RE$EARCH MONEY

The 10th Annual RE$EARCH MONEY Conference
in collaboration with the
National Research Council of Canada

Priming the Pump:
The Role of Government Research Support in Business Innovation

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Conference Proceedings

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Welcome & Opening Remarks
Jeff Crelinsten & Mark Henderson

Henderson noted that this conference represents the first featuring a formal collaboration with the National Research Council, an organization that is re-structuring to better serve its clientele in the face of changes that are sweeping the global economy. "Throughout Canada's innovation system, change appears to be in the air. Canada is indeed at a crossroads in the development of its innovative capacity, but the current environment is fraught with some uncertainty at this point."

He credited that uncertainty to two major initiatives being undertaken by the federal government: the expert review panel on research and development, headed by Open Text's Tom Jenkins; and the forthcoming Digital Economy Strategy. The impetus for each of these initiatives has been Canada's persistently low ranking on innovation in various reports, and they should be key to ensuring the country's future competitiveness and productivity. "It could dramatically alter the innovation landscape as we know it, determining the success or failure of Canada's efforts to transform itself into a true knowledge-based economy and society."

This year's conference theme was therefore intended to examine the ingredients of a successful innovation system where business success is supported by effective policy, regulations, and programs. This theme also parallels the mandate of Jenkins' R&D review panel, which is to provide recommendations for maximizing the effect of federal programs that contribute to innovation and create economic opportunity for business. Canada differs from many of its competitor nations by offering most of its support for business innovation indirectly, primarily through tax measures, which has led some observers to call for a greater degree of direct support such as a partnership program.

Introductory remarks
John McDougall, President, National Research Council

Beginning with an overview of NRC's role within Canada, McDougall described the institution's role with respect to research and innovation. Further to Henderson's comments, he described Canada as a strong supporter of R&D, albeit doing so largely in an indirect manner through tax incentives, rather than through direct public investment.

"Successful innovation economies typically have things called 'research and technology organizations', that live in this middle ground between academic research and the industrial market," he explained. "The purpose of these organizations is essentially to help create value that is ultimately deployed in the marketplace by companies."

> "As Doug Barber would say: it's not innovation until it's commerce and enterprise."
>
> — John McDougall, President, National Research Council

At the same time, the public ownership and not-for-profit status of research and technology organizations poses a certain challenge. "They're really designed to be agents of economic development," he said, although their success depends on the extent to which they are market-driven. In this light, NRC set itself a mandate of becoming the most effective research and technology organization in the world, thereby stimulating sustainable domestic prosperity. The overarching goal would be that of positioning Canada as a world leader in innovation.

"In order to do that, we have to carry out particular tasks — those tasks include strategic research, provide technical services in the form of standards certification, problem solving, and consulting, and other kinds of support that would help Canada meet its current and future industrial needs." In addition, initiatives such as IRAP (Industrial Research Assistance Program) make it possible for companies to partner with NRC in order to move their own R&D agendas forward.

With 4,000 employees and an annual budget that has sometimes topped $1 billion, but currently averages around $750 million, NRC's history is populated with high profile accomplishments, from industrial products like concrete for harsh climates or aviation black box systems to medical innovations in the form of vaccines, pacemakers, and virtual surgery technology.

With respect to Canada's place in the world in the future, McDougall placed Canada's priorities within these six categories:

1) natural resources — "We're a small population in a very large country, so we are in a sense fortunately well endowed with natural resources. That creates an obligation to use them well, and to take advantage of them for the benefit of the world."
2) environmental challenges — These stem directly from our abundance of natural resources, which must be developed in such a way that they do not despoil the country's ecological integrity. Canada is also a highly urbanized population, creating a disproportionate share of the world's environmental burden.
3) health — More specifically, McDougall cited the increasing cost of the health care system, raising the prospect of balancing the quality of care against the ability to deliver it effectively to everyone.
4) security — This term applies to different forms of security, from personal safety to the standards applied to critical infrastructure or the financial system.
5) change — "We see the need to help our communities adapt to change so that they can function effectively."

6) economic growth and sustainability — Identifying sectors that are strong today, and determining how they can remain so in the future.

As a broadly based research entity, NRC deals with cutting edge work in astronomical sites as well as in the garages of ambitious inventors and engineers, and everything in between. By way of taking stock of this range of activities, McDougall organized them in four areas:
1) strategic research and development
2) technical services
3) Industrial Research Assistance Program (IRAP)
4) managing scientific infrastructure for the benefit of Canada

"Everything we do now fits into those areas. NRC remains and will remain a strong supporter of private sector R&D. We are going to be more outcome-oriented, more collaborative; we're going to ensure clarity around goals, and contribute to Canada's science and technology agenda."

Keynote speaker: Rick Harwig, Harwig Innovation Services, the Netherlands
"Open Innovation and Government Support in Innovation"

By way of introduction, NSERC Vice-President Janet Walden recounted Harwig's career and in particular his role as Chief Executive Officer for Philips Research. "In that role, he really drove the concept of open innovation as a leading theme within Philips, and inspired the emerging high tech campus at Eindhoven to become a unique open innovation centre in Europe, with more than 80 diverse partners that collaborate in R&D, innovation, and venturing, making it a key point for the private sector in the Netherlands."

> "There are many businesses in this world that go beyond earning money. They would also like to do a decent job for society and would like to leave something for their children, which is actually the main reason why I'm doing what I do today."
>
> — Rick Harwig, Harwig Innovation Services, the Netherlands

Harwig began by explaining that while he engages in a variety of R&D activities, much of his work focuses on energy, which he employed as the template for his account of how innovation functions. He began with a description of the R&D "ecosystem", indicating that most economies on a regional scale remain incomplete, and therefore depend on cooperation across various sorts of boundaries. In Canada, for example, such co-operation would take place between provinces; in Europe, this means the even more ambitious prospect of international co-operation; even globally, we are beginning to see co-operation emerging between major players such as China, Europe, and the United States. "It's interesting to look at global, innovative markets and then have a triple helix — the co-operation between knowledge institutes, business, and governments."

Citing the manner in which the Netherlands was literally constructed by hand — the medieval establishment of dikes and water boards that are still operating today — Harwig maintained that a country's history determines its character, which in this case is a tradition of broad co-operation for common goals. By way of building on this tradition, he described a virtual innovation network called Brainport, which unites R&D activities in the southern part of the country to create an economic powerhouse. He noted that this arrangement can build on strengths, such as enhancing the region's strategic location for goods coming into Europe, as well as addressing weaknesses, such as lagging in the adoption of renewable energy.

Outlining the impact of Brainport, Harwig stated that the region contains just 16% of the country's population, but is responsible for more than half of the country's patents, more than half of the private R&D, about a third of all exports, and a quarter of the R&D employment. "There are a lot of very high value-added activities, and companies like Philips, ASML, and NXP Semiconductors are large companies that spend many hundreds of millions of euros on R&D every year."

Eindhoven itself, although it only has about 220,000 people, has become well known for these activities. The rise of ASML as a leading semiconductor manufacturer is an example of how the region nurtures talent and economic potential. In addition to helping companies through downturns by enabling employees to return to school until business picks up, Brainport has also built a number of important R&D linkages between businesses and universities. ASML's success has been profound, garnering a majority of the world market for its products and weathering a serious economic downturn. "I've seen this change from a relatively academic environment, with a scientific way of working, to a pretty open business-oriented community that actually goes with an innovation attitude rather than a scientific attitude." This is also reflected in the support for R&D, which now emphasizes private investment along with public support.

When Harwig arrived at Philips, he found the organization to be fairly closed, which limited the freedom and enjoyment of those working there. He contributed to dismantling silos within the company, as well as erecting buildings that would unite research initiatives. He conceived of an open system of innovation that was premised on the analogy of a funnel, drawing ideas from as many different places as possible and directing them into the institution.

> "We went from the laboratory as our world to the world as our laboratory."
> — Rick Harwig, Harwig Innovation Services, the Netherlands

Among the challenges he has been dealing with are the ultimate disposition of various ideas, including the IP. "We have learned to work with intellectual property that is common access, shared, and dedicated. You have some of each, and the question is how to do your portfolio in these three buckets, so that as a company you have a position but also contribute to the community."

Harwig then introduced a complex matrix with four components on each axis. One axis represents variations based on ideas that are new to the world (a genuine invention), ideas new to a particular company (but another company may already have embraced it), ideas new to the category (representing a new business unit), or new to the product (an improved product). The other axis refers to businesses that are emerging, growing, maturing, and declining. The various combinations within this matrix reflect the wide degree of variation surrounding how new ideas appear and are handled, so that on the one hand you can have a great deal of innovation from an emerging firm that makes little impact because the firm has little weight in the marketplace, while in contrast a modest product improvement in a mature enterprise can have a much greater impact, given the existing reach the business has already provided for that product.

"We learned that it is better, if you establish a new idea, to give it a separate name and work with dual branding." This can simplify matters when you do not know if this business unit will be brought under the wing of the overall company or sold off. The latter prospect is easier if the unit in question is not seen to be affiliated with the main company.

> "Whatever you do, it has to be constructive for people as well as the business. If you do that, then much more is possible than you would think in ordinary, old-fashioned, multinational terms."
>
> — Rick Harwig, Harwig Innovation Services, the Netherlands

He cited a model from Heidi Mason and Gordon Bell of Silicon Valley, academics and entrepreneurs who learned how to describe this process. "One of the most important things is to describe how you will hit the first pin in a bowling alley. It is helpful to participate in the intellectual effort to describe the business rationale." This is the equivalent of asking who will be the first customer to actually pay you for your goods/services. He acknowledged that markets vary, depending on the nature of the enterprise doing the market, and factors such as the population density of the intended marketplace. Nevertheless, he insisted that a first customer can and should always be found.

Turning specifically to the issue of solar power, Harwig showed a map with locations around the world with good potential to generate solar power, contrasted with locations with good potential to receive solar power. While these locations seldom overlap, that should not prevent the development of major generating capacity. For example, Germany has become a leading adopter of solar technology, even though its available sunshine is much less than many other parts of the world. Small firms at Eindhoven have been able to take advantage of this development, marketing to Germany as well as to France. The Netherlands, on the other hand, only has a few demonstration projects, rather than a wider embrace of this technology.

"There's always a business, and it pays to have a model to co-operate."
— Rick Harwig, Harwig Innovation Services, the Netherlands

A questioner noted that the Netherlands was where the concept of the limited liability firm first emerged, then asked Harwig about the extent to which this aspect of Dutch culture drives the collaborative approach. "It helps, if you're a small country and you know you need the rest of the world as your market, so we are pretty humble when it comes to business," Harwig replied. "People have learned that it pays to co-operate."

Another question addressed the role of government in the establishment of an R&D ecosystem. Harwig credited EUREKA, the 40-member EU network founded in 1985 to promote international, market-oriented research and innovation with direct support to small and medium-sized enterprises, large industry, universities and research institutes. "That has given — with a lot of red tape, frustration, and blood, sweat, and tears, I'll add — an environment where people have learned to co-operate, to do the bureaucracy, but also deliver." Skepticism about this strategy has steadily been replaced by enthusiasm, he noted, as the network has grown to handle challenges such as IP and contracts.

Keynote speaker: Alistair Nolan, Senior Policy Analyst, Directorate for Science Technology and Industry, OECD
"International Trends in Business Innovation Policies and How Canada Measures Up"

Nolan set out to highlight salient findings from a study the OECD completed at the end of 2010, "Business Innovation Policies: Selected Country Comparisons", which was conducted at the request of Industry Canada. His stated goals also included a discussion of good practices for innovation support by governments, particularly with respect to fostering demand, as well as the challenge of evaluating policy and some open questions facing Canada.

