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Thursday, May 1, 2008

Chair

Mr. James Rajotte

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● (1105)

[*English*]

The Vice-Chair (Hon. Dan McTeague (Pickering—Scarborough East, Lib.)): Colleagues, I see we have quorum.

[*Translation*]

I have the honour to be chairing the 35 th meeting of the Standing Committee on Industry, Science and Technology. I am replacing Mr. Rajotte. Lucky you.

[*English*]

Pursuant to Standing Order 108(2), we are doing a study of Canadian science and technology, and we're joined by several witnesses. Mr. Robert Best is vice-president of the national affairs branch of the Association of Universities and Colleges of Canada; and Michelle Gauthier is director of research, policy, and analysis. From the Canada Foundation for Innovation, we have Eliot Phillipson, president and chief executive officer;

[*Translation*]

and Manon Harvey, Vice-President, Finance and Corporate Services; from Genome Canada, we have with us the President and Chief Executive Officer, Dr. Martin Godbout.

[*English*]

From Biotron we have Norm Hüner, scientific director.

We will give witnesses from each organization five minutes. I will try to hold you to that, as we have many questions.

Thank you for coming.

We will begin with you, Mr. Best.

[*Translation*]

Mr. Robert Best (Vice-President, National Affairs Branch, Association of Universities and Colleges of Canada): Thank you for the opportunity to be here today, Mr. Chair. With me is my colleague Michelle Gauthier. She is the Director of Research and Policy Analysis at AUCC.

Canadians' standard of living depends increasingly on our competitiveness in the global knowledge economy. To maintain and enhance the standard of living Canadians currently enjoy, we must secure our position among the world leaders in research.

Universities account for more than one third of the national research effort in Canada—a higher proportion than in all other G-7 countries. University research is more geographically dispersed than private sector and government research in Canada, and consequently plays a critical role in the economic and social development of all regions of the country. Universities educate the highly qualified researchers who are increasingly in demand across the economy, and the university sector is the only sector that performs research for all other sectors.

University research is a Canadian success story, but this was not always the case. Investments over the past decade by successive federal and provincial governments of all stripes, and by universities themselves, have turned Canada from a country at risk of experiencing a major "brain drain" to one that is benefiting from a "brain gain".

But while they are significant, Canada's gains in university research over the past 10 years remain fragile. Our competitors in the G-7 and newly emerging competitors like Russia, China and India are investing heavily in research—including university research—to increase their competitiveness in the global race to attract high-paying jobs, research talent and investment.

● (1110)

[*English*]

Mr. Chairman, the success of the federal S and T strategy will depend most fundamentally on people—on the development, attraction, and retention of talented individuals with the research skills so in demand in the knowledge economy. Over the next decade, we expect the knowledge economy to create significantly more jobs for advanced degree holders. As well, the retirements of advanced degree holders currently in the labour market will generate large-scale replacement demand.

Beyond people, a balanced approach to implementing the public-private and targeted and non-targeted dimensions of the federal S and T strategy will be very important. Significantly, the S and T strategy reinforces the importance of federal support for discovery and creation; for developing, attracting, and retaining research talent; for state-of-the-art infrastructure; and for the institutional costs of providing an excellent research environment. Increased and balanced investments in all four elements are essential to maintain and increase our competitiveness in university research.

As the strategy moves forward, Mr. Chairman, I would draw particular attention to support for the institutional or so-called indirect costs of research. These include the costs of operating and maintaining research facilities; managing the research process, from preparation of proposals to accountability and reporting; complying with regulatory and safety requirements; and managing intellectual property and promoting knowledge transfers.

As well, the strategy places considerable emphasis on developing private sector research and commercialization capacity while maintaining Canada's leadership in public R and D performance, and on identifying research areas where Canada can be a world leader while also acknowledging the need for broad strength in basic research.

With regard to the private sector, it is worth noting that Canada is first in the G7 for the share of private sector research investments going to universities, and second in the G7 for the share of university research funded by the private sector. Since 2001 the private sector has increased its investments in university research at a rate four times faster than investments in its own research. Despite these improvements, more can be done to enhance university-private sector partnerships as well as those with the public and not-for-profit sectors, particularly in relation to knowledge transfer.

Universities play an increasingly key role as cross-sectoral platforms, both through their regular programs and their research in general, and also through centres, institutes, and research in innovation parks that bring university researchers together with researchers and applications-focused personnel from other sectors.

Mr. Chairman, I would like to close on the subject of accountability. Our association is committed to improving the visibility, accountability, and transparency of federal investments in university research. In 2005 we published *Momentum*, our first periodic public report on the impacts of university research in Canada. We will be releasing a new edition of *Momentum* in October of this year as one of our many ongoing efforts to communicate to decision-makers and the general public the importance of university research and its contributions to Canada's economic and social well-being.

Merci beaucoup. Thank you.

The Vice-Chair (Hon. Dan McTeague): Thank you very much, Mr. Best. You were virtually on time. I was going to use and indulge the privilege of the chair to ask your position on the RESP bill I have before the Senate, but I think I'll leave that for another day.

We'll now move on to Eliot Phillipson of the Canada Foundation for Innovation.

Sir, you have five minutes.

Dr. Eliot Phillipson (President and Chief Executive Officer, Canada Foundation for Innovation): Thank you, Mr. Chair, for the opportunity to address the standing committee. I'm joined by Manon Harvey, our vice-president of finance and corporate affairs.

I want to talk to you today about the role of the Canada Foundation for Innovation, CFI, as a key player in Canada's science and technology enterprise through its investments in research infrastructure in Canada's universities, colleges, research hospitals, and research institutes.

As outlined in the national S and T strategy, CFI's investments are critical to strengthening our capacity for innovation by enhancing the quality and scope of Canada's research enterprise, by facilitating the training of highly qualified personnel—that is, the human infrastructure, which is the most important resource in a knowledge-based economy—and by promoting the development of technology clusters through programs that encourage collaborations between public research institutions and the private sector.

Since its creation in 1997, CFI has committed more than $3.8 billion in support of over 5,700 projects at 128 research institutions in 64 municipalities across Canada. These projects have covered a broad range of scientific disciplines, with considerable investment in the priority areas outlined in the S and T strategy: environmental science and technologies, natural resources and energy, health and related life sciences, and information and communications technologies.

CFI's investments are made on the basis of a rigorous assessment of merit, using international standards to determine the potential of the project to increase the capacity of Canadian research institutions to compete internationally and to produce knowledge that will benefit all Canadians.

The 2007 federal budget and the federal S and T strategy reconfirmed the CFI as an essential element of the country's science and technology enterprise and provided funding of $510 million for another competition to be held before 2010. After completing an extensive consultation with stakeholders, the CFI recently launched a major competition for this $510 million, which will ensure that universities and colleges in Canada continue to play a central role in Canada's future prosperity and competitiveness.

This prosperity will depend increasingly on our ability to innovate—that is, to generate knowledge and ideas from which are derived new products, services, and policies that create economic wealth, enhance social foundations, sustain the environment, and improve quality of life, concepts that are central to the Government of Canada's S and T strategy.

The CFI's investments in research infrastructure complement those made in people and in the direct and indirect costs of research by the three federal research funding agencies, the Canada research chairs program, Genome Canada, and other federal programs. Together, these investments have had a profound transformative impact on Canada's R and D enterprise. The brain drain has been reversed, as Canada has become a very attractive destination for researchers, and institutions have been able to greatly strengthen priority research areas identified in their strategic research plans.

However, the global S and T landscape continues to evolve rapidly, and international competition is ever more intense. The S and T strategy is therefore a very timely document in providing an articulation of the federal government's priorities and policies in promoting S and T in Canada and its clear commitment to sustain and promote Canada's competitiveness through investments in higher-education R and D.

● (1115)

In conclusion, the CFI is successfully meeting its mandate of strengthening the capacity of Canadian research institutions to carry out world-class research and technology development for the benefit of Canadians. An ongoing, robust, state-of-the-art research enterprise is fundamental as Canada's economy evolves from its traditional dependence on natural resources to one based increasingly on knowledge, technology, and innovation. Ensuring the success of this transition will require that the Government of Canada maintain its strong commitment to the nation's research enterprise. Canada's future economic prosperity and quality of life depend on this commitment.

Thank you. *Merci*.

The Vice-Chair (Hon. Dan McTeague): Thank you very much, Mr. Phillipson, as well, for being on the mark.

I'd like now to turn to Mr. Godbout.

[*Translation*]

The floor is yours, Dr. Godbout.

Dr. Martin Godbout (President and Chief Executive Officer, Genome Canada): Thank you, Mr. Vice-Chair and distinguished members of the Parliament of Canada.

[*English*]

Genome Canada, a not-for-profit organization established in February 2000, was given the mandate by the Government of Canada to develop and implement a national strategy for supporting large-scale genomics and proteomics research projects for the benefit of all Canadians.

[*Translation*]

In the last eight years, our achievements have been many. Genome Canada has adopted a dynamic and systematic approach aimed at activities exclusively in the fields of genomics and proteomics, with a goal of achieving tangible and measurable results. This has allowed Canada to have pride of place among the world leaders in genomic and proteomic research in the fields of human health, the environment, agriculture, forestry, fisheries and the development of new technologies.

