a high-risk proposition if your objective is commercialization. We, instead, have focused on much more iterative market-driven models for research, which produce significant results that are tied to user and organization needs.

On a panel I was on, someone said recently that if you want to drive research, invest in research; if you want to drive commercialization, invest in commercialization. Right now the current models of funding university-based research reinforce the behaviours that we've heard don't necessarily drive innovation. They reward publishing articles. They do not reward patents, and they most certainly don't reward setting up small businesses. We have to think about the structures and how they align with what we say we want to achieve.

I would note that a lot of effort has gone into trying to turn professors into entrepreneurs. You've met some who have made that transition—Hossein Rahnama, who is from Ryerson, is an excellent example of a Ph.D. entrepreneur. However, lots of people become professors because they want to stay in their labs and they want to write papers. I say we should let them do that, but build the structures that will help identify the research that has commercialization potential and bring in the people who know how to do that and how to start companies and grow them. Right now the current structures don't necessarily support that.

Obviously, Ryerson is very committed to supporting the creation of start-ups. We have one of the leading incubators in Canada and, indeed, in the world. We have partnered with the Bombay Stock Exchange to set up an incubator in India to provide soft landings for Canadian entrepreneurs going out and Indian entrepreneurs coming in.

We've been very successful with a number of federal government funding programs that we're grateful for, from FedDev to CAIP, and so on, and we're partnering with groups like the Ontario Chamber of Commerce to help scale up existing businesses.

● (1200)

I think that one of the things we really have to come back to is an example from health care. It's another quote saying:

> The future of medical computing is bright. Obstacles to the practical use of the computerized medical record exist.... We have a golden opportunity to avoid a new round of escalating medical costs.

Does anyone want to guess when that was written? It was written in 1990. We've had the technology we need to transform health care for the 25 years I've been in this industry, but it is the organizational and human factors that are a huge issue.

I just wanted to close—

● (1205)

The Chair: You are about three and a half minutes over. Please be quick.

Prof. Wendy Cukier: My apologies.

I think that one of the things, and we can talk about this more in questions, is that universities are basically medieval institutions. There are many changes that could be wrought to actually transform education for the 21st century. Bringing together government, educational institutions, and industry is a very important part of moving that forward.

Thank you.

The Chair: Thank you very much.

Colleagues, we missed the business last week. We are very short on time now because of votes. I seek some guidance. I can give you six minutes each, and that will get us out of here on time. If we want to have some business, I'll have to cut it down to about four and a half minutes each.

Do you want to save the business for Tuesday, or do you want to deal with it today?

Ms. Peggy Nash (Parkdale—High Park, NDP): We are not back here on Tuesday.

The Chair: I'm sorry. You are right. It will be a week from Tuesday.

Hon. Judy Sgro (York West, Lib.): Yes, I think it would make more sense.

Ms. Peggy Nash: Sure. Let it go until then.

The Chair: All right. Then let's proceed with six minutes each.

Mr. Lake, go ahead.

Hon. Mike Lake (Edmonton—Mill Woods—Beaumont, CPC): Thank you.

Thank you to the witnesses for coming today.

I want to focus a little bit on some examples. We've heard some broad-based things. We haven't heard many examples of these disruptive technologies based in your areas.

Colin, I am going to start with you. You and I have talked in the past, and one of the things that we talked about.... I remember you sharing a little bit about how Google Maps works with the traffic flow. I thought that was an interesting example of something that changes the way we navigate our world in terms of driving, taking buses, or whatever the case may be.

Can you give an example for the rest of us of how that works?

Mr. Colin McKay: Sure. Thanks very much for the question.

The example of traffic data and how it is applied to mapping services, whether it is Google Maps or others, is a perfect example of how you can have a functional consumer product that actually has a consequence for important things such as infrastructure investment and quality of life for commuters.

When you have a phone and you have opted into location services, you are in a sense providing anonymous tracking information about your movements to your phone provider and to whatever mapping service they use, which allows them to know when you are on a highway or any other road and what speed you are going at. When you aggregate this sort of data from thousands of people, all in the same traffic jam or in the same city, you get very detailed information about that traffic behaviour that could be used to provide guidance to users about choosing their routes and choosing when to leave.

It also sends important signals to cities and to people in charge of making investments in infrastructure around congestion points or highways that may need more investment. It gives them the sort of detailed data that was previously available only by hiring university students over the summer to sit on the corner and use their little clicker to count the traffic. It's a consumer product that in its application actually provides data and insight that can inform tremendous investment.

Hon. Mike Lake: It's very much in real time. When I am driving down the highway and I see that red line, I know that it represents a whole bunch of people who are sitting in traffic in that moment, not moving.

Mr. Colin McKay: Yes.

Hon. Mike Lake: That's interesting because it builds on what Wendy was saying regarding the way technology is used. That's not what the location services were originally meant for, but someone has found a way to use it in this unique fashion.

Mr. Colin McKay: Yes.