He began by referring to a document that is fundamental to any discussion of innovation, the OECD Science and Technology Industry Outlook, which is produced every two years. The 2010 edition shows the growing attention to demand-side aspects of this subject, such as employing public procurement or other public investment strategies to channel innovative activity. Many countries around the world are adapting their tax systems toward this end. Among the trends has been a shift away from supporting military R&D, with a new emphasis falling on fields such as biotechnology, information technology, and nanotechnology being applied to health, energy, and the environment. Policies are also focusing on knowledge networks, including investments in IT networks or improving access to public research data. The activities themselves are also occurring more often within network settings, including private-public partnerships. Above all, governments are assigning unprecedented importance to evaluation, in light of making the most of scarce funding.

> "We actually have very little evaluation, surprisingly little good evaluative evidence about what works in some of the key instruments that policymakers are deploying, and almost no good evaluation of the demand-side policies."
>
> — Alistair Nolan, Senior Policy Analyst, OECD

Showing a graphic comparing Canada with a number of other countries, Nolan pointed to findings that show Canada is performing well in a number of areas, especially human resources, skills, post-secondary education, scientific publications, and the share of occupations that have science or engineering content. By some measures, however, Canada does not fare as well. For example, the gross expenditure on research and development (GERD) as a share of national wealth (GDP) has actually been declining since 2005. Canada's proportion of business R&D is especially low, reflecting much less venture capital activity relative to the size of the economy.

In a comparison between countries of direct support (such as grants or subsidies) for R&D, Canada does not stand out; when indirect support (such as incentives that would forego tax revenue) is incorporated, however, Canada is almost without rivals. Other countries, like the United States, reverse this strategy, placing far more emphasis on direct support.

Nolan noted there are advantages and disadvantages associated with each approach. Direct support can be targeted to areas with desired social returns, assigning these resources to undertakings that need help to complete their R&D work so they can enter their market. Direct support can also pose complicated design and review processes, which can be minimized to some extent by making the program's goals more generic. The latter could take the form of generalized "innovation vouchers" for R&D support services, at far less cost than a dedicated system. By the same token, these vouchers could be redundant, sponsoring recipients to seek support that they would have pursued even without such an incentive.

Meanwhile, indirect support is non-discriminatory, easily implemented through an existing tax system, and neutral with respect to the type of R&D being conducted. On the other hand, the possibility of redundancy is high, with credits going to companies that did not need this incentive to conduct this work. There has been some evaluation of support schemes for R&D, but Nolan insisted that more evidence is needed to illustrate the costs and benefits of tax credits for society.

Governments are also providing support in other ways that support innovation without supporting R&D specifically. This can include enabling access to early stage equity financing, promoting business networks, making information more accessible, and above all, facilitating the creation of new enterprises. With respect to good practice in this area, he emphasized the need to dovetail any approach with market mechanisms. Citing simulation studies carried out by University of Warwick researcher Gordon Murray, Nolan noted that when governments partner with private firms in ways that allow for

private management and optimal returns to those firms, the results are superior to other approaches.

In this same context, private partners within business networks that have been created with public support tend to lose interest in their partnership once that public support ends. Rather than serving as a mainstay for these networks, then, public agencies would do better to promote the demand for networks amongst private participants, such as by advertising opportunities that could be opened up through this kind of co-operation and perhaps allaying any concerns that those participants might have about interacting in this way.

> "Public development agencies frequently approach the private sector with a menu of services, with an agenda, rather than going to the private players and trying to raise demand for network-type services, which can then be met by the public sector. They can act in concert with market-demand, with market needs, rather than deciding *a priori*, what the market requires."
>
> — Alistair Nolan, Senior Policy Analyst, OECD

Nolan sees the same problem besetting business incubators, another popular initiative. "You see in many countries that governments start to become landlords. They invest in physical space; they buy buildings. They're tying up scarce public resources in stuff, in bricks and mortar, which they don't need to do."

Speaking in more general terms, Nolan argued that programs designed to address problems in commercialization of innovation should be tailored to the specific shortcomings that are perceived to be taking place. If, for example, the assumption is that firms are not taking advantage of particular services because they do not know those services exist, then any effort to raise awareness of those services should be a temporary measure, rather than an ongoing one. On the other hand, if some structural problem is responsible, such as high transaction costs that prevent smaller firms from taking advantage of particular services, then a more permanent step must be taken to compensate.

It is also essential to have data to back up the implementation of any particular program. Nolan offered the example of venture capital funding.

"While policymakers are much concerned with the supply side of the venture capital markets, and increasing funding through venture capital at early stage activities, in many contexts, it's likely that the demand side is just as or maybe more important. And you find good evidence of this from surveys in the United States, and Canada as well, where something like 95% of all the proposals put to business angels and to venture capital firms are rejected. The problem isn't the lack of capital; it's the lack of good quality deal flow. A better intervention there might be improving investment readiness amongst potential investee firms."

Nolan provided other examples of demand-side incentives that are proving their worth. In Germany, new buildings are required to use renewable energy technologies, and those that demonstrate themselves to be up to a specified level of efficiency will receive financial support from the government. He also pointed to Top Runner, a program introduced in Japan in 1999 to improve the energy use and lower the emissions of engines. The program sets standards that are emulated by other manufacturers.

In that light however, Nolan offered a few caveats about the use of regulations to induce innovation. For one thing, the impact of such regulations will likely be specific to particular technologies and industries, which can create significant lags in terms of the broader economic and societal impact. As a corollary, therefore, governments are recommended to have staff who have a good understanding of the affected industries drafting such regulations.

Nolan also cautioned that the effects of regulation could be ambiguous *a priori*. He pointed to an interesting demonstration of this principle in the way California promoted wind energy in the 1970s and 1980s, an initiative that has been analysed by Gregory Nemet. During this period, California accounted for most of the world's demand for wind power technology, which was driven by government incentives of some sort. Nemet points out that even as this market was growing, the number of patents in this field actually fell. The reason was that the industry had decided on a dominant paradigm for the design of the turbines, the familiar single mast, three blade array that is found almost everywhere. "No matter the inducements in the public sector, you didn't get innovation. There was more wind power, of course, but it didn't spur innovation."

The lesson to be taken away from Nemet's work is that regulations must respect the fact that some innovations will be adopted regardless of what requirements may be present, simply because they make business sense. Hence, Nolan reiterated his advice that the people drafting those regulations must understand what the industry is doing. In some cases, industry will avoid innovation just to make life easier for themselves. For instance, when the Corporate Average Fuel Economy regulations were imposed in the United States during the energy crisis of the 1970s, automobile manufacturers responded not by redesigning their vehicles, but by changing the mix of modes so that the entire product list could meet the necessary standard. Parallel regulation introduced around the same time to deal with the energy efficiency of refrigerators only had the effect of bringing American models up to standards that have been maintained in Europe for a long time.

Finally, Nolan warned that the ultimate effect of regulations may be effective in spurring innovation, while remaining cost-ineffective in terms of the general equilibrium of technology. For example, as vehicles become more efficient, people drive more. Meanwhile, a rise in tax on gasoline will reduce fuel consumption, but at a lower overall cost to society.

He closed his talk with some observations on evaluation. When looking at how a particular measure affects a particular target group, he maintained that it is insufficient simply to compare the situation of that group before and after the implementation of the measure. While changes in the status of that group could well stem from the measure, it could also arise from unrelated factors (such as a widespread economic downturn) as well as the way in which you observe changes. Employment metrics, a popular metric, would be inappropriate in terms of assessing innovation; long term effects will not be evident if evaluation takes place too soon after a measure is put in place; assessments of R&D levels will not necessarily take into account the difference when considering companies that have only just begun performing R&D.

Nolan referred specifically to the danger of using administrative performance standards as proxies for measuring the impact of a program, a danger enhanced by the popularity of such standards in many countries. The approach has become especially prevalent in the United States, where their role has been defined by the Government Performance and Results Act of 1993. This legislation requires federal agencies to establish performance goals for research undertakings, including a description of how these goals will be met and how they can be verified. Criteria such as the quality, relevance, and leadership surrounding a project can therefore be assessed against international management standards.

According to Nolan, organizations attempt to measure the impact of their research projects by reporting the extent to which the project management met these international standards. He cautioned that there is no reason why a relationship should exist between such standards and the impact being measured.

For instance, a government program might seek to reward small firms for undertaking R&D and commercializing the results. The performance standard for the program might be "the percentage of participating firms that develop a marketed innovation, within a time period X". But if program managers only accept easy-to-serve participants who would have marketed an innovation even without the program's incentives, a high score on the performance standard might be associated with little or no genuine impact. By contrast, if the program intake comprises many hard-to-serve firms — businesses that would otherwise have found it difficult to create and market an innovation — then even a low score on the performance standard could be associated with some genuine impact.

Nolan insisted that there must be evidence of such relationships before relying on administrative performance standards to gauge impact, adding "these choices of performance metric have complex effects on the behaviour of program managers and the likely impact of the scheme." If that behaviour extends to the cherry-picking of easy-to-serve participants by managers who know that they could themselves be assessed against some performance standard, then impact assessment will be further skewed.

> "Innovation is a complex phenomenon, and if you're going to capture it in any sort of metric framework, you need multiple indicators simultaneously."
>
> — Alistair Nolan, Senior Policy Analyst, OECD

By way of conclusion, Nolan argued that evaluation must be adopted strategically. For large projects relying on government spending, rigorous evaluation must be carried out, using surveys, case studies, and multi-method approaches. This principle applies especially to pilot programs. Moreover, he stressed the virtues of making evaluation data public.

Nolan also offered some thoughts about the policy mix in Canada with respect to innovation. With strong emphasis on indirect support, and little emphasis on demand-side incentives, the country's approach raises questions about whether policy should shift to areas with high social returns through direct support and whether the mix is focused too much on R&D-driven innovation.

"A lot of this discussion is about R&D," he concluded. "But we know that innovation is about much more than R&D." By way of example, he pointed to research on Apple, which has added about $30 billion to the value of the company, along with thousands of jobs, thanks to the iPhone. But only about 25% of this new value stems from patentable technologies linked to R&D. "The rest is coming from innovations and investments in intangibles such as design, creative beauty, emotional attachment to the product, enhance functionality."

The first question from the audience asked about best practices in evaluation. Nolan asserted that Anglo-Saxon countries remain at the forefront of this field, citing Canada as a particular success story. That said, practices can vary with the political willingness of governments to support this activity; for instance, programs that are known to be successful tend be evaluated often, while those that are less certain may not be examined as thoroughly. He also credited the idea of making the results as widely available as possible. It is also important to use control groups when assessing impact, to avoid the bias that would be created if a program only accepts outstanding applicants.

> "Canada is one of the leading countries in the OECD, in terms of evaluation culture."
>
> — Alistair Nolan, Senior Policy Analyst, OECD

A second question asked about two countries — Finland and Switzerland — which had essentially no direct support from government, and only modest amounts of indirect support, even though both are outstanding performers of innovation. Nolan acknowledged knowing more about Finland, where he credited good governance, an evaluation culture, and a nurturing of human capital for success. With respect to the last of these points, he noted that surveys of young Finns show that a high proportion of them imagine growing up to be teachers, reflecting the respect the country has for its human

capital. Similarly, Finland is among a handful of countries — including Sweden, the United States, and the UK — that invest more in intangibles than in machinery, to good effect.

A third question asked about the extent to which government support nurtures resentment from other nations because of a perception of unfair competition. Somewhat linked to that question, what role does culture play in the rate at which actions take effect in a given country, or a given region of a country? Nolan admitted that nothing came to his mind, since practices such as public procurement are covered in detail by the World Trade Organization. With particular respect to culture, he portrayed that matter as highly nebulous and hard to pin down; nevertheless, he agreed that it is undoubtedly one of the defining features of how innovation may occur in each country.