In addition, Genome Canada continues to play a leading international role in funding research projects to study the ethical, environmental, legal and social implications of genomic and proteomic research.

● (1120)

[*English*]

Since 2000, the Canadian federal government has invested $840 million in Genome Canada, to which has been added close to $1 billion in partnered co-funding and interest earnings.This additional funding was secured through the development of collaborative relationships and partnerships with private, public, and venture philanthropic organizations, both in Canada and abroad, to jointly finance large-scale genomics and proteomics research projects.

These investments have enabled Genome Canada to build a very strong organization that supports research projects, thus allowing Canadian genomics researchers to gain well-deserved respect and credibility in both the national and international arenas for cutting-edge research science that will have tremendous results for Canadian society and the global community.

[*Translation*]

Genome Canada's innovative business model is based on the funding and management of large-scale, multidisciplinary research projects that are evaluated by international peer committees. This model also allows researchers in all the areas I have previously mentioned access to groundbreaking scientific and technological platforms. The model also includes the creation of local centres of expertise in genomic research across Canada and the co-funding of projects with strategic research partners, both national and international.

[*English*]

Of high importance to Genome Canada is assuming the role of facilitator, drawing together industry, government departments and agencies, universities, research hospitals, and the public in support of large-scale genomics and proteomics research projects of strategic importance for Canada.

[*Translation*]

I will be pleased to take your questions.

The Vice-Chair (Hon. Dan McTeague): Very good, Dr. Godbout.

[*English*]

We'll now go to Biotron.

I'm glad to see you here, Mr. Norm Hüner. You have the floor.

Dr. Norm Hüner (Scientific Director, Biotron): Thank you very much for inviting me and giving me the opportunity to describe the Biotron, a facility funded through CFI.

The Biotron is an interdisciplinary international experimental climate change research facility located on the campus of the University of Western Ontario and dedicated to the elucidation of the impact of climate change and extreme environments on plants, insects, and micro-organisms.

Experimental climate change research represents an important new experimental approach whereby researchers can quantify the ability or inability of organisms to adapt to new environments. Thus, this research approach not only provides important insights into the impact of climate change on biodiversity and ecosystem health, but also identifies possible ways to maintain food and energy supplies under future suboptimal climate conditions.

The principal collaborating institutions for this initiative include the University of Western Ontario, the University of Guelph, and Agriculture and Agri-Food Canada.

The three primary missions of the research programs enabled by the facility are, first, to accelerate understanding of the responses to and consequences of global climate change on terrestrial and aquatic ecosystems; second, to provide the research infrastructure to support and stimulate the shift of growth markets towards so-called bioeconomy in the areas of medicine, agriculture, and forestry; and finally, the Biotron provides the expertise and analytical facilities to assess and quantify the potential environmental benefits and risks associated with emergent biotechnologies on biodiversity and general ecosystem health.

This facility allows world-leading scientists not only to elucidate mechanisms by which organisms as diverse as plants, algae, cyanobacteria, soil micro-organisms, and insects sense and respond to environmental change at the community, whole organism, and molecular levels, but also to assess the impact of climate change on the interactions of these organisms within controlled ecosystems.

The Biotron was funded in March 2004. CFI contributed 40%, Ontario Innovation Trust contributed another 40%, and the University of Western Ontario and industry contributed 20%. Construction of the Biotron was completed in the summer of 2007, and the grand opening is planned for September 2008.

Since the year 2000, funding for basic and scientific research in Canada has exhibited unprecedented growth through the Canada Foundation for Innovation as well as through programs such as the Canada research chairs program. The visions represented by these innovative programs have received international recognition by the scientific community and represent a major attractor for hiring new faculty at universities as well as in attracting post-doctoral fellows and graduate students who are HQP.

However, the long-term sustainability of the new infrastructure created through CFI remains a major challenge for the future. The potential demise of support for these infrastructure facilities created through CFI will be inevitable without continued long-term public support combined with industrial support for basic research in large facilities such as the Biotron, so it's critical for the life of facilities such as this that we find a balance between targeted research funds and discovery-based research.

Thank you very much.

● (1125)

The Vice-Chair (Hon. Dan McTeague): Thank you very much, Mr. Hüner.

We'll now turn to questions and answers. The first round is six minutes.

Feel free to respond as well as you can. I will be making sure our colleagues stay to the time that's provided. The first round is six minutes; the second round will be five minutes.

We'll begin with Mr. Brison, from the Liberal Party.

Hon. Scott Brison (Kings—Hants, Lib.): Thank you, Mr. Chair.

I have a question for Mr. Best.

You cited that Canada ranks first in the G7 in terms of private sector investment in university research. You also referred to some challenges we have around commercialization. I'd like to understand how that is sustainable. If the private sector is investing significantly in university research, yet the commercialization is not occurring at the rate it ought to at the other end of the process, it doesn't strike me as being a sustainable situation, because ultimately the private sector tends to base investment decisions on commercial outcomes.

I'd be interested to know how we have those two seemingly divergent facts.

Mr. Robert Best: First of all, the question is where the private sector is having its research done. To the extent that it is funding some of the research in the universities, in many cases it's on a contract basis. When I talk about commercialization, I'm not necessarily talking so much about the results of that research directly funded on a contract basis in the institutions; when we're talking about commercialization, I think we're talking more generally about the wide range of research done in the universities, most often publicly funded, and how that research then makes its way to the marketplace.

In five minutes I didn't have time—in fact, I lost some of this as we practised, but I would stress that the relationships between universities and the private sector have become much more complex and much more extensive over the last decade. I think what we have come to understand is reflected in the S and T strategy: that commercialization is not like we used to think of it, a one-way push out of the universities, but is really about building partnerships and a complex network of interrelationships at various levels between the private sector and institutions.

When I say “challenges”, I mean yes, there's more we can do. We've made significant progress, not least in a change in attitudes on both sides, but I think there's room for more. Part of the challenge is that our private sector still does not often have the receptor capacity necessary to be able to take discoveries that have potential market applications and move with them, so part of the challenge is to build that capacity in the private sector.

Again, the S and T strategy notes that our private sector is better able to make use of and see the importance of people with advanced degrees who can form that crucial link. That's part of the challenge. To the extent that the private sector is doing research in universities, that relationship is being enhanced over time.

● (1130)

Hon. Scott Brison: If you look at the models, for instance, there wouldn't have been a Silicon Valley had it not been for a Stanford, and there's wouldn't have been a Silicon Valley had it not been for a very vigorous venture capital and entrepreneurial community there. If we consider that model for a moment, Canada probably needs a more vigorous venture capital industry, and that becomes an issue of government in terms of tax and policy, among other things.

Taking a look at what happened with Silicon Valley and the incredible boom on the technology side that is now being almost entirely focused on cleantech, how can we learn from that example and apply it to Canadian research and commercialization? What can we do with our universities, our capital markets, and our entrepreneurs here to try to recreate that? When you're making your investments, Mr. Phillipson, on behalf of CFI, do you involve venture capital community members and identify the kinds of early-stage technologies that they're interested in over the long term, for instance, like cleantech?

Dr. Eliot Phillipson: We don't specifically identify the venture capitalists, but we do—

Hon. Scott Brison: Do you use their expertise? Do you speak with them to identify the kinds of things they're interested in over the long term and try to determine a path that can lead to commercialization, based on their understanding of where the markets are going and what the world is really demanding?

Dr. Eliot Phillipson: It's really the institutions. Our applicants, as you know, are the institutions—the universities and the colleges. Because we fund only 40% and a great deal of the balance comes from industry, the institutions are generally in close touch with their industries, particularly regional industries that may have an interest. They are the ones that end up investing a significant part of the other 60%.

Hon. Scott Brison: Let's say we wanted to position Canada as the best place in the world to research, develop, and commercialize cleantech opportunities. In 2005 $30 billion was invested globally in cleantech; in 2006 it was $60 billion, and last year it was $150 billion. Are you saying that federally your organization cannot take that kind of focused approach and try to create those conditions within Canada on a national basis? You mentioned environmental sciences, but are you saying that you rely almost exclusively on what is coming up from the institutions to determine investment?

The Vice-Chair (Hon. Dan McTeague): That will have to be your last question, Mr. Brison.

Dr. Eliot Phillipson: Yes. That is, our applications come from institutions based on their research priorities, but they also reflect the government's priority research areas, so it's a two-way process. In other words, we may indicate the areas that the S and T strategy outlines are priorities, but the projects within each of those areas come up from the institutions that are most heavily focused on that particular area.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Phillipson and Mr. Brison.

[*Translation*]

Ms. Brunelle, from the Bloc Québécois, you have the floor.

Ms. Paule Brunelle (Trois-Rivières, BQ): Good morning, ladies and gentlemen, and thank you for being here.

As we know that there can be no research without researchers, I would like to put my first question to Mr. Best. In your brief, you told us that, with all the advanced degree-holders in the workforce who will be retiring, there will be a huge demand for renewal. On the other hand, you tell us that the OECD indicates that, compared to other countries, Canada is significantly behind when it comes to people holding doctorates.

My question is: what solutions do you have? I would also ask the other participants if this situation has repercussions for their organizations. Do we, for example, have to go and look for researchers overseas, or do we have enough in Canada to meet our needs?