Hon. Mike Lake: Martin, maybe I'll go to you. In your industry, you obviously represent many organizations across the country. Could you give us some examples? You talked about some broad areas where you would refer to advanced manufacturing as opposed to disruptive technology. What concrete examples could you give us of the way our lives might be impacted today by this type of advanced manufacturing?

● (1210)

Mr. Martin Lavoie: I think one of the best examples, if you get into the area of robotics, is probably civil applications of drones. I think this one is going to disrupt a lot of sectors. It's also disrupting regulations, because now Transport Canada has to look at how it will regulate this.

It's interesting, because drones incorporate a lot of other disruptive technologies such as 3-D printing. All of the drones have parts and components printed and the reason is that 3-D printing allows for a reduction in the number of components in a product. Traditionally you would make one part and make another part and then glue them together or weld them together or screw them together. 3-D printing allows you to reduce the number of parts by printing two, three, or four components in one shot, so you have more complex shapes.

If I knew where it was going to disrupt, I'd be investing there right away. I think you're going to see a lot of applications in places where it's very expensive or dangerous to send a human being. You're going to see a lot of them in the Arctic, with pipeline inspections, for geomapping for the oil sands, inspection of hydro, and all kinds of applications like that. I think that is more disruptive than what you see in the media about delivering a pizza. I'm not sure about that, but I think there are a lot of industry applications that would be disruptive. That would be one of them.

The other thing is that in any makerspace you visit you'll see people building drones, because if you have the right skills and the right equipment, it's easy to invent new applications with the advanced cameras and the advanced vision systems. That's pretty much one example you should keep your eyes on.

Hon. Mike Lake: I'm going to just jump in and ask you a question. I was actually going to go in a different direction, but you talked about makerspaces, and I don't really understand exactly what you're talking about. For anyone who might be reading the transcript of this who doesn't have the background that you have, maybe you could explain it in easy-to-understand terms.

Mr. Martin Lavoie: A makerspace is pretty much a business incubator that is led and used by people, by anybody.

You see a lot of them starting to be implemented in universities, for example. People put together a pool of money to buy 3-D printers and advanced manufacturing equipment that they couldn't afford on their own, and then people buy a membership so that they can access those means of production. Then they can hang out with other people and develop products with them.

It's really an entrepreneurial thing that is starting to be some kind of a business incubator thing, but it's not really supported by government. It's really kind of a grassroots movement. People go there and they can also get trained. Some of them offer classes on how to do 3-D design using 3-D software, how to use the printer, how to use the laser cutter, or how to use the CNC machine. Some people see it as a business incubator, but what is interesting is that the movement behind it was a grassroots movement. It was not initiated by a university or a government. It was really a grassroots movement that just came up.

The Chair: Ms. Nash, you have six minutes.

Ms. Peggy Nash: Thank you very much to all the witnesses for being here today. There are three very different areas of expertise, all of which are very integral to the study we're doing.

Ms. Cukier, let me start with you.

You finished your comments by talking about the need to transform our education system, our university system, for the 21st century. You talked earlier about needing the structure to take research and the people who want to do research and combining that with the people and the ability to commercialize that research. Can you talk a bit more about what that would actually look like in the university system?

Prof. Wendy Cukier: Sure.

I want to give a short answer, and then I can provide some follow-up after the meeting because I know time is short.

Essentially, right now, faculty members are rewarded for doing traditional research. If you look at the funding the federal government provides to support university research, the focus for the most part is on publishing papers and performing in that domain. The places where there's funding to support the commercialization of technology doesn't fall in the traditional places universities look for funding. It's more organizations like FedDev and the Canada accelerator and incubator program that have indirectly provided funding to support universities who want to build incubators, commercialize technologies, and so on.

My first point is simply that our structures are not aligned to do what we say the objectives are.

The second point is that our president has said repeatedly he wants to graduate students who have the choice of a career—and Ryerson is very well positioned in that space—or create their own companies and hire other people. He talks about students graduating with a diploma in one hand and a corporation in the other. Providing opportunities for young people to increase their employability through co-ops, through paid internships, and so on, is absolutely fundamental and not disconnected with some of the things the other panellists have talked about.

If you look at the challenges many small and medium enterprises are facing in their use of advanced technology, part of it is buying the technology. Part of it frankly is that most CEOs of SMEs are worried about meeting payroll on Friday and don't have the time to change the wheels on the bus while they're driving 90 miles an hour down the highway.

There's a huge opportunity, but we don't have the structures to support young people going to small or medium enterprises and helping them harness the potential of some of these new technologies. That's the kind of thing we're working on with the Ontario Chamber of Commerce, but existing structures don't support that kind of experiential learning in the ways we would like to see it supported.

● (1215)

Ms. Peggy Nash: Thanks very much.

We did hear in our last panel as well that professors are funded to do research, but they're not funded to do commercialization. We do need both obviously. I'm a big believer in funding basic research, but we've been missing that kind of driveshaft to take it to the commercialization.

I want to applaud your work. You've given me a tour of the digital media zone at Ryerson. It's very exciting and there are so many incredible, bright young minds there. It shows that when you bring people from different disciplines together there is an explosion of not just ideas but the commercialization takes place.