A fourth question asked for examples of effective programs that support non-R&D innovation, especially with regard to the service sector. Nolan pointed to technical extension systems that have worked particularly well in the United States. Likewise, voucher schemes in the Netherlands have proven to be successful.

A fifth question addressed the notion that if policy is a mechanism to change the natural trajectory, what rationale would there be for indirect support at all? Nolan said the primary argument is the claim for positive externalities that can be created in this way, in contrast to a socially sub-optimal level of R&D investment by private interests if these incentives are not in place. Another powerful argument is the assertion that such support brings in firms from other countries, which might not otherwise consider coming to your country.

Panel 1: The Changing Role of Government Research Labs in Regional Innovation Systems
Panelist: Eric Cook, Executive Director/CEO, Research and Productivity Council
Panelist: Christophe Deutsch, Vice-President, Operations, INO
Panelist: John McDougall, President, National Research Council of Canada
Panelist: Geoff Munro, Assistant Deputy Minister and Chief Scientist, Natural Resources Canada
Moderator: Laurier Schramm, CEO, Saskatchewan Research Council

Schramm began by framing the landscape of Canada's research technology organizations, which have seen some changes over the last couple of decades. "At the front end of the innovation continuum, universities are the primary doers of the basic, blue-sky, curiosity-driven research that's needed for our long term development of new knowledge and understanding. At the other end of the continuum, business and industry are traditionally the primary doers of the commercial work itself." Government research and technology organizations (RTOs) occupy the space in between these ends of the continuum. This is also the zone referred to by entrepreneurs as the valley of death, the difficult period between the completion of applied R&D work and the closing of first

sale. Universities will stay away from these activities, since the most secure source of their funding will be found in basic research, while industry will find its own relative safety in improving existing products or deploying new technologies that have already been tested and adopted elsewhere. RTOs therefore wind up functioning alone in a highly risky environment.

> "The RTOs that survive in this world are those that are mission-oriented, results-oriented, client-focused, impacts-oriented, and very entrepreneurial."
> — Laurier Schramm, CEO, Saskatchewan Research Council

Canada's RTOs have also been evolving over the past few decades, expanding beyond just doing applied R&D in the form of proof-of-concept at the laboratory bench scale. They increasingly embrace scale-up engineering, analytical and testing services, designing and constructing pilot plants or commercial-scale demonstration plants, and even working directly with companies on integrating innovations into commercial practice.

Schramm noted that another major change revolved around how the money flows to these institutions. Where RTOs were once fully government-funded, most of them are now raising as much as half their revenue from other sources; some obtain all their money from non-government sources, even though they remain government-owned. These other sources consist of contract services of one sort or another. He offered his own organization, the Saskatchewan Research Council, as a typical case: "In this fiscal year we will raise 80% of our revenues by contract in the marketplace, competing with everybody else. That's quite a change from our inception, when we were fully government-funded."

The past few decades have also seen the emergence of not-for-profit research and engineering companies — private RTOs — which operate in much the same market as their government-run counterparts. Across Canada, therefore, all these various RTOs account for some $2.5 billion worth of business every year. NRC represents the largest single player, but there are also eight provincially-run RTOs and 20-30 significant size private RTOs in Canada.

Traditionally these RTOs had little to do with one another, but the creation of Innoventures Canada (I-CAN) in 2006 marked an attempt to promote more interaction, with the aim of minimizing risk and redundancy as well as promoting the potential of combined expertise and resources. "By linking together, we have the collective ability to accelerate Canada's evolution as a leading innovative global economy."

Munro added to Schramm's description of the changing RTO landscape by noting the growing prominence of Related Science Activities (RSAs), which do not deal with the generation of new scientific knowledge, but instead the dissemination of that knowledge. That being said, both types of activities are integral to any R&D undertaking, and will

usually be conducted by the same people. He also specifically distinguished science and technology from innovation, the latter being defined as "a process by which an idea or invention is translated into a good or service used by people to create wealth".

> "We're expected to be far more effective in measuring what we do than we've ever been before. And we are lousy at it, quite fundamentally."
>
> — Geoff Munro, Assistant Deputy Minister and Chief Scientist, Natural Resources Canada

In the case of NRCan, the roots of the organization extend back to the origins of the Geological Survey of Canada, fully 165 years. This means history and mythology have blended into the institutional culture.

"In my view there are three measures of success, only three." The first is relevance, which he defined as who you are relevant to, specifically your customers. Customers for government labs may be the politicians who support that lab's existence. The second measure is the impact of your work, which can be very challenging. The third aspect is quality, which is usually not a problem in Canadian research facilities.

> "We can do things that are very, very relevant. And guess what? They don't fit the infrastructure, the policy framework isn't right. The recipient, the client can't use it because it doesn't fit the model for operational implementation. So it goes to a place I nicknamed years ago, called binder heaven. Government's got lots of binder heaven places."
>
> — Geoff Munro, Assistant Deputy Minister and Chief Scientist, Natural Resources Canada

Munro also noted that this review of success??? raises the question of why government is doing science and technology work in the first place. His answer:"What we're there for is to provide the evidence, so that evidence-based decision-making can take place."

Munro offered five reasons why governments invest in science:
1. Informing regulatory policy decisions and standards
2. Producing public good products and services (such as environmental monitoring or mapping)
3. Maintaining expertise in areas that support public value (such as seismic expertise, which would have no private sector motivation)
4. Creating a capacity to respond to changing priorities
5. Supporting innovation to improve the well being of Canadians

Finally, he expressed his preference for changing the term "sustainable development" — a term loaded with environmental implications — to "developing sustainably", which brings out the economic implications of this approach to growth. In a related way, we

have broken up much of the R&D landscape into discipline-specific fields of expertise that are inextricably linked, but which are not always acknowledged as being so linked.

Cook picked up on that theme by referring to the well-known disconnect between the country's lacklustre innovation performance and the high quality of its research institutions. He noted that we could well be spending enough money to achieve the desired results, but not spending it in the most effective way. He characterized Canada's current approach to innovation as one of technology push, which takes an idea and then seeks an application for it. He described this as a strategy for invention, rather than innovation, which is why people working in this system find themselves being challenged, since most inventions do not represent the kinds of innovations that have a profound commercial impact. "The fact that we're generating a lot of inventions and not many of them are being commercialized is perfectly normal."

By way of contrast, he explained, the innovation chain should start with the application first, rather than a unique idea. "People like to call this applied research; I prefer 'market research'." This approach skirts the daunting problem posed by the "valley of death", since the commercial problem will already have been addressed, and the solution should be ready for sale.

Cook also responded to the assertion that companies are not interested in innovation. "I've experienced exactly the opposite to that in my organization. We have companies lined up to procure services from us, that they're willing to pay for." Nor does he accept the stereotype that R&D must be a fully fledged laboratory affair, which can put off smaller enterprises that are unable to support such formal activities. Nevertheless, he insisted that these smaller firms can benefit from embracing an innovation culture that extends beyond this caricature.

> "When you walk through our facility, every project has a paying customer. Every project has a customer that wants that done, and if it's not going on time, I'm getting a phone call. That's how you know when you're doing market-led research."
>
> — Eric Cook, Executive Director/CEO, Research and Productivity Council

Deutsch related his firm's experience in bringing an RTO's capabilities to small and medium size enterprises, particularly the use of open innovation to assess what these enterprises might need. For him, this approach was not simply a matter of attending conferences where presenters talk exclusively about their successes; the Research and Productivity Council also wanted to hear about the problems and failures that were being faced by potential clients. Although it would seem that firms might be reluctant to share such negative details of their operational experience, Deutsche noted that nine firms did just that. The interactions ran from specific technical difficulties to long term market challenges, and these became the basis for a conference examining each of these

situations. No fewer than 170 people paid to attend this conference and help these nine firms, which Deutsche regarded as remarkable. The conference ended up being less about the traditional networking objectives typically associated with a conference, and more about solving the problems that were being showcased.

Deutsch took this event as evidence of how much RTOs can help SMEs. He was particularly struck by the extent to which participants were able to escape their R&D silos, offering the example of a forestry company that wound up getting help from agricultural researchers. What he took away from the experience was an appreciation that RTOs can help SMEs not just in identifying useful forms of innovation, but how they should managing those forms.

McDougall returned to the theme of Canada's weak innovation performance, combined with the growing spectre of global competition, describing the need for an essential balance between push and pull with respect to how new technology is introduced to the marketplace. He presented capital as a factor that drives much of this tension, especially as it relates to the straightened circumstances of start-ups coping with the valley of death. This becomes a case for governments, and RTOs in particular, to become involved with seeing such companies survive their ordeal, if the results will have a lasting economic impact. In this context, he described how NRC is dealing with the changes it must face.

> "The times caught up to us, maybe even passed us by for a little while. But one of the things that's clear, in a world of differentiation, speed, agility, and responsiveness, we found NRC was experiencing some challenges. We'd been operating more as a science and curiosity-driven research place, and that meant we'd drifted away from our mandate. Our mandate is to conduct scientific and industrial research in fields of importance to Canada, which to me sounds demand-driven."
>
> — John McDougall, President, National Research Council

This mandate often emphasized natural resources, either with regard to their extraction or their disposal. In order to address this mandate, then, McDougall explained that NRC was set to become a purposeful, outcome-oriented organization, which meant those outcomes were being successfully employed by clients. In reviewing the best way of making that happen, they initiated a move from institute-driven or researcher-driven work to program-driven work. This has been characterized by a high-profile shift to flagship programs, which demonstrate the value that NRC can bring to particular fields. Internally, these programs become useful as models showing people how any kind of program should work.

> "We find ourselves in a cultural challenge right now. Our researchers find it easier to do self-directed research like universities, especially if we just hand over money and say 'go for it'. But we want them to be more mission-oriented, and to make change we need to change our business models."
>
> — John McDougall, President, National Research Council

According to McDougall, when NRC staff were approached with this idea, they responded by stating that the organization's values needed to focus on accountability, leadership, integrity, collaboration, and being results-oriented. With that focus, he maintained, NRC could have more clarity in terms of the problems being pursued, more clarity about the outcomes and specifications to be achieved, an understanding of the value propositions that are being developed, and the resources available for these purposes.

A questioner representing NSERC noted that a similar partnership strategy with smaller firms fielded requests to carry out activities in phases that were weeks or months long, with decisions being made in this same frame. In light of the number of such firms that are instead choosing to partner with organizations like universities, why might they choose to do that?

Cook responded by noting that private sector partners tend to be risk averse, leaning more toward the "D" side of the R&D equation, and leaving universities to undertake the task of more fundamental inquiry.

McDougall added that this was understandable in light of the financial realities facing most small and medium sized enterprises. "While they're going along, they're trying to survive. They tend to default to a short-term problem-solving R&D, mostly," he said. Schramm qualified that observation, noting that companies may be less interested in new knowledge than in knowledgeable new people.

A questioner from Natural Resources Canada recalled Harwig's triple helix — made up of knowledge institutes, business, and governments — suggesting that the most important strand might be that of government action. She asked what must be done within the federal government to promote this linkage with the other two strands.

Munro argued that the earlier model of people working within well defined silos is giving way to an approach that will maximize the number of minds being brought to bear on any given problem. However, he acknowledged that some barriers persist.