Mr. Robert Best: Thank you for the question. We have to do a combination of things. First, without doubt, we must produce more PhDs here in Canada. For at least 20 years, we have looked overseas for a significant proportion of our PhDs, immigrants with doctorates. They are going to remain a significant source of our advanced degree-holders and we are going to have to be able to compete globally in order to get them. There is global competition for that kind of talent and for those PhDs.

At the same time, we are going to have to develop more talent and train more PhDs here. So we need investment, like scholarships, to encourage more people with the talent and skill to complete a doctorate to do so, often when they are in their 20s, and to make sacrifices in that quite critical stage of their life.

Scholarships are part of the solution, but universities also have to have the means to train these people. That is both a federal and a provincial matter. So it is a combination of things. At the same time, we have to do what we can to attract immigrants.

● (1135)

Ms. Manon Harvey (Vice-President, Finance and Corporate Services, Canada Foundation for Innovation): The Canadian Foundation for Innovation funds the infrastructure or the tools for research. Our experience over the last 10 years has shown that these tools have really helped to attract researchers to Canada. The new challenge is to keep them here. Our investment has been considerable and we must be able to sustain it. We have a lot of statistics that tell us that attracting and retaining people depends a good deal on the tools we use and on having laboratories on the cutting edge of technology. This helps with their training so that they go into industry afterwards.

Dr. Martin Godbout: For Genome Canada, given that we invest in very few projects—less than 110 of them in eight years—the good news is that the projects are very large-scale. This has had a huge impact on the training and recruitment of post-doctoral students and principal researchers who have joined and trained Canadian teams.

As you said previously, the competition is not in Canada, it is worldwide. Fortunately, because of the funding and the infrastructure that provides the necessary equipment and facilities, our statistics show that there has definitely been recruitment all over Canada in genomics and proteomics.

Ms. Paule Brunelle: Related to that question, are our efforts in research and development adequate on a more global scale? Are we investing enough compared to similar countries, whether the investment is financial, in the originality of our research, in the support we provide to our researchers or in our commercialization efforts? Is Canada doing enough?

Mrs. Michelle Gauthier (Director of research, Policy and Analysis, Association of Universities and Colleges of Canada): If you compare the situation 10 years ago with today's, you will see that the very significant investments in the last decade have changed our ability to compete internationally. Other countries are always improving their competitiveness. Our GERD to GDP percentage is 1.9%. Countries should have a figure of 3% to be competitive with, say, the top five in the world. This is only one indicator, but it shows that we should be continuing to increase our investment in the area.

I will add that this is not just a challenge for the university community or for the researchers that we would like to have in the university community. More than 60% of PhDs choose to work in other areas of the Canadian economy, whether it be for the federal government, for provincial governments or in the private sector. With all those different areas needing people with Masters degrees and PhDs, we need to invest more.

Ms. Paule Brunelle: Do I still have time, Mr. Chair?

The Vice-Chair (Hon. Dan McTeague): You have 30 seconds more.

Ms. Paule Brunelle: Dr. Godbout, Genome Canada funding is done through a foundation rather than through a funding agency. How is the accounting done? I recall having been at the Standing Committee on Public Accounts where the Auditor General told us about that. Could you speak to us about it briefly?

● (1140)

Dr. Martin Godbout: Absolutely. In the document I sent to you, you will find a table that summarizes the governance and the accounting. Genome Canada has to make regular financial reports to the Government of Canada. The responsible department is Industry Canada.

We do it in several ways. We submit a corporate plan every year. We have quarterly meetings of the Board of Directors, and a government representative sits on the board. We have policies, we have a series of financial reports, annual reports, a strategic plan and a corporate plan.

Then, we have had audits, not financial audits but compliance audits. The agreement between the Government of Canada and Genome Canada is a contractual one. It is a proper service contract. The contract states that the Government of Canada can, regularly and at its discretion, conduct not only financial audits but compliance audits: does the agreement reflect what we are doing? It can conduct evaluation audits, after all, we are talking about $840 million. Have we met the government's expectations? These audits are done regularly each year.

The Vice-Chair (Hon. Dan McTeague): Thank you, Dr. Godbout.

[*English*]

Mr. Colin Carrie (Oshawa, CPC): Thank you very much, witnesses. I'd like to get right to some questions here, because there are so many things I'd like to ask you.

Dr. Phillipson, I was wondering if you could comment. We have these big science projects here in Canada—you know, the SNOLAB, the NEPTUNE project, the light synchrotron. They seem to have issues with operating costs. I was wondering—do you recommend that the committee actually start looking at the funding for long-term operating costs for these big world-leading science projects that we should all be very proud of?

It seems that we haven't really looked at that. Could you comment, please?

Dr. Eliot Phillipson: You have identified a problem that exists with these large science facilities and projects in Canada. Over the years they have often been developed regionally, in a decentralized way, and funded and owned in a variety of different mechanisms. Some of them do not have ongoing major challenges with operating and maintenance; those you don't hear about, but you certainly do hear about the ones that do.

Most countries—in fact, all our competitor countries—have now developed an overall process or structure to handle their major investments in science and technology. In fact, with that in mind, the granting councils, the National Research Council and CFI, are addressing the problem—not the solutions, but at least they are identifying what the problems are, which facilities come in under this classification, and how other countries approach them.

Mr. Colin Carrie: I see it as an identified problem. As I said, I'm very proud of what we're doing, but I also looked at the governance structure, and it seems to be weighted very much towards academia and not business. I think one of the ideas was to get partnerships with private industry to help pitch in for those things.

Could you comment on the governance structure? Have you looked at that?

Dr. Eliot Phillipson: We are looking at the governance structure. As I've said, they've developed in a totally ad hoc way, often originating in universities or in other regional enterprises.

Overall they've served Canada well. As you said, many in the country are leaders in the world, so I don't want to give the impression that we haven't done well. It's just that, going forward, we need to do better by looking at an overall structure as to how they might be managed—the stewardship, the governance, all of the ongoing operating costs, all of the points you've mentioned.

Mr. Colin Carrie: Do you recommend that the government take a look at this in order to see what we can do for the future?

Dr. Eliot Phillipson: We think it would be useful.

Mr. Colin Carrie: So it would be a good idea.

The Vice-Chair (Hon. Dan McTeague): I think Mr. Best wanted to add something.

Mr. Colin Carrie: Sure, Mr. Best, go ahead.

Mr. Robert Best: Just briefly, clearly a number of our member institutions are involved, either as hosts or involved otherwise. Many of these facilities involve quite a number of institutions, including some private sector partners, provincial governments, and others.

It's fair to say that I agree completely with Dr. Phillipson that the models vary substantially and that what they're designed to do vary substantially. In some cases, the relationship with the private sector will be on a contractual basis. There will be a platform, a facility, in place where the private sector can come in and have research done on a contract basis. I think to expect the private sector on an ongoing basis to cover the operating costs of that platform facility is questionable in terms of whether that's the best way to do it. There may be times when it is appropriate. I think you have to take them one at a time.

I do think it is important that a framework be put in place—taking into account the differences, but a framework—before we take on any more of these projects. Right now what happens in a number of them is that the people run them, and in some cases the scientists are spending a lot of time cobbling together money, one year or two or three years at a time, to run these facilities rather than focusing on actually the science and the output.

● (1145)

Mr. Colin Carrie: I'm glad you brought that up. I've looked at the governance structure in the boards, and I hear from them that they're having problems getting private money. But the boards are all made up of academics. I'm just thinking that in terms of relationship-building and things like that, it would make sense to me to have some board members who actually have contacts in industry.

This kind of leads me to the next question. I wanted to talk to you about this. You are representing the Association of Universities and Colleges of Canada. In your opening statement, you just talked about universities. In Oshawa I have Durham College and I have the University of Ontario Institute of Technology. I've heard that there is a real bias out there with university research versus college—in other words, theoretical research versus applied research.

As I said, even in your comments you talked all about universities; you really didn't talk about colleges. I'm wondering if there's an inherent bias in our funding of research. Is this a legitimate concern? Could you comment on that?

The Vice-Chair (Hon. Dan McTeague): Mr. Best, you have about 30 seconds to apply your answer.

Mr. Robert Best: Thank you.

First of all, as to the question of bias in my remarks, we represent universities and university-level colleges, hence my bias. I can't speak for community colleges. I know that the ACCC does speak for community colleges; Jim Knight spoke to the issue here. I know that they are doing what they view as important applied research, and they're doing more of it. The universities also engage, though, in the full spectrum, from basic research through applied research, in a host of areas.

As to whether there's a bias in funding, I'd say university research is the full spectrum. I don't think anyone would suggest that the research being done in the community colleges is the full spectrum, from basic to the various types of applied research.

The Vice-Chair (Hon. Dan McTeague): That will have to be it for now, Mr. Carrie.

We'll turn to Ms. Nash of the New Democratic Party.

Ms. Peggy Nash (Parkdale—High Park, NDP): Thank you, Mr. Chair.

Hello to all the witnesses. Thank you for your presentations.