I have a lot of questions for you, but I want to ask some of the others.

Mr. McKay, I have been to Google in Canada, and thank you for that tour. That was very interesting. What would it take for Canada to be the home of the driverless car? How would we get Google to set up a greenfield site in Canada and produce their vehicles here?

Mr. Colin McKay: It's an ambitious goal and one I share.

Ms. Peggy Nash: I'm shooting for the moon, Mr. McKay.

Mr. Colin McKay: Exactly.

Unfortunately we're taking baby steps in making sure we perfect the technology, but it is exactly the sort of technology that Martin was referring to that you build from small-scale manufacturing, with very specific components and very sophisticated systems, and do it in a way that can be expanded quite quickly to meet market demands.

I would say Canada already has the components in place for a similar industry, whether it is in robotics, advanced manufacturing, or even automobile manufacturing. We do have early career, mid-career, and late-career specialists in computer sciences and applied systems that do the sort of work that we look for in that program. Once again the challenge is having firms identify the market and make the investments themselves as well.

The Chair: Thank you very much, Mr. McKay, Ms. Nash.

Now on to Mr. Carmichael.

Mr. John Carmichael (Don Valley West, CPC): Thank you, Chair.

Welcome to our witnesses. This is an absolutely fabulous topic. What a great opportunity to expand our horizons, and your input today is very important.

Dr. Rahnama spoke the other day to tearing down the walls at the DMZ and giving young innovators an opportunity, without putting any brakes on them, to come up with new ideas to innovate and to create new technologies, disruptive technologies.

My question to you, Ms. Cukier, is this. How do you take those technologies and create the entrepreneurial drive that's going to give that individual the opportunity to start a new company, and take it...? The last time we spoke with you, we talked about the gap between research, innovation, and commercialization. We have that valley of death that we referred to way back, two years ago, which seems like a long time ago. How do you take these young people and give them the chance to run their own companies, but give them the tools to do it in a way that they're going to get to a commercialized state, succeed, and then employ that in the marketplace?

● (1220)

Prof. Wendy Cukier: I think it's an excellent question, and I think the younger we start, the better. The first thing you need is someone who has that entrepreneurial intent, and the percentage of Canadians who think about starting their own businesses is smaller than we would like, so you have to start early.

Once they have an idea, getting them advice, mentors, exposure to potential customers, and a deep understanding of the end-user are critically important. Too often you end up with flying pigs that no one wants. You need that interaction between young people who have a great idea and the potential market.

Here's a good example. We were talking about drones. One of our DMZ companies just raised $2.5 million in crowd-sourced funding for their drone, DreamQii. The secret sauce in the DMZ is partly culture, but it's also location, location, location. We have 300 people coming through that place who are potential investors and customers. We have Heather Reisman walking down the hall and saying, “I'll take one of those and here's the cheque”. That's an oversimplification, but a kid working in their garage does not have the same opportunities for exposure to mentors, for exposure to customers, or for exposure to investors that they do in a place like the DMZ.

Of course, there's Communitech, and there are incubators all over. That's key, and so is providing the potential seed funds to get them started. We've worked really hard to have laddering so that you can get a little bit of money to start, and then the funnel narrows and you have to go through another competition. We pick the best out of those. You get more money and more money, and so on.

You may all know that we recently partnered with a number of private sector investors, the Ontario government, hopefully the federal government as well, for Scale Up Ventures to try to address exactly the problem with the valley of death, where you get to the $200,000 investment level and then you're stuck.

You really have to take an ecosystem approach to it. I think Canada is doing well, but it certainly can do a lot better. Does that answer your question?

Mr. John Carmichael: You're getting close.

Prof. Wendy Cukier: Okay.

Mr. John Carmichael: I'll just carry on from there.

You've given that individual the opportunity to become an entrepreneur, to build their business, to build their dream. The follow-up question is going to be: how do we, as government, play a role that will benefit all this? I guess that's a loaded question that you can all jump into, but if you've taken the walls down and you've given them the free rein to develop, how do you manage that internally to ensure that they're going to get to a place of success, so no flying pigs?

Prof. Wendy Cukier: One of the things that results in success is failure. You have to be able to tolerate failure. You have to be able to allow them to say, “This isn't going to work”, to pivot, or to join a different company. I would say that we'd rather have three out of five than two out of two. Encouraging that kind of risk-taking behaviour, where failure is a badge of courage and not something to be ashamed about, is hugely important.

In addition to supporting some of the programs that reinforce these opportunities for young people, government is a huge potential customer. Right now there are a lot of restrictions on procurement and so on. We've heard strategy after strategy for the last 20 years. Government should be a model user. Government should be a place where there are opportunities to experiment, to innovate, and to give some of these young people a chance to sell and try their products. Governments should be the first customer. The City of Ottawa, OC Transpo, was one of Hossein's first customers.

Mr. Colin McKay: I completely agree that you both have to emphasize the ecosystem as well as the ability within the constraints of government support and government programs to actually have a couple of failures or two under your belt.