> "The science community and the policy community talk two different languages. They talk two different time scales. Policy analysts need something for the minister's briefing book for that afternoon going into Question Period, and the scientist says 'Great, no problem at all. Give me $300,000 and three years and I'll get you your answer. So you can appreciate how those two don't mesh very well."
>
> — Geoff Munro, Assistant Deputy Minister and Chief Scientist, Natural Resources Canada

Deutsch stated that a strong program approach would indicate where collaboration would prove to be most effective and make such collaboration more attractive to everyone in an organization. McDougall added that collaboration is best cultivated at the design stage of

a project, rather than later. This means building relationships that will lead to a value exchange that will create more value than if only one sector alone tried to take on a task. Nevertheless, building those relationships does represent some time-consuming effort before you have even concluded what you want to do.

Another question asked about how to confront the challenge of diversifying a national economy's interest at the peak of a commodity boom, as happened when mining company Nokia found success in high tech.

McDougall replied that such success depended on framing an agenda that reflects the interests of stakeholders. Circumstances sometimes mitigate against that alignment of interests. "When it does occur, you move quickly, or you miss the chance," he said. A thriving commodity-based economy also distracts people from anything other than immediate profit, in contrast to when that economy begins to sour, and people run out of capital for new projects. "So you've got to prepare yourself for the top and bottom of the cycle, to be ready to create the things that have continuity right through the cycles." Schramm echoed that view, suggesting that the problem was reduced by the fact that different commodity sectors go up and down at different times, so there are many opportunities for RTOs to insert themselves as agents of economic change. Even so, if these organizations are not nimble enough to take advantage of those opportunities, they will not survive.

Deutsch pointed out that RTOs may be populated by PhD holders who have been trained exclusively as researchers, rather than being sensitive to the dynamics of business. That sensitivity can be cultivated through supplemental training activities such as "innovation school". This will allow people at the heart of the research process to participate more fully in R&D projects to yield a result in line with the needs of industry.

Munro cautioned that technology can become a trigger that overcomes the dominance of commodities, as happened in pulp and paper production, which once relied on the quality of Canadian trees but now relies more on new methods. The regulatory environment, too, can reflect or even drive such shifts, an observation that led Cook to note how operating in the stricter European environment had yielded innovations applicable to North American operations as well. Schramm concluded that such examples make a strong case for the support of public policy work.

A questioner from NRC asked about the quantification of technologies on an innovation spectrum, which could help with accountability and planning. Deutsch responded that his organization had done just this, which helped align strategy and development with the needs of clients. "We always know where our technologies are, in terms of readiness," he said, adding that such measures also make it clear where partners would be needed and what sort of business model will emerge.

Schramm said that while individuals have a good sense of what stage a particular technology might be, many organizations are now looking further afield to determine how their work compares with similar work elsewhere. He interpreted this as an important step toward moving past the "not invented here" syndrome.

The global implications of innovation were raised by a questioner from International Science and Technology Partnerships Canada, a not-for-profit organization with the primary objective of strengthening Canada's relationships in science and technology, business-to-business, and overall economic, trade and politics. More specifically, can RTOs help companies gain better access to global knowledge and global markets?

Speaking specifically about natural resources, Munro cited three primary roles his organization has with respect to international collaboration. One of those roles is providing small firms with access to international markets, another is increasing the market share of those firms, and a third is exchanging technical knowledge with them. McDougall offered a similar list on behalf of his own organization, adding that the prospect of international partnerships is now built into project planning. "We need to be right in the forefront," he said. "It's not good enough to be the best in the region anymore; you have to be globally in the forefront." By way of example, he pointed to a new collaboration with EUREKA.

Schramm also explained that such collaborations are a two-way street, and Canadian RTOs are being approached by potential partners from elsewhere who are eager to expand their own global reach.

> "Other people around the planet are starting to search around the planet as well. Other countries probably thought of this before we did."
>
> — Laurier Schramm, CEO, Saskatchewan Research Council

A member of the co-operative education branch of the University of Ottawa asked about what sort of training regime might produce a generation of scientists and engineers who can contribute more effectively to the country's innovation performance. Deutsch responded by saying that a new approach need not be complicated, but could simply be a matter of adding a few more elements to the curriculum, such as collaboration, teamwork, and other essential soft skills.

Crelinsten wrapped up this session by responding to this final question, noting that the university reward system did not reflect an emphasis on contributing to business performance. If academic institutions set up such a system, students and faculty would quickly develop the skill set necessary to succeed in the market.

Day 2, 12 May 2011

Keynote speaker: Jérôme Nycz, Senior Vice President, Strategy and Corporate Development, BDC

"Building an Innovative Nation"

Nycz addressed two distinct forms of innovation: radical innovation, as supported by venture capital, and incremental innovation, as supported by entrepreneurs. Both of these aspects of innovation are supported by BDC. "BDC is in the business of providing smart capital to entrepreneurs to accelerate their success. We take more risk, but we're also mandated to be profitable, and we have returned $180 million back to Ottawa."

Nycz cited the 2009 report by the Council of Canadian Academies that detailed the country's lagging innovation performance and blamed that outcome on weak business innovation. This is crucial in light of the fact that 90-95% of Canadian enterprises qualify as SMEs, which could benefit from adopting a more innovative stance.

> "Leadership in innovation is mainly up to the entrepreneur. Each one of them must meet the challenge of making their business innovative. Leadership must come from the business community. Our job is to support them. Ultimately the only way to improve Canada's competitiveness is to have tens of thousands of businesses take increased action every day. It's the sum total of these actions that will make the difference."
>
> — Jérôme Nycz, Senior Vice President, BDC

Returning to the theme of radical and incremental innovation, Nycz noted that each must be supported differently. He suggested that radical innovation is what most people initially imagine in terms of invention, although "invention" falls short of the full meaning. To become an innovation, an invention must find customers, and venture capital is often essential to getting an invention ready for market. In this respect, Nycz maintained, Canada's venture capital system is not in good shape. The difficulty goes beyond simple scarcity of funds to a disconnect between those funds and the business cycle, or more specifically, the investment being made and fund-raising by companies.

He also emphasized the role of quality over quantity with respect to commercialization. In the US, the quartile containing the top performing firms attracts the most funding, while in Canada it is the quartile with the worst performers that pulls in most of the money. Moreover, Canada has proportionately more venture capital funds than the US, but these are much smaller, on average about half the size. This means investments are too small to make an initial difference, and there may be nothing left for a second or third round. "There's pressure for investors to exit as quickly as possible, rather than build world-class companies." This has long-term implications when these investors leave, since the company will have a much lower market valuation. Hence, while Canada has

many strengths and advantages with respect to science and technology, they are not enough to yield commercial strengths and advantages.

Turning to incremental innovation, he suggested it is not as popularly compelling as radical innovation, but over time it can have a huge impact. By way of demonstrating this principle, he offered some examples from BDC's portfolio. One of them, Polaris Transportation Group, a traditional trucking company, had made strategic investments in information technology but needed to upgrade its system. By making this investment, the company was transformed from its traditional basis to that of an advanced logistics firm, capable of handling its ordering and shipping in a much more sophisticated way. Polaris ultimately tripled its sales.

Another client, VMAC, deals with air compressors used in the construction industry. Having identified a need for smaller, lighter equipment, the company undertook R&D work to develop a product that could actually fit under the hood of a truck. An international market emerged, worth millions of dollars to VMAC.

Each of these BDC clients employed incremental innovation to achieve outstanding improvement in their performance. For Nycz, this was evidence that anyone thinking about innovation should not think of it purely in terms of radical changes. Policymakers especially should consider the regulatory environment with this distinction in mind.

A question asked about BDC's investment mission, noting that the organization's strategy document emphasizes a positive rate of return but not a commitment to growing small companies. Nycz reiterated his earlier statement that BDC is self-sustaining, but its demands for rate of return are not excessive and it has backed many firms that have in fact grown quite successfully.

A representative from a University of Ottawa spin-off company called The Evidence Network, which measures the impact of innovation intermediaries, asked how BDC was choosing to invest in VC funds, given the poor performance of most of those funds. Ncyz responded that a bipolarization of investment is taking place in the market, driven by information and communications technologies that make it possible to start companies with much less money than ever before. This trend has given new momentum to angel investors, who work closely with these entrepreneurs. Some sectors, such as energy and clean technology, remain highly capital intensive, and in these cases at-scale funds are required. When BDC comes to invest in such funds, therefore, they consider factors such as the track record of management and cohesiveness between the fund managers. Currently they are also concentrating on clusters, which is a more efficient way of employing capital.

A final question asked if there were a role for BDC in attracting larger companies to Canada in order to help struggling SMEs. In fact BDC is doing just that, working with

firms in places like Silicon Valley in order to cultivate a relationship between those firms and Canadian firms that could usefully interact with one another.

Panel 2: Pushing the Envelope: Policy Initiatives in Support of Business Innovation
Panelist: John Clarkson, Deputy Minister, Energy and Mines, Manitoba
Panelist: Allyson Reed, Director Enterprise and Communications, Technology Strategy Board, UK
Panelist: Arie van der Zwan, Senior Policy Advisor on International Affairs, Ministry of Economic Affairs, Agriculture and Innovation, the Netherlands
Moderator: Tom Brzustowski, RBC Professor, Commercialization of Innovation, Telfer School of Management

Brzustowski began by noting that a lot of clever people in government had dedicated themselves to various ideas for promoting business innovation, and new methods of measurement are now indicating to us which of these ideas are paying off. He acknowledged that it is easy to conceive of the innovation system as a coherent matrix that can be understood and co-ordinated in a consistent way. "And then my feet touch the ground," he confessed. "The innovation system is more like a soup, in which all sorts of living things are there. They are companies that have individual innovation strategies; they make decisions in their own best interests. They are affected by national characteristics, by governments, but the number of influences is very large and there are influences from the rest of the world as well."

> "Our collective understanding of innovation is becoming more discerning, more deep, and we're beginning to see attempts to put policies in place, to put practices in place, which reflect that growing depth of understanding. We're now starting to be able, through measurements and evaluation, to assess which ones are really working and which ones are not."
>
> — Tom Brzustowski, RBC Professor, Telfer School of Management

Clarkson argued that most discussions of Canada's innovation performance tend to focus on the issue of how to generate more R&D activity, rather than concentrating on the specific aspect of business-based innovation. He thanked Brzustowski for the soup analogy, which effectively conveys the complexity of the actual circumstances surrounding innovation in the marketplace, where the interests of an innovative economy must be balanced against those of individual participants in that economy.

For Clarkson, this broader discussion raises two points that are uncomfortable for Canadians to confront. One is risk; the other is collaboration. He cited the latter as a sore point, noting that Manitoba has a wide range of agreements based on economic development through innovation, which have been signed with countries around the world; however, there are no such agreements with any other Canadian province. "We look like we're competing against ourselves," he concluded, noting how provinces mount independent booths at international trade shows.

Risk, he observed, is not a systemic matter but one that is defined by the people at the centre of all innovation activities. By strengthening people's ability to be innovative, we can likewise strengthen their willingness to take on more demanding activity, and consequently weather a greater degree of risk, which should yield comparatively more reward. Such support could take the form of a framework that identifies national strengths and weaknesses, along with areas where we want to focus our efforts. Likewise, a well-defined set of tools will put an innovation process in motion; such tools could take the form of training programs, which portray science and technology skills as not just being about becoming a researcher, but also becoming a successful entrepreneur. In that same vein, a program to teach entrepreneurial skills will establish a new generation of individuals who can identify, introduce and retain new technologies in the Canadian marketplace. Manitoba has also created programs to help immigrants start new businesses, to help small companies gain access to vital management or marketing talent, to help promote access to venture capital pools.

Clarkson also suggested Canada needs to do a better job of establishing a culture of innovation, so that both of the primary types of innovation — continuous and disruptive — are built into our activities on a regular and routine basis.