I'd like to ask a question to all of you about the best balance for Canada going forward in terms of our government investment of dollars. The CFI provides an opportunity for moneys—our tax dollars that are invested—to then partner with the private sector. I assume that many of the projects that get identified are identified because of the potential for commercialization, obviously, in order to get private sector money, which is important going forward. Also, we know that often basic research can lead to important discoveries and important opportunities that may have unanticipated consequences, in some cases. We need to get the right balance.

What should be the right balance going forward in terms of funding through organizations like CFI and anticipating or directing projects that we know will receive good private sector support versus funding through universities and research grants for basic research that may not initially have a commercial application that we know of?

Any of you or all of you, can you comment on that, please?

The Vice-Chair (Hon. Dan McTeague): Mr. Phillipson.

Dr. Eliot Phillipson: I'd be happy to start.

The balance of where the funding comes from depends to a considerable extent on exactly where in the spectrum, from fundamental research to commercialization, we're talking. Clearly the private sector, understandably, is reluctant and generally does not invest in very basic fundamental research. That's true not only in Canada but throughout the world. It is largely the responsibility of government—that is, the public sector—to invest in the very basic fundamental research simply because it is so far upstream that the potentially commercial products simply cannot be predicted. No one could have predicted all of the commercial benefits that would have resulted from Einstein's fundamental research, yet nobody today would deny it. But at the time, no one, including Einstein himself, could have predicted it. So that generally is a role for the public sector, for government.

When we move into technology development, where a considerable amount is done in colleges, there it is a much more balanced funding. We see there that there is public sector funding, but there is also more private sector funding. Once the technology is developed and it's moving into the marketplace, then it becomes predominantly the role of the private sector. The government's role there is largely to facilitate the private sector in terms of fiscal tax policy and other things.

● (1150)

Ms. Peggy Nash: In terms of how we're investing our tax dollars, do we have it right going forward? Should we be balancing more one towards the other? Or do we have the correct balance now?

Dr. Martin Godbout: I think we do. We have done a lot of catching up over the past eight to ten years.

I will take this opportunity to answer your question along with Mr. Brison's questions on...because we always benchmark with Silicon Valley. I had a chance, when I was a scientist, to work in Sorrento Valley in California, down in San Diego. It takes three ingredients: you need people, the scientists; you need good science; and you need money. Drop any one of the three and you won't succeed.

To answer Mr. Brison's questions vis-à-vis yours—

Ms. Peggy Nash: Well, I don't want Mr. Brison to take my time.

Dr. Martin Godbout: No, no, the questions are very related. He asked what the ingredients were and you asked about the balance. You have to do some cooking here.

The solution is time. It takes time. Don't compare Sorrento Valley or Silicon Valley with what we do today. In ten years from now, we will be able to do some benchmarks.

Do we have the right balance? I think we do. The question is sustainability. You will not see the results of investing $10 billion in research from the government next year. You won't see the results of that next year. It will take, in live science, 10 to 15 years.

One responsibility that Genome Canada has is to ask the applicants—those who apply to get the funds—to convince us that there is a potential application within five years. So we go from 15 to five. But we don't look for a return on investment. It will take time. It takes time.

Ms. Peggy Nash: Mr. Hüner, do you have a comment? You partly sparked my question with your comment on the underfunding of basic research.

Dr. Norm Hüner: I think the balance varies depending on the area. For example, I would think that the area of the environment now is a crucial area that government and scientists are focused on worldwide. The likelihood that you're going to get a commercializable product supporting environmental research is not necessarily obvious, yet the importance of this is unquestionable.

So I think the balance varies depending on the area, and depending on the probability of getting a commercializable product out of the area. The balance has to be also in terms of what is the long-term importance of the research itself in terms of the concerns of the government, the people, nationally and internationally. That's going to evolve and change over time. I think we have to be ready to let it evolve and change over time.

The Vice-Chair (Hon. Dan McTeague): Ms. Nash, I'm going to allow you a small question. There was some time taken away for the Liberals, and I made the deduction.

Ms. Peggy Nash: Thank you, Mr. Chair.

Mr. Hüner, are you saying that when it comes to certain areas of research, perhaps we don't quite have the balance right, and that in areas that are not obviously commercializable in the short term, we need to be augmenting our basic research?

● (1155)

Dr. Norm Hüner: I've been doing this research on the environment for 30 years, before climate change was a big issue. Issues arise over time, and we have to be sensitive to changes in issues. We can't put all our eggs necessarily in one basket, because it may not be that basket that we want to put them in 15 to 20 years from now. It's going to change over time, and we have to be sensitive to that.

The Vice-Chair (Hon. Dan McTeague): Thank you, Ms. Nash.

Mr. Simard, you have five minutes or less.

Hon. Raymond Simard (Saint Boniface, Lib.): Thank you very much, Mr. Chair.

I'd like to thank the witnesses for being here this morning.

I'd like to start by referring to one of Mr. Carrie's comments with regard to what we fund and what we don't fund. What we don't fund in a lot of cases are the operating costs. I find that in a lot of cases we are losing the provinces as partners. I've seen provincial ministers at openings of some of our nice big research facilities; they're very negative about them because they know they'll be stuck funding the operating costs over 10, 15, or 20 years.

Is this a fact or...? The provinces are a very important partner in any research project that we would do.

Dr. Martin Godbout: If you look in the package that we provided to you, there is a graphic showing co-founders of Genome Canada. Genome Canada receives $1 from the Government of Canada; by contract, we have to raise another $1 from another source. And it is not federal-provincial. We have to lobby—sorry for the expression—to get them on board.

When you look at the pie chart overall, Genome Canada is providing 40%; the province 17%; the foreign investors, the philanthropists, about 14%; the private sector, the VC, the venture capital, 10%; the federal government—it's my colleague Eliot Phillipson with the CFI, because we have to synchronize our competition for equipment and operating costs—about 8%; and finally, the universities, the institutions, provide 8%. When you have a commitment to raise money from other sources, you have to bring people on board.

The Vice-Chair (Hon. Dan McTeague): Mr. Simard, I see two others—Mr. Best and Mr. Phillipson—who are interested in answering. I'll allow both of them to respond.

Mr. Robert Best: Thank you.

If I understood your question correctly, it was specifically with regard to the operating costs on big science facilities.

Hon. Raymond Simard: Actually, it was any research project. In my riding of Saint Boniface, for any research project that we announce federally, the province is there. But they're saying, "You know, it's very nice; you guys come in, cut the ribbon, and walk away, and then we're stuck funding the operating costs."

Mr. Robert Best: On big science, on the specific issue of operating.... We have to be careful not to generalize, because some provinces in fact are contributing to the operating costs on some of them. It varies, and it varies with our own priorities, but it is the case that some are contributing.

Dr. Phillipson would be able to speak more, I think, to the leveraging of provincial and other partner funding for infrastructure projects across the board, because that's built right into CFI.

Hon. Raymond Simard: I'd like to move on, actually—

The Vice-Chair (Hon. Dan McTeague): I'll give you a few more seconds, Mr. Simard. We're a little more flexible here.

Mr. Phillipson, go ahead.

Dr. Eliot Phillipson: I can only speak for the projects funded by CFI, of which there are well over 5,700 now across the country. We actually did a study a couple of years ago on the ongoing operating and maintenance costs, and what you say is correct. You hear about those. But only 17% of the projects reported difficulties in the ongoing operating and maintenance costs. Now, they included, understandably, several of the large science facilities that were referred to earlier, because the magnitude of their costs is so great.

So there is a problem. We do work with the provinces before these awards are made in the first place. There is a problem, but I think it needs to be kept in perspective.

The Vice-Chair (Hon. Dan McTeague): Mr. Simard, go ahead.

Hon. Raymond Simard: Thank you.

Mr. Phillipson, we all understand the principle behind universities as centres of excellence. The concern I have, or that I've heard expressed, is that sometimes it's at the expense of smaller universities. So you would have the same university—U of T or UBC—receiving funds, and the more funds it receives, the greater the gap between that university and smaller universities, for instance.

Can you tell us on what basis you provide your grants and how you ensure an equitable distribution of funds?

Dr. Eliot Phillipson: Thank you. I appreciate that question.

Our awards are made on the basis of a rigorous assessment of merit, as I said. I won't go into the detail, but it involves expert scientists in the field first evaluating the science, then a higher-level committee—made up of a broader representation of academic, government, and private sector—assessing the potential overall benefits for the country, and then a third level. Our awards are based ultimately on the assessment of merit, as I've described it, albeit briefly.

When we actually look at how various-sized institutions fare as a percentage of their applications, it turns out that colleges in the country actually do slightly better than small universities and large universities. Small universities do second-best, and the large universities, the type you mentioned, are third in terms of the percentage of applications that are successful. The difference is the size of the applications, because the large universities are the ones capable of putting together the plans and proposals and maintaining some very large science facilities.

The other point that's important to keep in mind is that some of the largest awards are in the medical and health field, and there are only 16 medical schools in Canada. Therefore, in those smaller institutions you referred to that do not have medical schools, the percentage of their applications that are successful is competitive. It's just the size of the awards that is smaller, because many of their projects are in non-medical areas that don't require huge investments.

● (1200)

The Vice-Chair (Hon. Dan McTeague): Mr. Best, very briefly, please.

Mr. Robert Best: Thank you.