What we try to do is build that ecosystem from a young age all the way through to university and beyond, working in the community, as Wendy mentioned, with tech hubs like Communitech and Notman House in Montreal, but starting at an earlier age with programs, like Ladies Learning Code and Actua's Codemakers, to get them interested in the technology and working within a community of peers so they have those shared experiences.

The opportunities—

● (1225)

The Chair: Mr. McKay, I'll get you to expand on that later. The time is up in this round.

Ms. Sgro, you have six minutes.

Hon. Judy Sgro: Well, it's okay because quite often Mr. Carmichael and I have the same train of thought, so don't take all of my time, but perhaps you'd like to finish that up.

Mr. Colin McKay: Sure. We refer to these tech hubs frequently today, and they are success stories because they provide that space where you have the researchers and academics, who may hold tenure but are looking for an opportunity to explore business ventures, and they can cross paths with business people.

These are the sorts of exercises that help break down some of these roles for the more motivated among the academic world, and they're the sorts of exercises that need to be supported in a more flexible and consistent manner across the country.

Hon. Judy Sgro: Mr. Lavoie, would you like to comment on that?

Mr. Martin Lavoie: No. I'll leave it up to your questions.

Hon. Judy Sgro: Good.

Ms. Cukier, I can't help but sense some frustration within your comments when you are talking to us about these disruptive technologies and what we could have and could not have. Government gets in the way many times rather than helps sufficiently, I think.

Clearly, on this particular topic that we're talking about, we see that as a huge opportunity in the future. What government wants to know, I would suggest, no matter who's sitting at this table or another table, is how we help that happen. First, how do we get those students excited? By the time they end up at Ryerson, as an example, do they already have the bug? Rather than waiting until they're in university, how can we get our younger kids, the nine- and ten-year-olds who are playing around with these different ideas, excited and thinking about how they might work on the development of various things so that continues to build and feed that entrepreneurial skill as they go through their high school years and into university?

Prof. Wendy Cukier: They've already dropped math.

Hon. Judy Sgro: Okay. I'll turn it over to you for your comments.

Prof. Wendy Cukier: I think the strongest predictor of entrepreneurship is if your parent was self-employed—a farmer, an entrepreneur. In Canada, because of the structure of our economy, we don't have as much as some other countries do.

I think there are groups like the Learning Partnership, for example, that try to get in even as early as grade 3 and let kids start their own businesses, even if they're just selling things back and forth to each other. There are all sorts of camps. Waterloo runs them. Ryerson runs them. Many universities run them, where kids can come to school in the summer and work on science projects or entrepreneurial ventures, and so on.

There are informal opportunities that are equally important as saying everyone must have a course in entrepreneurship, as they have in China, but I do think it goes to the fundamental culture. It goes to celebrating entrepreneurs as successful role models.

When I talk about my frustrations, to be perfectly honest, the federal government has been very good to Ryerson in terms of supporting some of our out-of-the-box approaches. What I would say is that the traditional models of funding university research and programming tend not to promote innovation, particularly at the federal level. But also at the federal level, it's important to look at what we say our objectives are and make sure we have the processes in place to realize them.

I think we're moving in the right direction, but we can be doing more.

Hon. Judy Sgro: One other question.... Can you provide a description of the roles of applied research and basic research in the development of disruptive technologies?

Prof. Wendy Cukier: That's a super important question. People always want to say pick one or the other, and that's a mistake. John Polanyi points out a perfect example. Research in lobster ophthalmology—the study of lobster eyes—I think in Newfoundland, created breakthrough technology for the cutting of silicon chips.

Nobody anticipated that this would lead to this. No one is going to find a cure for cancer in the digital media zone, so we have to protect and reinforce fundamental research, but we also have to recognize that market-driven applied research, partnering with industry and community organizations, is also valuable and should also be rewarded. It's not either/or. It's both.

● (1230)

Hon. Judy Sgro: It should be both of them, without question.

Going back to you, Mr. Lavoie, I thought it was really interesting to hear you talk about the makerspaces and how that really came together independent of government. Could you elaborate a little more? I thought it was quite fascinating.

Mr. Martin Lavoie: To give you a bit of background, a makerspace is actually a derivative of what we used to call the "hackerspace", which was a bunch of people, and if you've seen the Facebook movie, they get into the basement, they drink beer, and they try to get into a government website. The one who wins gets a job.

It's this same idea of sharing knowledge and skills and accessing the means of production to develop something without necessarily owning the property of anything. I always think that if I were a philosopher, I would say that it's the discussion that Karl Marx and Adam Smith would have if they were to have a beer together at the Royal Oak. It's about developing a business without owning the means of production. It's completely changing the paradigm.

Going back to your question about entrepreneurship, what is interesting is that what we see a lot of these days is makerspaces in high schools. It's as simple as that. Give them the means. I've seen these kids at the University of Ottawa makerspace who were eight years old and doing the engineering summer camp. They were printing little Minecraft figurines with the printers. They were fascinated. Kids love to make things. We all do. When we were kids, we loved to build things. They just loved it. They learn to design, to scan, and to use their creativity.