From a UK perspective, Reed described a perfect storm hitting that jurisdiction: economic changes like the credit crunch and a major change in government accompanied by a dismantling of research infrastructure. Her own organization — the Technology Strategy Board (TSB) — is taking stock in order to determine how to move forward. She described how the TSB can bring money, people, and assets to bear on accelerating economic growth and innovation within the country. At arm's length from government, the TSB also links government agencies, investment organizations, and business. More specifically, it selects commercialization projects that are run competitively, along with networks and employee exchanges, all of it concentrated in a few strategic areas. Much of what it does is centred on the demand side of the equation, dealing with health care, energy, carbon emissions, new digital technologies, always with an eye for transformative technologies that can open up new markets.

Reed suggested that a key role for the TSB is that of cheerleading, drawing attention to innovation in a way that creates buzz, but also setting appropriate standards and expectations for what is possible. Board members also spend a lot of time just listening to what is happening in various areas, particularly in terms of ideas that are appearing from newcomers. Above all, she emphasized the importance of quality versus quantity, in light of the fact that it is impossible to do everything and so priorities must be set.

> "Our role is often about balancing top-down strategy and integrated views with bottom-up views and activities. Getting that balance right is really important, and where governmental and policy organization really can add to the mix."
>
> — Allyson Reed, Director Enterprise and Communications, Technology Strategy Board, UK

Reed then listed three initiatives that are meeting with some degree of success. The first is collaborative projects, especially when a great deal of prior effort is invested about who would make the best partners. The TSB has also observed the remarkable results that can be possible when working with SMEs, especially with regard to encouraging these firms to pitch new and daring ideas. Finally, a robust community was established, one that also included universities.

By way of contrast, Reed outlined three things that did not meet with success. The first of these were sub-critical activities, such as setting up too many research centres that were capable of doing too little, so that they never achieved any profile or outstanding results. Secondly, the application process for grants became overly efficient, so that it drew from a relatively confined pool of individuals and organizations who were already familiar with the TSB. And thirdly, a one-size-fits-all approach will not work, but rather help given to any particular organization must be tailored accordingly.

> "One of the things which Darwin said which we find reassuring is that it's not the most intelligent that survive, it's the ones most adaptable to change. For policymakers and entrepreneurs it's a changing world, so we need to be adaptive."
>
> — Allyson Reed, Director Enterprise and Communications, Technology Strategy Board, UK

Van der Zwan reiterated the European community's high expectations and ambitions for the economic potential offered by innovation. He referred specifically to the prospects offered by the newly elected government of the Netherlands, which has set its sights on a goal similar to Canada's, namely becoming one of the top five innovators in the world. Regardless of the aspirations of individual nations, however, the larger EU framework is likewise aimed at seeing its entire membership progress in much the same way.

All that being said, he noted that the R&D intensity of the Netherlands comes to about 1.8% of GDP, which is roughly the same as Canada. Like in Canada, private R&D is also low, at about 1%. Nor does the Netherlands even expect to achieve the EU goal of 3% by 2020. Yet as the previous day's discussion of Brainport demonstrated, there are some outstanding R&D performers in the Netherlands, although the expansion of multinational connections continues to spread more of such activities amongst many different countries. Similarly, there has been limited interaction between public sector R&D and private enterprises, another priority for the new government.

Van der Zwan cited other parallels between Canada and the Netherlands, including concerns over the availability of venture capital and tax measures designed to promote R&D output. By way of attracting enterprises from other countries, the Netherlands is also embracing the principle of open innovation. "This has led to a much broader policy scope than just research and innovation," he said. "The new government will formulate a cohesive policy agenda for nine top sectors: creative industries, logistics, horticulture,

agri-food, life sciences, energy, water, chemicals, and high tech." This agenda will also incorporate areas such as education, foreign policy, and sustainability.

He emphasized that some of the changes would be drastic. As part of reducing the bureaucratic restrictions on R&D, some €500 million in R&D subsidies will be eliminated, to be offset by promoting greater cooperation between the academic, public, and private sectors.

Ron Freedman asked the panel which parts of the world they would regard as doing well and being worthy of emulation with regard to R&D and innovation. Van der Zwan cited Finland, especially with respect to its policy on the governance of innovation, which was copied by the previous government of the Netherlands. He also pointed to Switzerland, praising the complete absence of subsidies and tax credits in that jurisdiction. "The secret of their success is a tremendously good interaction between public research institutes, especially the technical universities."

Clarkson proposed Israel as a worthy example, in light of the speed with which new ideas enter the marketplace. He noted that the country mandates 100% ownership by universities of intellectual property developed by these institutions, which has yielded one of the world's highest per capita tech transfer rates. He also recalled that after just one trade mission to that country, they were able to set up Memoranda of Understanding and student exchange agreements in less than a year, which is in distinct contrast to other places he has traveled, where such agreements take much longer to strike, and generally only after two or three trips.

Crelinsten later offered observations from one of his contacts at Hebrew University, who credited such success with an emphasis on licensing as the most appropriate destination for most academic research, and a ruthless determination to focus on areas of maximum impact. Moreover, he noted that entrepreneurship has become an ingrained cultural dimension within the country.

Reed maintained that no country could be held up as the gold standard, a conclusion she regarded as somewhat reassuring, since it would indicate that there is always more that could be done to promote innovation. What stands out is a quality she dubbed "innovation vitality". Wherever such vitality is found, it is crucial to interpret it in relation to the circumstances of one's home country. Another factor is the amount of investment in R&D that comes from outside of a country; in this respect, Israel has the world's lowest rate of such investment, while Canada and the UK have the highest. Another question returned to the major theme of collaboration, but asked if there was too much emphasis being placed on this element, and that policies based on it would prove to be disappointing. Reed insisted that the most productive form of collaboration takes place across the value chain. "It's things that are new to product, new to market, making connections across sectors," she said. Clarkson acknowledged that collaboration is not a panacea, but it is nevertheless extremely valuable. "More and more what we're seeing is

business-based collaborations that are trying to get products into the marketplace, either faster or as products that are more complete." He presented an example from the developing world, that of electricity generators being installed in remote villages in order to pave the way for electrification on a wider scale, designed so that the fuel for these generators is produced locally with the same electricity. Brzustowski added that innovation and collaboration extends to business models, which have been changing accordingly.

A representative of Alberta Innovates asked about talent, specifically how individuals can be exchanged between organizations to maximum benefit. Reed said this can be accomplished through networks of innovators, either electronic or augmented by events that bring these people together. These links are especially important to mentoring and coaching, which have become integral to projects designed to help firms. Van der Zwan extended this point further, explaining how the Netherlands coped with fallout from the economic downturn of 2009 by allowing people who might be in danger of becoming unemployed and perhaps leaving the country to instead become seconded for up to two years at a public institution such as a university. "Now we see that this improved interaction between researchers in the public sector and the private sectors," he observed.

Clarkson suggested that these sorts of transfers might also benefit from less government direction. When Manitoba undertook an initiative on lean manufacturing that allowed companies in that province to weather the same 2009 downturn, its success owed as much to companies trading talent amongst themselves as to any particular government measure. Reed added that government could nevertheless augment the cross-pollination of particular sectors with individuals from other sectors, such as expertise in design being inserted into a field where design principles have been lacking.

Caroline Cook, of Natural Resources Canada, sought comments on the potential of innovation in government, particularly in the form of arm's-length organizations that have been created for that purpose. Clarkson responded that this form of innovation was incorporated into the Manitoba government's innovation strategy launched in the late 1990s. "We believed that not only did we have to support and sustain innovation in the economy, we have to look at how we in government become more innovative ourselves," he said.

According to van der Zwan, the Netherlands has been influenced by other countries' strategies with respect to innovation in governance. Formerly these influences were distributed amongst various government departments, but now the approach has become much more centralized and unified across all departments. Reed commented that her own, relatively young organization has had the ability to work across government departments in this fashion because it is in fact at arm's length from all of them. Moreover, any success they enjoy always becomes the success of the people with whom they are working. "That means that our key role is in being a trusted partner to make things happen. That slight independence, if you've got trust, seems to play really well."

Reed also emphasized that the TSB is able to attract talented individuals who otherwise would not be willing to work for government. "Our intention is to have some core people but also to have a very dynamic workforce of people who come in then go back out into business or government. It's a very lively environment; I hope that it keeps us fresh and in touch."

Keynote speaker: Luuk Borg, Head, EUREKA Secretariat
"When Innovation Means Business"

The holy grail, Borg observed, is that of creating growth and innovation with less money. By way of putting this lofty goal in perspective, Borg began by describing EUREKA, a European agency that has been around for 25 years and has even changed the lives of many Canadians. With 40 members and a commission, this large organization marshals national resources to support co-operative work in technology. Nor is participation limited to the EU27, but it also extends to Russia and Israel, which also have an interest in examining the market and looking for a niche, rather than developing a product and then trying it out on the market. Among the leading successes associated with EUREKA has been a patented system for chip production, and there are some 4,000 projects associated with the agency.

Among the changes that have affected EUREKA over its history has been an emphasis on the value of entrepreneurship, which used to be regarded as being much less important than academic qualifications. Similarly, international co-operation — and with it the outsourcing of activities — has become normal and often vital. This applies to R&D, too, since it has become too expensive to conduct independently. He also listed a variety of other trends, including a move towards loans and away from grants, an emphasis on simplicity and flexibility, and a particular focus on innovative, fast-growing SMEs.

EUREKA also hosts a great deal of collaboration between young technology companies, which should not be surprising in light of the degree to which social networking technology has been embraced by the latest generation of entrepreneurs.

All of these features have been integrated into the Eurostars program, which was instituted several years ago specifically to support R&D-performing SMEs. By way of keeping these companies happy, Eurostars minimizes the bureaucratic procedures necessary to obtain support, so consultants do not need to be hired in order to complete a proposal for funding. "If it's too bureaucratic, SMEs cannot apply. When we developed Eurostars, from the very beginning we said it should be a Web-based, modern thing that you do in an evening behind your desk in order to be able to apply."

Borg stated that the program now receives about 1,000 proposals a year, and it should be in a position to fund about half of them. The nature of these applications show other trends, such as an average of 2-3 countries being involved, and a drop in the requested support time to just over two years, which shows how quickly these companies want to

move into the marketplace. More than half of the applications pertain to information and communications technology, followed by biotechnology. They also range in size and R&D intensity, from small start-ups with fewer than 10 employees, which expect to grow by more than 100% as they move into the market, to larger firms that might be decades old and employ hundreds of people, which continue to be engaged in the development of innovative products.

Borg also had information on Canada's role in EUREKA as the leading participant outside of the European membership. Others, such as the United States, South Korea, and Singapore, are also taking part in EUREKA projects.

Ron Freedman suggested that the EUREKA program works because Europe has four levels of government — local, regional, national, and super-national government — along with four levels of taxation, the last of which funds this particular initiative. He asked if it might be better for that money to be spent by the national governments instead.

Borg disagreed, even as he acknowledged that the process was less efficient than it might be. Any kind of effort at collaboration, especially with respect to R&D, is a better investment than something like a military program. “Europe is about European integration, and we’re trying to create an environment where we work together as one.” He added that it is a complicated undertaking, and it can be wasteful, but it is still worth doing.

Another question asked about the relationship between EUREKA and universities, which have no essential market incentive to co-operate with business. Borg observed that the strategy is one of enticing companies to draw universities into projects, rather than forcing these institutions to become entrepreneurial.

A questioner recalled the slide that linked the number of employees to a firm’s growth potential, which can gainsay a government’s commitment to create new jobs. Borg’s response was blunt: “I am not in the creation of jobs, I’m in the creation of competitiveness. The name of the game is the company, and the company should not be burdened by creating employment. It should be a side product that we need. Maybe it’s not a lot, maybe it’s not enough, but it’s all we have.”