I anticipated that question might come, because I noted it had been raised before, so I did a little quick checking. The fact is that concentration is not a new phenomenon. In 1997, if you look at total federal support for university research, the top 15 institutions accounted for 75%. In 1991, the top 15 accounted for 74.5%, and in 2004-05 they accounted for 76%. At the bottom of that list of 15, some move in, some move out, but concentration is not new. It happens in other countries as well.

That said, our view is that excellence does not have an address. You will find pockets of research excellence, or the potential, in small, medium, and large institutions. The key is to ensure that those institutions have the capacity to compete in national peer-reviewed positions on the basis of their own excellence.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Best.

I will now turn to Mr. Stanton.

Mr. Bruce Stanton (Simcoe North, CPC): Thank you very much, Mr. Chairman.

I guess it's good afternoon now. Welcome to our witnesses.

You gave some very enticing presentations. As you can probably appreciate, most of us are not from the scientific community, unless of course you include the chair for his science in terms of managing gas prices.

The Vice-Chair (Hon. Dan McTeague): Let's not go there.

Mr. Bruce Stanton: Yes, let's not.

I have several questions.

I want to go back, Mr. Phillipson, to one of the points you made towards the end of your presentation. You said words to the effect that the global S and T picture is accelerating quickly, although we're doing well here in Canada. I wonder if you could follow that up and give some indication as to what implications that has for Canada. Is there something you might suggest or recommend we should address ourselves to?

Dr. Eliot Phillipson: That's a very important question. The global landscape is changing in the sense that there's a bit of irony. Research has become much more collaborative between jurisdictions, between countries, and at the same time much more competitive. The results of research are communicated now with the speed of light. And countries, particularly the developing countries—China, India, Brazil, Russia—that in previous years were not strong competitors with western countries in terms of science and technology are very rapidly becoming competitors.

That's one of the reasons—referring back to the question about PhDs—that Canada used to be a destination of choice for foreign PhDs to pursue their careers, if they were looking for a country into which to immigrate. They can now return to their countries of origin and have very successful careers. So our dependence, for example, on foreign-trained PhDs, which we've had in the past, will no longer serve us well in the future.

So the landscape has become much more competitive. Canada has done extremely well in the past decade for many reasons, but the driving reason was the tremendous investment by the Government of Canada through all the various mechanisms you had appearing before you. The implication is, though, that it's not one-time only. In other words, you can't say, well, we took care of research, so now let's move on to other things. It's an ongoing requirement. It's much like education. You don't educate one group of children and then move on to something else. So if Canada is to maintain its position in the science and technology world, we will have to sustain the type and level of investments we have been making in the past number of years. That doesn't mean it goes up continuously, but it has to be sustained at a level that will sustain our enterprise.

● (1205)

Mr. Bruce Stanton: That actually picks up on a similar theme to the one Mr. Hüner mentioned in his remarks as well.

I wonder if I could go to you now, Mr. Hüner. One of the things you mentioned in your comments was the difference between targeted investment and investment for discovery. Could you expand on that notion just a little bit more and comment on whether we have the right balance at the moment? What do those two terms mean?

Dr. Norm Hüner: Yes, as I mentioned to you earlier, to find that right balance, it depends on the area. For example, in the area of medicine—molecular biology, genetics, and so on—there's a tremendous potential for targeted research. There are other areas that are just as important that don't appear to have the potential for commercialization immediately, but if you're not investing in these areas now, what will happen 10 to 15 years from now?

If I can take a personal example, we've developed a sunscreen cream based on research done on photosynthesis. It has nothing to do with medicine. We've developed a sunscreen that has higher efficacy to protect against UV light than anything that's on the market today, simply because of evolution. Photosynthetic organisms have to deal with light all the time, and they've evolved a mechanism to do it. All we've done is exploit that. If you weren't doing research into the environment, you wouldn't have discovered it.

The Vice-Chair (Hon. Dan McTeague): Mr. Stanton, you have another minute, if you wish.

Mr. Bruce Stanton: Excellent. Thank you, Mr. Chair.

That was a great answer and a great example, by the way.

Finally, I'm picking up on the fact that we are representatives of the people here.There has been some talk about how we make sure these investments can come back to Canadians in the form of a more prosperous economy and how that translates to better wealth opportunities for individual Canadians. Connect the dots for me, in layman's terms, on how these important investments in science can in fact paint a better picture for Canadians in the years ahead.

Perhaps Mr. Best and whoever else I haven't heard from yet could answer.

The Vice-Chair (Hon. Dan McTeague): Mr. Best, then Mr. Phillipson, and I think that will have to be it.

Mr. Robert Best: Thank you.

If I may, I'll ask my colleague Dr. Gauthier to speak. She is working on our report, precisely on this issue of demonstrating momentum and how we demonstrate the benefits Canada will ultimately realize as a result of investments in research.

Madame Gauthier.

Mrs. Michelle Gauthier: I would say there are three key benefits that come back to Canadians. The first is in terms of the people who are educated and who become your adaptable, flexible workforce. We have and will show in the momentum report a number of statistics about what it means to have more university-educated graduates who have been trained or educated in a research-enriched environment and what that gives you in terms of your workforce and your contributions to society across all sectors when they come through.

The second is in terms of the knowledge generated for the country. We represent 0.5% of the global population. We're punching above our weight in that we generate over 4.5% of the global knowledge. What does that mean in terms of helping and in terms of breakthroughs across the country? We'll demonstrate a number of those key breakthroughs in cutting-edge areas as well as contributions across what I'd call the strategic reserve. A response to your earlier question about the balance between strategic priorities and strategic reserve is that after 9/11, we suddenly had a very big need for people who understood world religions, who understood and could speak a number of different languages that were key to resolving issues around terrorism. We didn't know the day before 9/11 that we would need them. But if we hadn't maintained that strategic reserve, we wouldn't have been able to call on them the day after.

The third type of contribution we make is in terms of the application of that knowledge generated through the people who embody it. That's in terms of how universities and research fuel innovation. I think we need a broader concept of what that is, that it's innovations in products, services, and processes, but it's also innovations in terms of behaviours and policies. So it cuts across the full scope of research. We'll be providing specific examples from institutions in the report, and I'd be happy to share some of them with you afterwards.

● (1210)

The Vice-Chair (Hon. Dan McTeague): Thank you, Ms. Gauthier.

We'll have to go very quickly, Mr. Phillipson. We're way over time.

Dr. Eliot Phillipson: I would concur with what Michelle Gauthier just said. To add to it in terms of outcome and long-term benefits, which I think was the point you were getting at, there are the economic benefits as a result of commercialization. I'll come back to that one in a moment.

It is important to keep in mind, though, that the benefits of research, even the economic benefits, in addition to enhancing our social foundations, may not be because of commercializable products. For example, in the health field, reductions in health care delivery as a result of better processes can exact enormous savings to the health care system even though it's not as a result of any commercializable product. Similarly, and in the health field in particular, quality of life is an important consideration in the vast majority of clinical cases. Improving the quality of life of a patient is not something that can be measured in dollars and cents.

Let me come back now to the—

The Vice-Chair (Hon. Dan McTeague): Mr. Phillipson, I'm going to have to stop you there. You can get that in on the second round.

I will now turn to *Monsieur Vincent s'il vous plaît.*

[*Translation*]

Mr. Robert Vincent (Shefford, BQ): Thank you, Mr. Chair.

Let us carry on in the same vein. I found it interesting when Mrs. Gauthier talked about the educated population, the application of knowledge and so on.

What percentage of the population does this benefit?

My second question goes to Dr. Phillipson. I understand that you were not talking about economic benefits, but I feel that Canadians investing so much money in your various spheres of operation expect some kind of economic performance. If it is only to train university people, they will want to know whether the investment is a good one that is going to the right place.

I hope you can give me some answers.

I will come back to you, Dr. Godbout. Do not worry. I will not forget you.

The Vice-Chair (Hon. Dan McTeague): Do you want to start with Mrs. Gauthier?

Mr. Robert Vincent: Yes, Mrs. Gauthier and then Dr. Phillipson.

The Vice-Chair (Hon. Dan McTeague): Who will be followed by Dr. Godbout.

Mrs. Michelle Gauthier: Fernand Martin, a researcher at the Université de Montréal, has done a study that he is about to publish. The study shows that the impact of the university contribution to the education of highly qualified people, together with their research activities, adds up to more than $50 billion over the last 20 years. This is the contribution to society in general terms. This macroeconomic indicator could well mean that 20% of the population has been educated at university in a research environment. Does that provide anything for the other 80%?

In fact, we can see that this 20% is generating much more than their share through their taxes that pay for services for all other sectors of our society, while they require less than 8% of the payments made by provincial and federal governments to support the services they need. So, in return, they contribute much more than the person whose lifetime salary is a million dollars more. It goes beyond the individual to society as a whole.

The Vice-Chair (Hon. Dan McTeague): Dr. Phillipson.

[*English*]

Dr. Eliot Phillipson: If you're asking for specific figures, which is a very legitimate question, these are hard to come by, but there have been studies and there are ongoing studies of the return on investment in research in a number of countries. In general, overall, the return is something in the order of seven to one. In other words, for every dollar invested in the research enterprise, ultimately there's a benefit, a return on investment in the order of seven dollars.