It seems to me that it's the first step before I teach them about entrepreneurship. You don't really teach it. You give an ambition. You inspire someone.

The Chair: Thank you, Mr. Lavoie. I'm sorry, but the time is always moving forward.

Mr. Daniel, you have six minutes.

Mr. Joe Daniel (Don Valley East, CPC): Thank you, Chair.

Thank you, everybody, for being here.

I'll ask various questions. I'm going to start with Mr. McKay.

I'm really just trying to better understand looking forward in terms of disruptive technologies. What criteria do you use? Why have you invested in automated cars versus thorium for developing power? Why have you decided that? Are there set criteria that you're using? What are they? Even Google has limits, right?

Mr. Colin McKay: Funnily enough, we have invested in alternative methods of generating power.

For us, particularly when we're talking about transformational technologies, it really comes from this point of view: do we see an element of the science and the ability of the science to develop and to address a truly fundamental problem for society? As I said, that's one part of the company. It's the ambition to take the resources, which thankfully we have available to us, and focus them on those large-scale problems, knowing that we have the employees that have both the skill sets and the interest in tackling those problems.

Importantly—and it feeds back to our earlier conversation—this also reinforces among our employees and our corporate culture that we're willing to take risks and we're willing to invest in these sorts of moonshots.

Mr. Joe Daniel: Hopefully you get a big return out of it when some of these technologies develop, so that's also a fairly motivating factor, I would have thought.

Mr. Colin McKay: Yes.

Mr. Joe Daniel: Mr. Lavoie, I have a question for you. You gave us the example of 3-D printing, which is fantastic. It's a local technology, etc. But my question to you is from a manufacturing point of view. Is that technology actually going to change the way manufacturing is done?

In other words, is it going to take that low-cost labour element out of it so that some of these jobs now will actually be good jobs here in Canada that we can actually develop and expand? Are there any other technologies that are doing that sort of thing in manufacturing?

Mr. Martin Lavoie: I do not believe that any of these technologies will kill jobs. What's killing jobs in this country, I'll be quite honest with you—

Mr. Joe Daniel: Will it create jobs?

Mr. Martin Lavoie: It will create jobs. It will create opportunities for new things that don't exist right now.

What's killing jobs in this country is low productivity. I was telling Wendy that here we fabricate 45 dollars' worth of goods in one hour of work. In the U.S., it's $60. That is killing jobs. The 3-D printing and automation are not the problem. They are the solution to that productivity problem.

It's also the solution to our demographic problem, because we have a reverse pyramid here, where a lot of people are retiring. Also, I think we have a big education gap in this country, right? That is exploding in our faces right now, because people don't have the advanced mathematics for the 80% of manufacturing jobs that out there right now. They cannot access manufacturing anymore, which wasn't the case 25 years ago. You could work in a pulp mill or in a sawmill. You didn't need that much education. It's totally the opposite today.

All of this is a solution, not a problem. For example, 3-D printing is going to change manufacturing when you have more materials that can be used on a printer. Think, for example, of all the inventory you need to carry in a country for, let's say, spare parts or automotive parts. Let's say you go to the dealership because you need new brake pads. They don't have them. They have to order them, and then they come in the next day. That's a lot of time and a lot of resources. I can envision a future where you're just going to print them on demand when you need them.

So it's going to create—

● (1235)

Mr. Joe Daniel: That's kind of where I was heading with that. You normally print it on demand, but now you're printing it here in Canada to make that product that you want, like some of these drones, etc.

Mr. Martin Lavoie: When you think of the mass production system of economics, it's totally irrelevant for 3-D printing right now. There are three things that 3-D printing is based on: complexity, low volume of production, and mobility of production, as I said.

Mr. Joe Daniel: But there are disruptive technologies, such as inkjet printing of organic components, which some people are doing here.

I'm just trying to get the break point, where the jobs will start flowing back here because the technology is here. You won't need that cheap labour cost elsewhere, because it's being done by machines more. As a result we will actually generate skilled jobs in Canada, and that should increase.

Mr. Martin Lavoie: When is it going to happen? That's the question I cannot answer.

Mr. Joe Daniel: I was hoping you could, but it's certainly interesting from that perspective.

Obviously, you're also making big decisions about which folks you're going to actually support in terms of development at Ryerson in the DMZ. What criteria do you use to actually determine which pieces should be done?

Prof. Wendy Cukier: It's a good question because we have different criteria. In our learning zones, the principal criterion is student learning opportunity. So whether they succeed, fail, or make a lot of money or not, we run a program that's funded by the province called Summer Company. They get $3,000 to start a business in the summer. As long as they go through the process, they're fine and we give them the money, and that's because of the learning opportunity.

When we get into, for example, our accelerator-incubator for digital technology and gaming, which is funded through CAIP, the criteria are job creation and successful businesses. The criteria there are really applied by external business people working with experts in the field, based on predicting if this is a good business that will create jobs.

It depends on which program and which part of the university. Some are education and some are jobs. In some cases, it's return on investment for the institution.