Crelinsten concluded with a query about how governments measure success. Again, Borg was blunt: “We succeed if we are able to create fast-growing companies. In principle, it is the value of the company.”

Panel 3: Pushing the Envelope: Exemplary Practices in Supporting Business Innovation

Panelist: Marie-Claude Coté, Vice-President, Business Development, Centre de recherche industrielle du Québec (CRIQ)
Panelist: Natalie Dakers, CEO, Centre for Drug Research and Development
Panelist: Andy Hopper, Professor, Computer Science, University of Cambridge
Panelist: Ari Huczkowski, CEO, Otaniemi Marketing, Finland
Moderator, Mario Thomas, Senior Vice-President, Ontario Centres of Excellence

The panelists introduced their respective organizations and the mandate associated with each of them. Huczkowski's described his marketing agency as the equivalent of Canada's Ottawa Centre for Regional Innovation or Brainport in the Netherlands, in this case being located in Otaniemi, northern Europe's largest high-tech hub just outside of Helsinki. Dakers outlined her not-for-profit centre dedicated to transferring biopharmaceutical technologies from university settings into the marketplace. Hopper presented himself as a member of his university's computer science department, but also as an administrator overseeing R&D activities and start-up firms emerging from those activities; he has also actively participated in building up several companies, with varying degrees of success. Coté outlined the role of CRIQ as completing work set in motion by industry, in partnership with universities or other research centres in order to cover a wide range of fields.

Thomas then asked each of the panelists to describe what works and what does not work with respect to business innovation. Coté responded that CRIQ's most successful venture has been the network of connections, which reveal what should be done to improve economic productivity. She cited the pulp and paper industry as an example, whereby research into their processes have made companies more productive.

Hopper referred the minimal barrier to entry for academics who have few restrictions on how they tackle research that can lead to the creation of business ventures. Dakers suggested that her centre's operation was similar, in this case bringing innovative university-based research to help meet the needs of biotechnology and pharmaceutical firms that are facing ever more demanding market circumstances. The key to achieving this is to present a "de-risked" version of the academic research, which industry can implement; however, universities are not generally prepared to take on this part of the process, in which case she and her colleagues provide the necessary interface to make this transfer of knowledge possible.

Huczkowski offered three examples of what had worked, including an open innovation database of unused corporate patents that could provide the basis for other start-up companies, a virtual incubation service that minimizes the outlay of fledgling firms, and a learning-by-development initiative that replaces instructors or professors with mentors who can help build up businesses. Conversely, he provided three examples of what had not worked, including programs that remain exclusively top-down, patenting for the sake

of simply patenting, and silos that prevent useful interactions between people, disciplines, or organizations.

Caroline Cook of Natural Resources Canada asked if organizations reached out to federal research bodies as well as local or regional agencies. Coté indicated that such links were in fact crucial, because no single agency holds all the necessary resources to address the challenge of innovation, which makes partnerships of one sort or another an ongoing necessity. Dakers concurred, indicating that federal organizations often have well-established infrastructure or services that it would be redundant to recreate elsewhere. She also cited a like-mindedness amongst these various parties, which could make partnerships all the more productive. For his part, Huczkowski noted that he has not needed to seek out federal linkages, since that level of government is among the owners of Otaniemi Marketing.

Crelinsten asked for a resolution of the seeming contradiction that often appears between the priorities of the academic sector and those of industry. More specifically, he wanted to know if this distinction was built into the definition of each sector, or if it were a cultural matter that could be resolved with the appropriate institutional management. Dakers replied that the cultural parameters defining institutions do pose serious challenges for innovation and commercialization of technology. Academic researchers and business researchers have entirely different expectations and mind-sets, with neither group necessarily wanting to take on the role of the other. The unoccupied ground between them represents the interface offered by her centre.

> "One of the biggest challenges of more effective commercialization in Canada has as much to do with culture as with anything else. I think you could throw all the money in the world at it and you wouldn't solve this problem. If you really want to see a change in the culture, then you've got to somehow align the incentives."
>
> — Natalie Dakers, CEO, Centre for Drug Research and Development

Crelinsten later asked Hopper to describe a model for combining the strengths of public and private sector institutions in a way that could be sustainable. "There are a whole lot of innovative people who don't want to publish papers, but don't want to work for large companies," Hopper explained. "You can put them in a unit where they're just as good as a university but their incentives and their motivations are different. Then you get it industry-funded, but subsidized by the taxpayer to get it started and keep it going."

Hopper added that as such groups proceed to develop market-ready projects, they have a demonstrated ability to spin off successful firms, to the benefit of the partners in the original model.

Thomas set the stage for the next aspect of the discussion, examining the relevance of regional models of innovation in the context of a global economy. Hopper acknowledged the temptation to disregard local strengths in favour of those areas that have achieved

international prominence, such as Silicon Valley, but that does not deny the reality of local strengths. “One of those strengths is that we’re not Silicon Valley,” he said, contrasting the project-centred energy of that environment with the longer-lived organized expertise to be found at Cambridge.

> “Our teams tend to stick together for longer than the Silicon Valley model. You stick together through hard times in a way that others don’t. You’ve got the advantage of top talent, and then the top talent sticks to it, which makes you go through a trough which a competitive culture might not go through to get yourself a better product.”
>
> — Andy Hopper, Professor, Computer Science, University of Cambridge

Similarly, with respect to venture capital, deals in a place like Cambridge can be much less complicated and predatory than they are in high-pressure settings like Silicon Valley. Angel investors are therefore much more willing to enter into these agreements, which are much clearer and much less intimidating.

Dakers agreed with that assessment, insisting that the word “cluster” refers to a genuine meeting of minds and resources at the local level. By way of example, she pointed to a biotechnology startup group in the unlikely setting of Cleveland, which since 2003 has pulled in more than a billion dollars’ worth of venture funding, drawn together some 600 health care companies, and signed some 450 technology transfer agreements. Even more impressive is the fact that this progress was driven by the arrival of companies from elsewhere. “They’ve completely turned that region into a hub of health care, and it really started with that shared vision and focus.”

Coté extended this example by pointing to the trust and understanding that come with a shared goal, which in turn fuels the push for open innovation. Setting and achieving such goals is much easier to do at the local level. Within Quebec, she added, this principle has been used to combine the goals set by regional centres to achieve R&D capabilities to compete at a global level.

Thomas put this question directly to Huczkowski, asking if his region in Finland offered a model that could be transplanted elsewhere. Huczkowski responded by citing cultural qualities as the key to establishing and transporting any kind of innovation model. In California, for instance, the openness of hippie culture laid the foundation for Silicon Valley; in Cambridge, entrepreneurs build upon an extensive academic tradition; in Kitchener-Waterloo, it may be the familiarity of community barn-building that set the stage for RIM. The models that grow up in each of these places may not be fully transferable to another site, unless that site shares some of the same cultural qualities.

Thomas asked other panelists if they shared this perspective. Dakers suggested that there is no “cookie cutter” that can insert an ideal model anywhere. Certainly research groups share common interests and often common personalities, which makes it possible to

establish productive partnerships. Coté offered examples of this same principle in places such as the aluminum industry, whereby a sector mobilized at the local level can be highly successful in obtaining funding to address a problem.

Thomas asked about the difficulty of managing enterprises founded by tech-savvy individuals who focus more on the development of technology than on the commercial prospects of either the development process or the technology's potential market. Hopper stated that it is not inevitable that technically gifted entrepreneurs are handicapped with respect to business matters; conversely, business expertise brought in to enhance the commercial prospects of some innovation may not correctly gauge the pertinent technology.

Huczkowski argued that team-building transcends any particular expertise in business or technology. When technically minded individuals dominate a group, there may be too many other qualities missing to allow members of this group to communicate amongst themselves and fashion effective strategies. Dakers said shortages of management talent are nothing new, but it is often exacerbated by a lack of operational experience that can make day-to-day survival a major challenge, even without the additional challenge of nurturing excellence.

Luncheon Keynote: Logan Stanton, Director, Head of North America, World Economic Forum
"A Glimpse of Canadian Competitiveness"

Stanton began with an introduction to the Forum's Competitiveness Report, which was launched in 1979 to discuss and compare what 16 European countries were doing. The undertaking has grown ever since, now dealing with 139 countries in all. "The goal is to help provide benchmarking for policymakers and business leaders. The goal is not to quantify exactly what your country is doing." Rather than being some sort of quality ranking, it is a holistic examination of the factors that affects the competitiveness of individual nations. It also contains many subjective elements, on the understanding that "perception is reality" when it comes to how a country is regarded by itself and its competitors.

> "We talk about globalization, and how the world is so much smaller, and companies span borders and expand borders. The reality is countries still matter. It took us over 1,000 years to get to where we are right now in terms of modern governance and government and institutions. And in the next 20 years we are not going to graduate from that."
>
> — Logan Stanton, Director, Head of North America, World Economic Forum

The information collected for this assessment falls into three categories. The first is basic requirements, such as bureaucracy and legal framework, infrastructure, fiscal status, and

macroeconomic stability. The second group consists of efficiency enhancers, such as educational attainments, interactions with domestic and international markets. The third group, innovation and sophistication factors, causes a great deal of consternation amongst observers, since it refers to the development of clusters or quality of R&D-related activities.

Stanton then presented a list of the top 20 countries, where Canada ranks 10th. By way of putting this in perspective, he also offered more specific comparisons between Canada, France, the UK, and the US. What emerges, especially amongst members of the G-20, is how very close these countries are in their capabilities. French infrastructure is superior to Canada's, for example, but Canada's labour market efficiency is superior to France's. Similarly, technology readiness in the UK is superior to Canada, but Canada's macroeconomic environment is stronger than the UK's.

He also singled out some areas of special strength for Canada. One is the ability to start a business, where Canada ranks first in the world. Other factors, such as time to start a new business or prevalence of foreign ownership, were closer to Canada's general ranking of around 10th. As for the calibre of the country's financial institutions, Stanton argued that they set an enviable standard for the rest of world.

Canada does have some areas for improvement, including the number of local suppliers for goods, the nature of competitive advantage, the breadth of the value chain, and production process sophistication. Stanton also identified a mismatch with respect to institutions, where the high quality of institutions and research is offset by poor company spending on R&D and poor government adoption of new products. A similar disconnect occurs between government policy and business culture in R&D and activities at universities.

> "There are no silver bullets in terms of innovation. It's organic, it's not synthetic. There were discussions about creating a culture — that takes time."
>
> — Logan Stanton, Director, Head of North America, World Economic Forum

Although Canada drops one spot in this year's rankings, Stanton concluded that the country retains its stable performance, high efficient markets, well functioning transparent institutions, and excellent infrastructure.

Freedman asked about the metric used for business spending on research. Stanton indicated that the numbers pertained to university-industry collaboration in R&D and company spending in R&D. Although he did not know where the numbers were drawn and how it related to absolute or relative spending, he asserted that it would be the same source for every country

A second questioner asked about the metrics behind two other categories, the nature of global competitiveness and capacity for innovation. Both of these are subjective criteria included in the survey circulated in the business community, as well as measures of university-educated proportion of the population. The same questioner asked about the tax rate, which Stanton indicated was drawn from surveys as well; he acknowledged that significant differences in tax structures between countries makes this a hard factor to include.

Another question dealt with the consistency of meaning associated with "innovation" from one country to another. Stanton indicated that a definition is included with the survey in order to promote such consistency, which does appear to exist.

A final question dealt with the issue of productivity, which over the last two decades has declined steadily in Canada relative to the United States, although that decline is not reflected in the competitiveness. "Productivity is not weighted as high in our report as some countries would like it to be," Stanton replied. Some economists disagree with this approach, but others applaud the removal of this difficult measure.