The difficulty is that, as Dr. Godbout mentioned, it's not an immediate outcome. It's not an assembly line where research goes in at one end and economic benefit comes out a short time later. Depending on the field, it can be 10 to 15 years, sometimes even longer, and it's not linear. We can connect the dots in retrospect, but it's very difficult to predict them going forward. Nevertheless, history has demonstrated that the dots indeed can be connected and that there is an economic return.

In addition to that, if I can take another 30 seconds, those of us who are in the research-funding organizations are not simply relying on history or faith that this will happen. We are trying to actually document it, and at CFI, for example, we are completing a study of spin-off companies at universities whose creation depended, to a considerable extent, on the infrastructure provided by CFI.

Now, keep in mind that the bulk of these investments have been made only during the past five or six years. There are already 94 spin-off companies that meet that description, and they have attracted capital investment through venture capital and IPOs of $1.1 billion. So this is just the early stages. In other words, we're talking about the first five, six, or seven years of CFI investments that have led to that sort of economic benefit. I anticipate, as we continue these studies and the further out we go, that we will see a much larger impact.

● (1215)

[*Translation*]

The Vice-Chair (Hon. Dan McTeague): You have a little time left, Mr. Vincent.

Mr. Robert Vincent: You say that you had an impact worth a billion dollars. But, since 1997, you have spent $3.75 billion. Perhaps one side of the equation does not equal the other.

Let us go back to Genome Canada and the new Biotron. I heard both your presentations, and I think that your research overlaps. Genome Canada talks about agriculture, research, large-scale agricultural projects, proteins. You talk about the environment too. You have also funded environmental projects. Biotron talks about climate change, earth sciences, plants.

Could these areas of research overlap? If not, are they similar? I am not very familiar with the areas. From your presentations, they sound similar. Are they completely different?

Dr. Martin Godbout: It takes a number of different tradespeople to build a house. We have people in two completely different trades. We deal with genes, with a genomic approach, the plans, the architecture. They have a more biological approach, more applied research. The two are complementary. The same applies to our partners; we make sure that things fit together, but we have two different groups of tradespeople building the same house.

Mr. Robert Vincent: At the same time...

The Vice-Chair (Hon. Dan McTeague): This will be your last question, Mr. Vincent.

Mr. Robert Vincent: Could the study not have been conducted in your facilities? I know that the Canadian Foundation for Innovation, the CFI, paid 40% of the Biotron project. It invested almost half the money needed to build another facility.

Dr. Martin Godbout: Let me assure you that there is no duplication of costs.

Mr. Robert Vincent: OK. That was what concerned me most.

Dr. Martin Godbout: I can put your mind at rest about that.

The Vice-Chair (Hon. Dan McTeague): Great.

[*English*]

Dr. Norm Hüner: If I may, yes, there is overlap. I think that's a very important overlap, because we use the techniques of genetics and microbiology to address larger-scale questions. Of course we have overlap in various areas to strengthen our approach in terms of understanding the environmental impact. So I think it's natural that there would be overlap, and necessary overlap to exploit the work that we can do in Biotron. So of course we have funding from individuals who receive funding from Genome Canada and other CFI projects that integrate into the Biotron.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Hüner. *Merci, monsieur Vincent.*

I'll turn now to Mr. Van Kesteren.

Mr. Dave Van Kesteren (Chatham-Kent—Essex, CPC): Thank you, witnesses, for appearing. I have a couple of questions.

This is a burning issue with me. I appreciate the work you do and I find it fascinating, and I suppose the areas you talk about in academic circles are probably the most exciting. However, as a parliamentarian—and I've not been at this long—I've wondered in the past about things like the forest industry, for example, which we just dropped the ball on. You're nodding, so I think you know what I'm talking about. Here's an industry that for years had the advantage of the 80-cent dollar, 65-cent dollar, and the Fins and Swedes came along and today they are producing all the innovation on it.

We've started something called a trucking caucus. The trucking industry is huge in this country. It delivers the produce that we as a producing nation and exporting nation have. It has devised and is telling us about the enviroTruck. Do you miss that? Are we missing those types of projects? I know, when we talk about 15 years down the road, absolutely that work has to be done. But the bread-and-butter stuff, the stuff that drives our economy—are we missing the industries that need help there? The universities can give them the assistance they need, and we can grow a whole new industry where we can do all these other things you're talking about.

Could you quickly comment?

● (1220)

The Vice-Chair (Hon. Dan McTeague): Mr. Phillipson.

Dr. Eliot Phillipson: I think you touched on an important point. You took forestry as an example, and it's a good example to the extent that historically our natural resource industries were very successful, but not necessarily investing a lot in their own R and D and innovation. In that sense, perhaps we have missed it. But I think those industries are very quickly realizing that the simple availability of the resource is no longer sufficient in today's competitive world. There are innovative ways of harvesting the resource, handling the resource, and adding value to the resource so that we don't simply—

Mr. Dave Van Kesteren: Do you go to them and say, listen, this is an important part of our economic sector? Do you go to the mining industries? Do you go the trucking industries and ask where you can help them in the universities to develop...not necessarily a better truck because the Americans are probably going to, or the Japanese, or the Germans will do that, but we can certainly make a better trailer. That's as an example.

Dr. Eliot Phillipson: The answer is yes. The universities are now working in several jurisdictions much more closely with their local industries. You mentioned automotive. CFI has funded a number of projects with the University of Windsor, for example, in partnership with the automotive industry. So those partnerships are occurring.

[*Translation*]

The Vice-Chair (Hon. Dan McTeague): Dr. Godbout.

[*English*]

Dr. Martin Godbout: Very quickly, four years ago we had a major issue with mad cow disease. We went to the industry, because it cost $1.9 billion of trade deficit with Canada and the United States. My board said, what can we do to help? We helped by providing the sequence of the bovine genome, which is about the same size as the human. The human cost $3 billion; we did the bovine for $53 million. And the human took 10 years; we did the bovine in 14 months.

To answer your colleague's question or Monsieur Hüner's, we had the technology, and we were ready to react. With the SARS virus, we had an epidemic; it was awful. Within 10 days, Canadian scientists sequenced the SARS virus. The platforms, the equipment, were there and we were able to respond very quickly.

The Vice-Chair (Hon. Dan McTeague): Mr. Van Kesteren, you have one final question.

Mr. Dave Van Kesteren: One final question. Well, the Standing Committee on Social Affairs, Science and Technology came out with a report, and I want your opinion quickly on intellectual property. As we invest, where should the IP go? Does it belong to the government? Does it belong to the researchers?

The Vice-Chair (Hon. Dan McTeague): Mr. Godbout, followed by Madame Gauthier.

Dr. Martin Godbout: Just very quickly.

In that context, remember when you talk about IP that 20 years ago Canada did not have a law on patent. If you take human health as an example, it takes 15 years to get the product on the market, from the bench to the bedside. We are just at the beginning of this phase because of the 20 years that we have a patent.

So to answer your question, yes, we do take care of it, very much. In the case of genomics and proteomics, the number of filing patents has increased tremendously. Who owns it? I think it should be owned by the institutions, not by the Government of Canada in our case.

The Vice-Chair (Hon. Dan McTeague): Madame Gauthier.

Mrs. Michelle Gauthier: There are different ownership patterns across the country in terms of whether it's researcher-owned or institution-owned. But studies are showing that it's less about who owns it and more about the strength of the technology transfer offices to be able to manage that intellectual property effectively, to be able to pursue the relationships with the business community, with the venture capital community, and to actually exploit its full value and ensure that there is the receptor capacity. When you look at the Canadian and U.S. technology transfer offices in universities, you see that those that have been in operation for more than 10 years have much better results than those that are fledgling, or new at it, and that is where we need to put more of our effort.

● (1225)

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Van Kesteren.

We'll have three more, and then we'll have to wrap it up. That will be Ms. Nash, then Mr. Simard, and then because of his good behaviour, the chair, Mr. Rajotte, will have the last question.

Ms. Nash.

Ms. Peggy Nash: Thank you, Mr. Chair.

You are all experts in scientific research, and I'd like to ask you which countries are the benchmarks. Which countries do you feel have got it right when it comes to investing in scientific research, having the right balance between basic and commercialized research, and having the right education policies? Is there a model you immediately think of that Canada ought to aspire to?

Dr. Martin Godbout: In the case of Genome Canada, we took the models of the United States, U.K., and Germany, and now the model of Genome Canada is being emulated, copied, by other countries.

Ms. Peggy Nash: Then we are the benchmark.

Dr. Martin Godbout: Slowly we are becoming the benchmark.

Ms. Peggy Nash: Thank you.

Would anyone else like to comment?

Dr. Eliot Phillipson: It depends again on which field. Canada is the benchmark in many respects. Certainly organizations like the Canada Foundation for Innovation and the Canada research chairs are being emulated internationally. They were the pace setters. They are unique.

Overall, which countries have it right? Each country is so different that I'm not sure this is a one-size-fits-all proposition. Each country will have to find its way. But if you're asking which countries have been very successful, the most successful, by and large, are the small western European countries—Sweden, Switzerland, Finland, Denmark—and Israel. But they are all small countries with quite different geographies. That doesn't mean we can't learn from them. We can, but I'm not sure their experience is directly applicable to the Canadian scene.