The Chair: Thank you very much.

[*Translation*]

Ms. Papillon, you have six minutes.

Ms. Annick Papillon (Québec, NDP): Thank you very much, Mr. Chair.

As you know, Canada is the only developed country with an intellectual property deficit. That means that we spend more buying other countries' technology than the rest of the world does buying ours.

In a recent article I brought to this committee, the author, Jim Balsillie, criticized the fact that Canada has no intellectual property strategy. The European Union has a sophisticated system for protecting intellectual property. Obviously that is part of the Canada-Europe Comprehensive Economic and Trade Agreement, which ensures prosperity for Europe's pharmaceutical industry.

Do you think that Canada still has a way to go when it comes to protecting our businesses' intellectual property? I think you will all have something to say about that.

Mr. Colin McKay: I will start, but I will continue in English.

Ms. Annick Papillon: Okay.

[*English*]

Mr. Colin McKay: I think I've read the article that you're referring to by Mr. Balsillie and he raises some important points, especially about start-up companies and their capacity to tackle intellectual property, particularly patent challenges, as they look in the international market.

My response to that article would be that we're talking about capacity building for entrepreneurs and innovators, and their ability to understand intellectual property provisions and to protect their innovations on a global scale. We're not necessarily looking for national mechanisms to create an intellectual property inventory. It's more that in the same way that we need to educate them on entrepreneurship, risk-taking, and growing their business from SMEs to larger exporters, we need to give them the tools so they understand their intellectual property rights and have the ability to exercise them globally.

I would actually say that from our experience within the high-tech sector, there's a danger in concentrating on intellectual property as a physical value and a token of economic success, because it can often become a brake on innovation when it's exercised in the wrong way. There needs to be a flexible and responsive patent system that provides the opportunity for innovation by small and large companies alike.

● (1240)

[*Translation*]

Ms. Annick Papillon: Mr. Lavoie, what do you have to say about this?

Mr. Martin Lavoie: I do not think it is a question of having more or less. It is about achieving a balance.

As Mr. McKay said, it is important for a company that invented something to protect its market for a certain number of years. That is true in the pharmaceutical sector. If companies do not make money, they will not make new drugs.

At the same time, we want less expensive generic drugs. Where is the balance? Are we talking about 10 years, 12 years or 15 years? I hear from both sides in the manufacturing sector. Some people feel strongly that everything should have intellectual property protection. However, many representatives of SMEs tell me that it is not worth the trouble. In any event, technological change happens so quickly that even if I have protection for 20 years, in five years I am going to have to innovate because my product will not last 20 years. Technology life cycles are not long enough.

I hear both sides, and I am not sure whether more or less is needed. I think we need to strike a balance between the two.

Think about 3D printers. The first patents for 3D printers date from 1982 or 1984. Things exploded when the patents expired, because everyone could use them and create different applications. We need a little bit of both.

Ms. Annick Papillon: Is it a good strategy to set that aside for a while and tell ourselves that it is constantly changing in any event? It may be necessary to constantly update it as much as possible, knowing that we will not always be completely up to date and that the strategy will always have to be improved. Can we not start now? Do we not run the risk of falling behind other countries?

Mr. Martin Lavoie: It is a business decision. You can do a cost-benefit analysis. However, taking out a patent costs money and takes more than just a couple of days. It generally takes longer in Canada than in other countries, and it is typically very expensive. We do not necessarily need more patents, but we can perhaps commercialize more patents in Canada.

The last time I consulted the Canadian patent database, if I am not mistaken, I saw that more than 350 university patents had been issued in the past two years. I found one that had been commercialized: a curling broom that had been commercialized for the Canadian team at the Olympics in Vancouver. I think that came from the University of Western Ontario.

Ms. Annick Papillon: I would like to talk some more about this very important article.

Representatives of the University of Toronto say that U of T is in a class with the likes of MIT and Stanford University when it comes to research and development. However, Stanford University has generated $1.3 billion U.S. in royalties on its intellectual property. The Massachusetts Institute of Technology issued 288 U.S. patents last year alone. The University of Toronto generates less than $3 million Canadian in annual income and averages eight patents a year. That is not much compared to the American universities.

What can we do so that our universities are more competitive with American universities?

What do you think, Ms. Cukier? You talked quite a bit about how universities lag behind.

[*English*]

The Chair: Be very brief, please.

Prof. Wendy Cukier: It's complicated.

The Chair: All right.

I will move on to Mr. Miller.

The last three speakers have five minutes each.

Mr. Larry Miller (Bruce—Grey—Owen Sound, CPC): Thank you very much, Mr. Chairman.

To all the witnesses, thank you very much. I'm filling in at the industry committee today and I think this is a fascinating topic.

I believe, Mr. McKay, it was you who talked about drones, or maybe it was Mr. Lavoie. It came up earlier.

I'm going to come at it from the agriculture side. It was not very many years ago that the GPS came out. Now, basically, once a farmer has programmed a certain field in there, he starts in at the end and everything after that.... I do want to say that actually farmers picked up on that technology a lot more quickly than I might have thought.