> "The country has been successful in nurturing its human resources. It's ranked 6th in health and primary education, and 8th for higher education and training. But improving your sophistication and innovative potential of the private sector, with greater R&D spending producing higher on the value chain would enhance Canada's competitiveness and productive potential going into the future."
>
> — Logan Stanton, Director, Head of North America, World Economic Forum

Panel 4: Priorities for Action: The Industry View
Panelist: Tony Florio, University Relations, Research in Motion
Panelist: Rick Harwig, Harwig Innovation Services, The Netherlands
Panelist: Mag Iskander, President, Information Systems, MDA
Moderator: Savvas Chamberlain, CEO & Chairman, EXEL Research Inc.

Chamberlain put this discussion in perspective with a description of how Kitchener-Waterloo emerged as a premier centre for innovation in Canada. He traced the roots of this success to the mid-1970s, when computing power was much more expensive, costing about $1 million per million instructions per second, as opposed to today, when the cost is less than 25 cents per million instructions per second. WatFor, the locally developed compiling program for such instructions, played a major role in starting to reduce this price. In the meantime, many traditional lines of business, such as rubber and shoe-making, were leaving the region. Local leaders began looking more closely at the university as a source of economic momentum and began to promote start-up companies based on innovation. However, Chamberlain recalls that potential sources of support such as banks were not convinced that these enterprises could succeed. Slowly, some funding began to emerge, but results were not evident until the late 1980s. All the while, skeptics

remained unconvinced that a semiconductor-based business could success in Ontario. Last year, just such a university spin-off, Dalsa, enjoyed $250 million revenue.

Florio represented RIM, another Kitchener-Waterloo firm that still has strong ties to the university community. The archetypal example of such ties has been the co-op program, which was pioneered here, and which helps the company take advantage of an ongoing pool of talent in the form of highly motivated students, many of whom go on to become valued employees. Today the company is successful and prominent enough to support university research in collaboration with agencies such as NSERC, but not always with an eye toward new products or services.

> "Our measure of success in terms of research is talent and ideas. We don't have a great expectation that we're going to have commercialized IP. At the end of the day, if I sit down with our folks internally and say what a good project looks like, a good project provides useful knowledge. It gives somebody inside RIM a chance to look at something that might be a bit speculative and might give them a sense of whether this is worth pursuing further, or maybe it's a dead end. And frankly, knowing something is a dead end is probably just as useful as knowing that it's not a dead end."
>
> _ Tony Florio, University Relations, Research in Motion

RIM also values the opportunity to fund and work with graduate students across the country, increasing the pool of experienced talent that might work for the company or simply move the entire industry forward. He noted there was really no down-side to any aspect of these university-industry interactions, although it demands dedicated company resources that may be beyond the means of smaller enterprises. "It really does require a significant amount of engagement to make it all work," he admitted, adding that further measures will be required to help small and medium sized firms enjoy these same benefits.

Harwig picked up on that final point, recalling how he learned at Philips the way in which large companies could help smaller ones that are often part of a supply chain and therefore part of the innovation ecosystem. He also recalled the patience that is often demanded to see innovation through from start to finish.

> "Usually it take eight to 12 years before you see any money coming out of any real effort in innovation. So consistency in government policy and relationships is a number one priority."
>
> — Rick Harwig, Harwig Innovation Services, The Netherlands

Harwig cited other priorities for the successful implementation of innovation, including the ability to cross borders — between internal departments, between companies, and between countries —the same kind of open, critical engagement that this conference sustained. Such engagement is essential to identify not just major problems that plague businesses, but seemingly minor steps that can nevertheless open up the path to success.

"Sometimes it's really simple," he explained, but the hard part is mapping out what may be hundreds of essential arrangements with researchers to address each simple matter as it comes along. Despite such motivation, he has observed that it is hard for researchers in either universities or firms to dedicate themselves to improving industrial processes, and so there is a practical case to be made for an intermediary organization that could assist in this regard.

Iskander offered some background on MDA, starting with its founding in the 1970s as an interpreter of satellite signals that could be turned into maps. Today it is a major satellite and defence firm, with about $200 million in revenue annually. The company also thrives on its original line of work, producing geospatial information that is increasingly important to monitoring environmental activities and managing human activities such as transportation.

> "A lot of credit for the existence of MDA today goes back to visionaries in the 1970s and 80s in the federal government. Some of these people saw niche technologies, niche areas where they invested in space robotics. Canada invested about $100 million in the late 1970s and early 80s to develop the first generation of Canadarm. As a result of that, MDA today is exporting in excess of over a billion and a half dollars worth of space robotics to NASA and elsewhere."
>
> — Mag Iskander, President, Information Systems, MDA

In contrast, Iskander described Canada's procurement and contracting system as broken. "It's slow, it's bureaucratic. It is not appropriate at all for high-risk, high technology industry like the space industry." Likewise, intellectual property policies are in need of improvement. Such changes are crucial for MDA, which he described as exclusively interested in development work, rather than research. "All our dividends are recycled into creative business ideas, into developing markets, into developing products." This has led to some dramatic innovations, such as a robotic arm that can function inside an operating MRI to conduct brain surgery.

Chamberlain then posed the question of how to convince all of Canadian society to support the push toward innovation, given that many innovations sound the death knell of some traditional industries and an early end to many people's livelihoods. Florio recounted how his own father was one of those who built his own career on the low-skill, high-paying industrial work that was once available; for him to move out of this kind of work would have demanded significant educational effort that he could not have afforded. "If we are saying that we live in a more innovative society, at a time where it's absolutely necessary to take advantage of all the brains we have in a country, then it's a real reshaping of the way we do education and training, a way that doesn't exist right now."

Caroline Cook, of Natural Resources Canada, recalled Brzustowski's depiction of how companies could apply innovations, some of which will subsequently leave out part of

the employed population. She argued that managing such companies in a way that would address this problem is very different from the mind-set than simply improving the bottom line. “You have intelligent, bright people who have that corporate history and maybe there are some keys to design innovation that you would tap into because they’re not the educated doctoral types.”

Harwig reinforced Cook’s observation, pointing to the ongoing disparity between wage rates in the developed and developing world, which will not be resolved anytime soon. He reiterated that this situation will take some very creative solutions to preserve the standard of living for people currently employed in the manufacturing sector of industrialized countries like Canada.

A questioner suggested that the new mind-set being considered would not be one premised on solving technical problems for economic gain, but rather on simply solving society’s problems. Iskander responded in a provocative way, suggesting that the challenge is one of identifying appropriate opportunities, which is how MDA has progressed even as some of its markets have disappeared. Harwig qualified that assertion, insisting that part of the gains that emerge from those opportunities should be returned to people in society whose lives may be disrupted by these changes. He added that he has seen models that are almost the inverse of what makes economic sense for society, with the majority of a firm’s employment being dedicated to R&D for the benefit of the firm, rather than producing anything of value to society. If you attempt to structure yourself in this way without taking steps to help those who will be displaced by the change, you will not achieve the necessary level of economic performance to compete.

Florio took this point even further: “Perhaps a more competitive economy is by its nature a more unstable economy.” In other words, if competitiveness is the ultimate objective for our society, you must help all the people who will be affected by the steps you take toward that goal.

Chamberlain moved the discussion forward by referring to the more than $30 billion of public funds that Canada spends on R&D, much of it broken up into piecemeal activities. He therefore asked what could be done to yield a more holistic strategy for this massive outlay.

Harwig said many jurisdictions simply start with long lists of issues that are important to them, such as health care or environmental priorities. Florio qualified this observation by portraying innovation as an art, rather than a precisely defined cause-and-effect process defined by the amount of money invested in it. He compared it to the investment people make in RRSPs, where the outcome is not always certain, but the risk is deemed to be worth taking. Similarly, Canadian society has taken decades to come to grips with the concept of budget deficits before making the necessary changes to eliminate them. Likewise, we as a society must come to a similar appreciation of innovation, understanding that we cannot know precisely what the outcome will be for the investment

we make in it, and secure only in the knowledge that nothing will happen if we do not make such an investment.

Luuk Borg made the point that framework conditions must be put in place to achieve the holistic approach Chamberlain was positing. Borg also indicated that principles of design and marketing need to be accorded the same level of consideration that technology generally assumes with respect to innovation.

Harwig agreed with Borg's assertion, offering the example of new forms of lighting that are taking the place of traditional incandescent bulbs. While the technical credentials of these lights have been well established, it will be their design and marketing that determines their success. Florio likewise agreed, touting design as the "secret sauce" that can lead to the acceptance of a product regardless of its cost competitiveness. "Certainly for a company like RIM, where you're designing a product that goes out into people's hands, you become a design company. At the end of the day, you can put together the greatest product in the world, and if it doesn't feel good in your hands, it's not going to happen."

Crelinsten related his observations from a study of open innovation, which asked about what companies were doing differently as they collaborated more. The results indicate that companies are beginning to tackle large social problems, not just from a technical perspective, but also with the aid of designers, marketers, and others who might not typically be thought of as the core expertise in such enterprises. Concurrent with that, Crelinsten underlined the fact that science and technology are traditionally taught in the educational system as though students were on their way to becoming scientists or engineers, rather than careers that play a different but no less important role with respect to these disciplines. The same outlook has been adopted in trying to win the support of politicians, who wind up no less enthusiastic when told — like our students — to "eat your peas", because science and technology are good for you.

> "I don't think people are appealing to the heart or the emotions enough when they talk about science and technology and innovation. Young people, our kids, our grand-kids, they're excited about making the world a better place. The politicians are like kids; they want to be elected, they want to be respected, they're fighting for power all the time. We've got to appeal on some emotional level."
>
> — Jeffrey Crelinsten, Co-publisher, RE$EARCH MONEY

He added that proponents of innovation often use fear to motivate, as in fear of being overtaking by developing economies. Yet this returns the discussion to an "eat your peas" basis, which is far from motivational. By way of contrast, Iskander noted the effect of bringing astronauts into schools, where they are received like rock stars. "It just inspires a lot of the young kids to go into math and science," he said, noting the perennially contentious struggle to fund human space flight. "It's one of the hardest arguments in

Ottawa, to convince politicians that this is a strategic investment, that you ought to make to move the country forward from an innovation point of view."

Harwig said an equally effective, but much simpler method is to invite young people to visit your company. Often this is not allowed, but he has lobbied for removing any restrictions. Alternatively, engineers can go to classrooms to relay their work in an exciting way. Florio indicated that RIM does just that, going into school so students can take apart a Blackberry. "The goal is to find a scientific principle — electromagnetism, cryptography, whatever the case may be — and teach it in the context of this thing that you hold in your hand, which you might be excited about, is actually based on all the stuff you're learning in school that you may not be so tremendously excited about."

Chamberlain related an even more fundamental rationale for such interactions, which is that of defeating a perception that business people are not necessarily good for society.

Caroline Cook asked if governments could somehow replicate the impact of one of their most successful social marketing campaigns — the anti-smoking movement — to cultivate an enthusiasm for innovation. Florio suggested that the elements are already there in programs such as Scientists in the Schools and various science fairs. The challenge is to find people who can manage and execute such programs competently.

Chamberlain concluded with some observations about the state of innovation in Canada, a country that has institutions and infrastructure that are more than suitable for this purpose, but needs to embrace this subject in a broader way.

> "We need a cultural shift to get our kids and our grandchildren to believe in business innovation, to become more sophisticated in business. To do that, we have to show them that it would be good for the society as a whole."
>
> — Savvas Chamberlain, CEO & Chairman, EXEL Research Inc.

He added that the most straightforward and obvious innovations have already been claimed, which means further innovations will take more subtle, interdisciplinary forms.