Mr. Robert Best: I agree. There is no single model. We have to learn from what is going on in a number of countries. More and more competitor countries are aggressively pursuing higher education and research as part of their national social and economic development policies and strategies. We can learn—I don't want to cherry-pick because we have to take the time to understand the context in which certain kinds of things are done in a country, and it's not our context. We look to a number of the countries Eliot Phillipson mentioned. We look to Ireland. We look to the U.K. We look to Australia. We look to the U.S. simply because it is much larger than we are, but it is next door and it has been enormously successful in this area in the post-World War II era. We can learn from all of them.

Ms. Peggy Nash: I hear you saying that we look around the world but we have to chart our own course.

Mr. Robert Best: That's right.

Ms. Peggy Nash: As my last question, I'd like to ask you what our major challenge is. What would you like to see us either look into or address in the work of our committee? I've heard concerns about when things are initiated—for example, the research chairs have no sustaining funding. That sounds very problematic and is something we may need to address. What do you think are the major challenges on which we should focus our attention?

Dr. Martin Godbout: In a nutshell, the Canadian innovation system works. The challenge is sustainability. We took 10 years to build it. Now it's time to collect the low-hanging fruit, and if we don't keep funding the Canadian system of innovation, we'll be in deep trouble.

There is a generation of scientists who are *mercenaires*. They will go where the money is, so please make sure we don't lose them.

The Vice-Chair (Hon. Dan McTeague): Is there anyone else on this?

Mr. Best.

Mr. Robert Best: Thank you.

Ms. Nash, you raised the issue a couple of times in questions about balance, but it's balance along a number of dimensions. It's not a target where we'll know we have the balance right and we'll stay there; it is always a work in progress. It is a balanced approach to targeted versus non-targeted research. It is a balanced approach to focus on the public versus private research. It is a balance between fundamental research and applied research, with commercialization applications. As a focus for this committee, that is very appropriate and very important.

My members would feel I was remiss if I didn't say that a particular priority for us is the issue I raised in my opening remarks about the institutional costs of research. It is a matter of the balance among the different types of investments the federal government makes. It's probably the least understood and least visible issue, but from the perspective of the universities it's perhaps most important to address ensuring that the institutions have the ability to provide that environment in which researchers can thrive. It means in part that when the federal government funds research through the research granting agencies and otherwise, it covers the full institutional costs. I mentioned that a bit in my opening remarks.

Thank you.

● (1230)

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Best.

Thank you, Ms. Nash.

Mr. Simard and Mr. Brison will be splitting up their time as soon as they can resolve that between themselves.

Mr. Simard.

Hon. Raymond Simard: Thank you, Mr. Chair. I will be splitting my time.

I wonder if I can ask both my questions immediately and ask for very precise and succinct answers.

The first one concerns a project in Winnipeg, Manitoba, where Ag Canada has actually partnered. It's called NCARM. The new government calls it CCARM. It's basically nutraceutical research, where a department of the government is involved directly with the university and a research facility. Some of the scientists actually revolve, so you could have Ag Canada scientists working within the research centre.

I think it's very innovative and creative. I wonder if that's the future and if it's being done elsewhere. It was the first time I'd heard of that, and I find that very creative.

[*Translation*]

My second question goes to Dr. Godbout.

You said that you had invested $840 million which leveraged a billion dollars from the private sector or from other partners. These are long-term projects.

Are there commercialization possibilities? Will there be long-term benefits to share from those long-term projects?

The Vice-Chair (Hon. Dan McTeague): The first question

[*English*]

could be answered by Mr. Best or others, and the last question by Monsieur Godbout.

Mr. Best.

Mr. Robert Best: Thank you.

On the matter of collaboration between federal departments and universities, there has been much public discussion about this. We canvassed our universities with a quick survey to see what kinds of collaborative relationships they had in place with federal agencies and departments. I was amazed by the number of them and the longevity of some of them. Some with Ag Can go back 30 years or more. So there really is quite a panoply of these kinds of relationships. They vary widely, but there is still room for new and innovative ones. They've happened below the radar screen. There's a great deal of that collaboration already going on.

The Vice-Chair (Hon. Dan McTeague): Mr. Phillipson is next, very quickly, and then Mr. Hüner.

Dr. Eliot Phillipson: Your question is a very good one. Partnerships are the order of the day in research. That is part of the evolving landscape. There's the old stereotype of the ivory tower, with researchers tucked away somewhere, having no foot in reality or connection with the private sector or government science. Those days are long since over. More and more of the projects are collaborative.

You mentioned the example in Winnipeg. There are several examples where the National Research Council, which of course is government science, is co-located on university campuses, the scientists are cross-appointed, and there is much more collaboration—and similarly with industry. So partnerships are the order of the day.

The Vice-Chair (Hon. Dan McTeague): Mr. Hüner.

Dr. Norm Hüner: The University of Western Ontario, in the department of biology, has a 50-year history of interacting with Agriculture Canada's station in London, Ontario, which is a huge research station. Over the last several years we've decreased the barriers and allowed research scientists at Ag Canada to be part of the department. So we have a continuous flow of individuals and research expertise between the federal department and our department. Agriculture Canada has been a major contributor to the Biotron itself.

The Vice-Chair (Hon. Dan McTeague): Monsieur Godbout.

[*Translation*]

Dr. Martin Godbout: People say that Genome Canada manages its money like a venture capital fund. That is good or bad, depending on whom you are talking to. When we invest in long-term research projects, we make sure that there can be an outcome of some kind within five years. I will give you two examples. The first is from Newfoundland where we identified the two genes responsible for right ventricular arrhythmia in the heart. We are talking about people 22, 23, 24 or 25 years old, with no cardio-vascular symptoms but who suddenly die without warning. The Newfoundland government has offered to do free genetic screening tests for their families. When the defective gene is detected, the person is given a pacemaker and they survive. So there is a very significant social and economic impact.

The other example is from Quebec City, where Dr. Michel Bergeron's research has developed a device into which a drop of blood or saliva can be placed. When someone comes to Emergency with a two-year-old with fever, no one knows whether the flu-like infection is bacterial or viral. If it is bacterial, the patient can die. Doctors prescribe antibiotics to reduce the risks. But now we can find out within 45 minutes if the infection is bacterial, and, if so, the kind of bacterium and the antibiotic needed. The good news economically is that the multinational company Becton Dickinson has announced that it will invest $300 million in the Quebec City technology park so that it can manufacture and develop the product.

● (1235)

The Vice-Chair (Hon. Dan McTeague): Thank you, Dr. Godbout.

[*English*]

Please be very quick, Mr. Brison.

Hon. Scott Brison: Mr. Phillipson, you mentioned environmental sciences as being a particular area of focus. Does the government determine that area of focus or provide that direction or focus to you? Environmental science, as you said, is its focus.

Dr. Eliot Phillipson: Right. It's one of the four areas I identified—

Hon. Scott Brison: Does that come from government?

Dr. Eliot Phillipson: Certainly the S and T strategy identified the four strategic priorities, of which environment is one—

Hon. Scott Brison: What are the key silos within environmental science that you believe will be the areas giving the greatest opportunities? What are you focusing on?

Dr. Eliot Phillipson: Perhaps I can just back up, because you asked whether government gave those to us, or you implied it. The answer is that government priorities reflect the reality on the ground—in other words, what Canada's strengths are. The four priority areas that were identified were not as—

Hon. Scott Brison: No, no—I mean, within environmental sciences, where is your focus?

The Vice-Chair (Hon. Dan McTeague): This will be the final question.

Dr. Eliot Phillipson: CFI per se doesn't have a focus. We focus our resources where the most meritorious applications are focused. We don't specifically identify one particular area.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Brison.

[*Translation*]

Mr. André Arthur, please.

Mr. André Arthur (Portneuf—Jacques-Cartier, Ind.): Thank you, Mr. Chair.

I would like to continue along the same lines as Mr. Stanton and Mr. Vincent.

The Government of Canada has an obligation to invest in scientific research, but it also has an obligation to justify its actions to its citizens. So you have the obligation to help the government explain to Canadians what they get in exchange for the considerable financial contribution they make to universities to which they likely have no intention of sending their children.

When we spend a lot of money to send athletes to the Olympic Games, maybe one gold medal comes back. It does not happen often. The Canadian culture of mediocrity means that very often athletes placing twentieth at the Olympic Games come back saying how well they did, and no taxpayer should believe that.

In the field of scientific research, if you look at things from the point of view of the ordinary taxpayer and not from the point of view of a self-satisfied university professor, can we come up with a criterion, a test, that an ordinary citizen can use to see how his hard-earned money has been used by the scientific community? What would you be prepared to do so that a labourer who pays his taxes with the sweat of his brow can be kept up to date on the results? In that way, that ordinary citizen would not be mad at his government because he handed over so much money, and yet—to continue the analogy of the Olympic Games—precious few Nobel Prizes have been won.

The Vice-Chair (Hon. Dan McTeague): Would anyone like to answer that question?

Let us hear Dr. Godbout first, then Mr. Best.

Dr. Martin Godbout: Having been a national team member myself, I know what you are talking about. You are an expert in communication. Researchers have a huge need to communicate with the public.