As far as the drone side of it is concerned, where is this going to go? We know a good use of drones is that farmers can use them, for example, to map out fields. They can use them to look for the emergence of new seed, weed control, and everything. Can you comment on what future uses they may have?

● (1245)

Mr. Colin McKay: Martin brought up drones, but I'll make a comment and then turn to him. My comment is that I'm really glad you brought up the agriculture industry, because for Canadians it's difficult to translate the impact of digital media and digital technology to what we consider an economy dominated by natural resources, and agriculture really has seized on the importance of GPS and the importance of cheap sensors that allow you to understand the soil on your farm to a degree where you can moderate acre by acre your fertilizer input and your other inputs.

It's that sort of data-driven decision-making that we bemoan in the manufacturing industry and other SMEs. I would be scared to step into the cab of a modern tractor, because I suspect it's much more complicated than my office, and I work at Google.

Drones are one of these technologies where they're in their infancy, and as I suggested, we see them with a bit of trepidation and fear, as well as ambition. They have very practical applications in terms of delivery to remote areas, efficient delivery of small products, and then, as you point out, they have the sort of surveillance and oversight uses that allow you to keep control of a very large, expansive property as a landowner.

I'll make one more comment and I'll turn it over to Martin. The advantage of drones may not be in the tool itself, but the fact that the manufacturing techniques and the understanding of technology around them are impelling a lot of individuals to explore them as a technology and as an the expression of their interest in manufacturing and technology.

Mr. Martin Lavoie: I would even extend in agriculture what we've seen a lot recently from the United States and from Japan, what we call the agri-robot. They're not necessarily drones, but agri-robots. I've seen all kinds of applications right now. From Japan there are robots picking fruit. Any activity that is labour intensive will essentially be disrupted by a robot at some point, because labour is the most expensive part of most businesses here if you're labour intensive. Picking fruit is one of them.

In the past we could never change the feel of a human being. Is that strawberry ready? Is it red enough? Yes, I'll pick it. The vision systems and the touch systems of the robots were not advanced enough, but now they're getting there. A robot can make a decision now as to whether it is ready.

You have to extend that to more than drones. Drones are great for mapping. They're great for surveillance, but I think you're going to get more and more of these robotic solutions in agriculture. Is it a good thing or a bad thing? It's a good thing if you're the owner of the farm, but maybe a bad thing if you're a Mexican worker coming here during the summer to pick fruit.

Mr. Larry Miller: Mr. Chairman, I want to stay on the theme of drones. We talked about some of the good things that can come out of it, but usually in anything there are some bad things. We have an article that I read or saw on social media not very long ago about a drone that was flying around high-rises and basically the article was saying it was like a peeping Tom that was out there.

How does industry, and how does government, deal with that? Is there any way we can prepare for that kind of thing or do you deal with it as the situation arises?

Prof. Wendy Cukier: I think it's like anything. Fertilizer can be used for good and it can be used to make bombs.

Going back to one of my earlier points, I think with all of these technologies it's going to be critically important to think about the impacts, both positive and negative, the policy implications, and some of the issues that you raised.

I thought you were going to raise the security issue, because that's a whole other set, given the potential military application of drones. I think it's a very good point for a group of parliamentarians to be thinking about exactly what you raised.

The Chair: Thank you, Mr. Miller.

Now, Mr. Masse, you have five minutes.

Mr. Brian Masse (Windsor West, NDP): I want to take up on that with regard to drones. Sorry, I've been in and out of the room. I've been dealing with a couple of things, domestic things, so I apologize for missing some of your testimony. I don't like to do that, but I have.

I'd like to go into the agricultural sector with the robots. I was really curious about what you were saying. How sophisticated can they get and then how quickly can they get into the market and still be useful? What would their life cycle be like in terms of before they get supplanted or would that happen?

● (1250)

Mr. Martin Lavoie: Right now, what you see are start-ups in the U.S. that are building those robotic applications for agriculture. They're not publicly traded companies yet, and it will be expensive for a while so that very few people will actually be able to afford one of those robots.

It's a bit like drones today. You will probably see a lot of companies that will start buying them and licensing them at some point as they do with drones right now, offering a service, because not everybody can actually afford a drone. It's still going to take a while, but now today's technology is so rapid it can advance.... Who knows? It could be there in maybe 10 to 20 years.

Mr. Brian Masse: Okay.

I'll put this across the board here. With regard to moving products to market, if we get into more assertive attempts to do that, could we be picking winners or losers, or could we be undermining current investors who maybe have already done their own research and development and have a product out there right now? If the government comes in with tax incentives, or cash, or helping universities get it to market, what do we do about those scenarios? Are they likely? Once they have their moment in the sun, do we still continue to do the same for others who might supplant them?

Prof. Wendy Cukier: I think you raise a good point. It's very hard to pick winners. I think that's why partnerships across sectors are absolutely critical. We've not seen a hugely successful track record when any particular sector, particularly government, with due respect, says we're going to invest in those people but not others. I think we need coherence in our policies and our strategies, particularly with a non-partisan lens around job creation and those opportunities to attract investors in job creation to Canada.