[*English*]

Some have it; some don't.

[*Translation*]

You are from Quebec City. Professor Fernand Labrie has the opportunity and skill to communicate with the public. We know that his work on prostate cancer has had problems and breakthroughs. Still, not all researchers have his ability to communicate with the public. So the priority is to communicate through newspapers, through the press and through television. They are not all Wayne Gretzky. So those who fund the research also have the responsibility to communicate with the public about the research and say what is going well and what is not. We have done that at Genome Canada. Our target audience is from 12 to 18 years old. They are going to be deciding whether they will have a career in science or not. We want to tell them about the career possibilities.

When the taxpayer shows up at the hospital with his child, he has no idea about all that. The child has a fever and the mother is in tears because the child could die. In 45 minutes, we know that the infection is viral. We give him aspirin, send him home, and it is gone in two days. If the infection was bacterial, he could die. That technology was just developed by a researcher in Canada.

● (1240)

Mr. André Arthur: I had to come to Ottawa to find that out, sir.

Dr. Martin Godbout: Exactly. So we have a communication problem. It was never in the headlines. I take the blame for that. We have to do it, we have to publish results of research like we publish results of hockey games.

The Vice-Chair (Hon. Dan McTeague): Mrs. Gauthier.

Mrs. Michelle Gauthier: I have two quick comments.

First, I agree about the communication. We have to do more of it. That is precisely one of the reasons that led us, three years ago, to publish our document called *Momentum* in English and *En plein essor* in French. A new version of the document is going to come out in October. We will not be sending that hundred-page document to every home in the country. But we will think of other ways, our website, for example, to communicate research results and to explain why Canadians should be interested.

Second, we now have had two opportunities to put together discussion groups in five or six places across the country and we found it very interesting. I told myself that the people we talked to would probably neither appreciate nor understand the value of research. I was very surprised to see the extent to which people who had never set foot on a university campus, had never read research results, could explain the extent to which university research was important for them, and not just in terms of its financial value. Through the moderator, we told them that it was only important if there was an economic benefit. They said no, what was important was understanding their culture and their history, promoting their language and making sure that everything was well with their families. They said that it was very important that university researchers should help them to do all that.

I was very encouraged by that. I will not say that our work is done, but, for us, it is a sign that Canadians understand the importance of these contributions.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mrs. Gauthier.

You time is up, Mr. Arthur.

Before turning the chair back to Mr. Rajotte, I would like to know if it is possible for us to extend our meeting to 1:15 p.m. to allow Mr. Brison and the chair to each ask a quick question.

[*English*]

Mr. Brison, you can have a very quick question.

Hon. Scott Brison: Sure. Thank you very much.

First of all, I agree that the progress made in the last 10 years has been important to Canada, and important to our social, human, and economic progress. I think we have to, if anything, ramp up investment in basic research.

The reason I was asking the question on whether there is an area of focus within environmental technologies is because part of the success with the relationship between universities such as Stanford in Silicon Valley, as an example, is that there is a great deal of cooperation at the outset in terms of overall focus over the next 5, 10, or 15 years in terms of what the venture capital community believes to be the best opportunity. The collaboration does not begin when the stuff comes out; it begins in terms of prioritizing how your granting councils and others will consider what you actually find most meritorious.

Firms such as Kleiner Perkins Caufield & Byers, or Khosla Ventures, and others are making decisions on cleantech, for instance. They're focusing on wave power, various next generations of solar, carbon dioxide capture and storage, or cellulosic next-generation biofuels, but they're making a decision in terms of what silos have the greatest opportunity—water purification and reclamation, toxic site cleanup—and they're making those kinds of decisions.

You said that CFI does not have that kind of focus at the outset. It's basically what applications come forward, and then you determine what is meritorious. I would assert that it makes an awful lot of sense for you and for governments to consider a slight change in that approach and to actually express that we are greatly interested in particular silos where Canada can be a global leader, and to actually engage the private sector at that stage as well—not to micro-manage individual projects, but to at least directionally provide that kind of leadership.

● (1245)

The Vice-Chair (Hon. Dan McTeague): Thank you for that very short question, Mr. Brison. Mr. Phillipson will be the only one to answer it.

Dr. Eliot Phillipson: I'll try to give an even shorter answer.

I did not mean to give the impression that that's not important. That sort of discussion goes on between the institutions and their private sector partners. Right from the outset, there is that sort of discussion. I thought you were asking whether CFI specifically directs what—

Hon. Scott Brison: If we're going to have a national strategy, a national granting council has to provide that leadership.

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Brison.

Mr. Phillipson, very quickly.

Dr. Eliot Phillipson: Well, we do provide it, in that we ensure that it's only the most meritorious projects, and part of the assessment of the merit is their potential economic and social benefits.

The Vice-Chair (Hon. Dan McTeague): Thank you.

Now I will turn to Mr. Rajotte.

It's a pleasure hearing you from that side of the table, Mr. Rajotte. No doubt your question will centre on gasoline and RESPs.

Mr. James Rajotte (Edmonton—Leduc, CPC): Thank you very much, Mr. Chairman. Thank you for chairing this meeting so well.

I want to thank all of you for being with us here today.

I want to address perhaps a couple of issues, one for certain. I appreciated all of your submissions, but I'm going to touch upon a submission by the AUCC. I think they do a very good job of outlining the implementation of the S and T strategy.

You talk about four things: talent, for example the Vanier scholarships; the direct costs of research, through the granting councils; institutional or indirect costs of research; and research infrastructure, the best example being the CFI. A challenge for any government is that when you get agencies, councils, or others coming forward to you, they always present a very solid argument as to why that particular agency deserves more funding. It's a very tough choice that the government has to make in terms of allocating a ratio. So I'm going to put the AUCC on the spot, and others can comment if they want.

Suppose in the next budget—you can use whatever figure you want, $100 million or $1 billion—the government had that sort of fiscal room, say $100 million. At this stage in our R and D situation, what percentage would you put towards talent, what percentage towards direct costs, what percentage towards institutional, and what percentage towards research infrastructure?

The Vice-Chair (Hon. Dan McTeague): Thank you, Mr. Rajotte.

Mr. Best.

Mr. Robert Best: Thank you, Mr. Chairman.

I did anticipate the question, but I don't have a pat answer—not surprisingly, I think.

It is a very important question. I'm not going to have an answer today that it ought to be 40-20-20. We are working on it. I'm not sure we're going to come up with ratios, but there are two points I would make.

First of all, I don't think we can divorce the question of the ratios from the question of the overall level of funding. I think the starting point has to be, how are we doing against international competitors, and within that, how do we allocate the investments to make sure we remain competitive? I know you didn't pose it this way, but I frequently had it posed to me by officials: let's assume there's not another dollar; how would you divide up the existing pie? Well, it's not a conversation that I think is useful, and I know you didn't pose it that way. But I do think the point needs to be made that the starting point is how we are doing against the rest of the world and our competitors.

As to the relative balance, the one other point I would make, which I made in our opening presentation, is that for our members the issue of institutional costs remains the overriding priority. We feel that moving to a minimum 40% reimbursement rate is crucially important. So that would be our priority.

That's as far as I would go in offering up numbers as to ratios.

The Vice-Chair (Hon. Dan McTeague): Mr. Phillipson.

Dr. Eliot Phillipson: I will take a stab at giving some numbers.

If we look back now at the first seven or eight years of CFI's existence, we see that because there had been such a deficit in infrastructure in universities, the percentage of the total federal research investment, as you've put it, that went into infrastructure averaged 27% of the total. Two years ago when we were making our presentations, we said that we thought 20% now would be sufficient, and that is to both sustain the investments at state-of-the-art level and ensure that we can continue to invest in new facilities, but some of the back-up, the catch-up, had already been done.

That figure, interestingly, we arrived at by looking at Canadian needs, but it turns out that it is very much in keeping with what other countries are doing. In the U.S. it's 22% to 27%, in Australia 20%, and in U.K. 22%. So for what that's worth, compared to other countries, it's something in the order of 20%.

And without going into the detail, you might say, how did we get there? We looked at costs, what the depreciation is, the scientific depreciation on the equipment and the infrastructure, and what it will cost per year to maintain it at state-of-the-art level. So that was the sustainability fees, and then we added in what we anticipated would be needed for new emerging areas in which we had not previously invested.

It's a very crude calculation, but it's an attempt to answer your question.

● (1250)

The Vice-Chair (Hon. Dan McTeague): Very briefly, Mr. Godbout, and then we'll have to wrap up.

Dr. Martin Godbout: For the genomic field, again it's hard to compare, but after eight years, 80% is going to operations for the projects, 15% for infrastructure and equipment, and about 5% to 6%, the rest, for the G and A, the general administration.

Mr. James Rajotte: Thank you.

The Vice-Chair (Hon. Dan McTeague): Thank you very much, Mr. Chair.

Witnesses, thank you very much for being here today. This is the first of many more to come. We are going to do an in-depth study. There has not been one done by this committee in a very long time, and we do plan to continue with the good work efforts and the ideas that you presented here to the committee today.

I want to thank colleagues as well for their thoroughness.

We are going to go in camera and very briefly then finish the fourth report of the subcommittee on agenda and procedure.

[*Proceedings continue in camera*]

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