Mr. Colin McKay: The model that certainly is prevalent in our industry is encouraging as many companies as you can, particularly through partnerships, whether it be through incubators or accelerators, and helping companies work through the skills they need to progress beyond their engineering innovation, their business skills or their marketing skills. It's really to create a dynamic community of businesses, recognizing that there will be successes but there will be many more failures.

The real lesson learned from that process is that a failure is not a hard stop. The entire process builds a community of support for the entrepreneur and their employees that they can then use to take the lessons learned and build upon them. That's how you grow a community of interest into an industry. Jobs then follow that as well.

Mr. Martin Lavoie: I can make one suggestion.

One thing I've noticed is that large multinational corporations that have venture capital arms tend not to be present in Canada. That's something we should maybe target. Think of the Xeroxes, the GMs, the GEs—they have huge venture capital arms with offices across the world. It seems like Canada falls under the U.S. thing, and not a lot of entrepreneurs can actually access it. I think it would be interesting to have those companies establish offices here. These large multinationals would be good to commercialize those products. They already have a portfolio and a sales force across the world.

Mr. Brian Masse: You bring up a good point in that the challenge we have is that we don't have the decision-makers often at the table in Canada here.

Prof. Wendy Cukier: Exactly.

Mr. Brian Masse: We're really going to have to work on that, because their interests may lie elsewhere. In fact, we could have innovation done here that then is exported somewhere else to be produced. I'd rather be a manufacturer still than a passive vessel.

That's all I have.

The Chair: Thank you, Mr. Masse.

Mr. Lake.

Hon. Mike Lake: Thank you, Mr. Chair.

Thank you once again.

Colin, perhaps I can come back to you. There's a lot of talk of big data these days. As you know, I have a 19-year-old son with autism. Google has a partnership going on right now with Steven Scherer, one of the top autism researchers in the world, working out of SickKids in Toronto. He’s just fantastic and is working with Autism Speaks out of the U.S. on a $50-million project called MSSNG. Basically it's looking at the genome of thousands of families living with autism.

I won't get you to talk specifically about that project, because that would be pretty specific, but maybe you could talk about big data: what it means and what the possibilities are for us in that area.

Mr. Colin McKay: I think the undercurrent to the comments you've heard today rely not just on a conversation about big data but also the idea of scalability. Put simply, big data is this transformation we've had from having to buy a very expensive personal computer with very little capacity in the 1980s to being able to buy as much capacity as we need with the click of a button and the use of a credit card online.

It means that people who have an insight, like Steven in Toronto, and need the resources in order to conduct large-scale research on very large problems don't have to go out and buy computers. They don't have to go out and build data centres. They can scale up their experiment as they need, using these resources. In this case, we donated that computing power to the autism society.

In terms of disruptive technology, which we've been talking about, this is the barrier to entry that has disappeared. Whether you're a young individual or you're someone in your twenties just coming out of university or you're in fact mid-career, you now have access to not just the computing power but also the manufacturing technology, 3-D printers and so on, to start a business and to iterate it very quickly, because you're not investing in the heavy equipment and you're not investing in the technology that ties you to an existing business plan.

That's the secret to big data. You now have easy and cheap access to the tools. You have easy and cheap access to the insight. You also have the ability to change your business and change your products when it becomes evident to you that something needs to happen.

● (1255)

Hon. Mike Lake: Actually, I was going to come to you anyway, Wendy, because I see a parallel between what Colin's talking about and what I saw at the digital media zone at Ryerson, where you have all of these incredible people working on app development, or whatever it might be that they're working on. But again, the world is wide open to them to use what other people have developed to turn out fantastic groundbreaking new products, innovations that all of us are going to benefit from. It seems there's a real opportunity there for them that didn't exist before.

Prof. Wendy Cukier: We're partners with OMERS, the pension fund, and the Ontario Centres of Excellence in a big data incubator called OneEleven that's focused on financial services, because there's a plethora of products.

The thing about big data is that it also raises lots of privacy and security issues. Coming back to technology adoption, we're working with Thomson Reuters, a big data analytics firm with 90 data scientists, holograms, wonderful displays of consumer behaviour, and the managers are making the decisions they've always made. Again, big data is a perfect example of an incredibly powerful technology that we're not using effectively. We have to crack that nut before we're going to achieve the benefits, whether it's in health care or commerce.

Hon. Mike Lake: I think I'm good, Mr. Chair.

The Chair: To the witnesses, on behalf of the committee, thank you very much for your testimony. This is a very groundbreaking subject for us, so your expertise is essential and we very much appreciate it.

We apologize for the delay in getting started because of the votes earlier.

Colleagues, as I mentioned, we'll be in camera, so our witnesses will wait outside for the first 10 minutes when we come back for the first meeting a week from Tuesday, as Ms. Nash reminded me, and I hope that you celebrate our Victoria Day weekend, our first queen, very effectively.

The meeting is adjourned.