Conference Close

Ron Freedman summarized the conference by describing it as one of the most international that has been mounted over the 10-year history of this event. The strong Dutch connection during this event put him in mind of a presentation he heard in 1981 from the head of research at Philips, who made a rather commonplace observation that the cost of employing an engineer varied from one country to another. Today this comment would seem all too obvious, but Freedman was struck by it at the time, since he interpreted it to mean that this manager was interested in hiring the best talent he could find at the lowest cost. That realization marked the beginning of his ongoing appreciation of the fact that technical know-how was in no way confined to the developed world but

something that could be found anywhere, a principle that is now regarded as one of the foundations of the global economy.

Speakers, Panelists and Moderators - Biographies

Luuk Borg
Head, EUREKA Secretariat

In 2006, Luuk Borg was seconded to Brussels by the Netherlands Ministry of Economic Affairs, to manage the set-up and launch of the joint EU-EUREKA Eurostars Programme for R&D-performing SMEs. In July 2007, he accepted the post as head of EUREKA's Secretariat. Under his leadership, says Borg, 'EUREKA continues in its ambition to perform as the best platform for research-performing businesses in Europe, with results that benefit society at large. Luuk Borg holds a master of science from Erasmus Economic University Rotterdam and followed a graduate programme at University Davis California. He began his career as a consultant and account manager on EU-funded and other research projects, specifically targeting the participation of small and medium enterprises (SMEs). Borg subsequently joined the Senter/EU-Liaison Agency of the Netherlands Ministry of Economic Affairs where, in 1997, as managing director, he oversaw the merger of EU-Liaison with Senter. Borg was also responsible for establishing the Netherlands Office for European Science and Technology (NEST). In 2001, Borg became director of Marketing and Promotion at the Agency for International Business and Co-operation (EVD), responsible for both the planning and execution of trade missions and coordination of overseas trade support offices. He then headed the Patent Information Division of the Netherlands Patent Office, with specific responsibility for the management of the marketing division. Under his leadership, a new business case for the Patent Office aimed at better use of intellectual property rights and patent information by companies and research institutions was developed. Luuk Borg was born in Ede in the Netherlands in 1963 and has four children.

Tom Brzustowski
RBC Professor, Commercialization of Innovation, Telfer School of Management, University of Ottawa; Chair of the Board, Institute for Quantum Computing, University of Waterloo

Tom Brzustowski is RBC Professor in the Commercialization of Innovation at the Telfer School of Management at the University of Ottawa and Chair of the Board of the Institute for Quantum Computing at the University of Waterloo. He is also Chair of the Scientific Advisory Committee of the Council of Canadian Academies (CCA). Brzustowski was President of the Natural Sciences and Engineering Research Council of Canada (NSERC) from 1995 to 2005. His recent work on innovation and productivity is published in the internet journal "Optimum Online" and in the book "The Way Ahead – meeting Canada's productivity challenge" (U of Ottawa Press, 2008). A professional engineer, Dr. Brzustowski graduated with a B.A.Sc. in Engineering Physics from Toronto in 1958, and a PhD. in Aeronautical Engineering from Princeton in 1963. He taught Mechanical

Engineering at Waterloo from 1962 to 1987, and also served as Vice-President, Academic of the university (1975 – 1987), and later as Deputy Minister in the Government of Ontario (1987 – 1995). Dr. Brzustowski has received honorary doctorates from a number of Canadian universities, as well as the Engineering Alumni Medal from the University of Toronto and the Gold Medal of the Professional Engineers of Ontario. He is an Officer of the Order of Canada, and a fellow of the Canadian Academy of Engineering and of the Royal Society of Canada.

Savvas Chamberlain
Chairman & CEO, EXEL Research Inc.

Successfully commercializing technology from his research as a professor at the University of Waterloo in Canada, Dr. Savvas Chamberlain founded DALSA Corporation in 1980. He was the CEO from its inception until August 2007, when he became Chairman. Under his leadership DALSA has grown to become a leading International Corporation in Digital Imaging and grew from few employees to 1,100. Its revenues at the end of December 2010 were $212 million. He resigned as Chairman of DALSA Corp on February 12, 2011. He is presently the CEO and Chairman of EXEL Research Inc. The recipient of numerous honours and distinctions, In July 2010 Dr. Chamberlain was made a Fellow of the Royal Society of Canada. In July 2009 Dr. Chamberlain was made a member in the Order of Canada. In May 2008 was elected Fellow of The Canadian Academy of Engineering. In 2007 he was awarded an Honorary Doctor of Engineering Degree by the University of Waterloo for his industrial contributions and was the recipient of Ontario Premier's Catalyst award for life time achievement in innovation He is a distinguished Professor Emeritus of the University of Waterloo and the holder of the AIA Lifetime Achievement Award. Educated in England and he holds MSc. and PhD. degrees from Southampton University. He has published more than 150 papers and has authored and co-authored more than 20 patents in the area of image sensors. He likes Greek literature, gardening, loves outdoors, nature, walking, hiking, classical music, Greek music, live theatre and the opera.

John Clarkson
Deputy Minister of the Department of Innovation, Energy and Mines in the Province of Manitoba

John is the Deputy Minister of the Department of Innovation, Energy and Mines in the Province of Manitoba. He has over 20 years of senior executive experience in the public and health care sectors. He leads the governments initiatives related to energy, mineral resources, petroleum, innovation, research, science and technology related business development, community connectivity, service transformation and information technology. Under his leadership, the government has been recognized as a leader in clean and renewable energy initiatives, energy efficiency activities, became one of the

fastest growing biotechnology regions in the country, released an aggressive strategy that links together environmentally sustainable practices with economic growth, adopted an aggressive innovation framework, and is transforming the way government operates through the use of technology.

Eric L. Cook
Executive Director/ CEO, Research and Productivity Council (RPC)

Eric is a results-orientated business leader with extensive experience fostering innovation. He passionately promotes innovation as a critical element of global competitiveness and advocates a balanced innovation policy that supports market-led research (pull-innovation).

Eric's business experience includes 20 years of leadership in high tech companies involved in advanced manufacturing, space science, aerospace, wireless communications and nuclear energy. Eric has participated in innovation initiatives for numerous federal and provincial departments and agencies. He is a Global Fellow with the Eco Innovation Program at the University of Versailles.

Eric was appointed Executive Director and CEO of RPC in 2004. RPC is a provincial research organization (PRO) offering contract research & development, and technical services. RPC provides technical expertise both regionally and globally to more than 800 clients annually serving the environmental, aquaculture, manufacturing, mining and energy sectors.

Marie-Claude Côté
Vice-President, Business Development, Centre de recherche industrielle du Québec (CRIQ)

Marie-Claude Côté is a graduate of Laval University with a degree in engineering and a Master of Science in production engineering. She is a certified New Product Development Professional (NPDP) by the Product Development and Management Association. Her commitment to innovation has enabled her to develop wide-ranging expertise covering: business strategies, innovation management and new product development. Ms. Côté started her career at EXFO EO, in Canada and later on in the United States. She joined the Centre de recherche industrielle du Québec (CRIQ) in 2006, as Vice President of Business Development. Her personal mission is that of CRIQ's, ensuring the competitiveness of Quebec industry through innovation. Her responsibilities include business development, partnerships and innovation management. She is also involved in various industry and research centre networks and serves on the boards of Alcoa Innovation and Innoventures Canada.

Natalie Dakers
CEO, Centre for Drug Research and Development (CDRD)

Ms. Dakers currently serves as the Chief Executive Officer of the Centre for Drug Research and Development (CDRD), an innovative organization in British Columbia with a mandate to address the commercialization gap between early-stage technologies arising out of university-based research and investment opportunities. Under Ms. Dakers' leadership, CDRD has signed affiliation agreements with major research institutions in Canada and forged important strategic relationships with Pfizer Canada and Genome British Columbia. With its over 20,000 square feet in specialized lab space and more than $12 million invested in state-of-the-art equipment, CDRD has attracted over 70 employees and 260 investigators. To date, CDRD has raised and secured approximately $74 million in funding and was named a Centre of Excellence for Commercialization and Research (CECR). Ms. Dakers brings to CDRD many valuable years of experience in the commercialization of technology, licensing, and intellectual property protection. Active in a number of business and scientific organizations, Ms. Dakers is Past Chair of BC Biotech and currently board member of the Canada Foundation for Innovation (CFI) and the International Science and Technology Partnership Canada (ISTP Canada). Ms. Dakers received a Peak Award for Performance and Excellence in 2004, and in 2009, she was the recipient of BIOTECanada's Gold Leaf Award for Industry Leadership.

Christophe Deutsch
Vice-President, Operations, INO

Christophe Deutsch is Vice-President of Operations at INO, a leading non-profit R&D centre in Optics/Photonics in Canada. Dr. Deutsch is responsible for the manufacturing, operations and production of all R&D projects. From 1997 to 2007, prior to joining INO, Christophe Deutsch held a number of progressively senior positions with the leading engineering firm ABB. He began in systems engineering, project management and a leader of several aerospace projects. In 2004, he began R&D Manager, leading a group of 70 researchers, engineers and technicians. With this role he developed a deep understanding of product development and technological innovation processes. Born in Mulhouse, France, Christophe studied his engineering at the Institut National des Télécommunications. He holds a Masters degree in mathematics from the University Paris VI, a M. Sc. and a Ph. D. in electrical engineering from Laval University. He promotes innovation in management to increase the efficiency of R&D and cofounded the RCR - innovation en gestion, a group of R&D Managers collaborating and exchanging ideas ion this area. He is currently involved in the implementation of open innovation tools in the Quebec City area with IDTEQ, a group of 5 R&D centres.

Tony Florio
University Relations Manager, RIM

Tony Florio is a university relations manager with Research In Motion (RIM), a leading designer, manufacturer, and marketer of innovative wireless solutions for the worldwide mobile communications market. He helps build effective partnerships between RIM and post-secondary academic institutions, focused on generating new ideas and developing talent in areas of strategic interest to the company. A graduate of McMaster University, Prior to joining RIM, Tony also held positions with Ontario's Ministry of Research and Innovation and the Ontario Centres of Excellence.

Rick Harwig
General Manager, Harwig Innovation Services

Dr. Rick Harwig, former Philips CTO and member of the Group Management Committee is independent professional as of April 2010. At Philips he was responsible for technology strategy and management, research and intellectual property and standards, new business incubation and applied technologies. He held various management positions in R&D and innovation in Philips Research, Consumer Electronics and Semiconductors and external board positions in FOM, STT, CQM, INRIA and A*STAR. He has driven open innovation to become a leading theme within Philips and inspired the emerging High Tech Campus Eindhoven to become a unique open innovation eco-system in Europe and the center of gravity for private R&D and Open Innovation in the Netherlands. Today he is active for the North Brabant Development Agency, Eindhoven University of Technology, TiasNimbas Business School, Vlerick Leuven Gent Management School, Netherlands Academy of Technology and Innovation, Prodrive, TNO and the Netherlands Ministry of Economic Affairs, Agriculture and Innovation.

Andy Hopper
Professor of Computer Technology, University of Cambridge, Head of Department of the Computer Laboratory

Andy Hopper is Professor of Computer Technology at the University of Cambridge, Head of Department of the Computer Laboratory, and elected member of the University Council. His research interests include computer networking, pervasive and sentient computing, and using computers to ensure the sustainability of the planet. Andy Hopper has pursued academic and industrial careers simultaneously. In the academic career he has worked in the Computer Laboratory and the Department of Engineering at Cambridge. In the industrial context he has worked in senior roles for multinational companies and also co-founded a dozen spin-outs and start-ups, two of which floated on stock markets. He is currently Chairman of RealVNC and Ubisense. Professor Hopper received the BSc degree from the University of Wales Swansea (1974) and the PhD degree from the University of Cambridge (1978). He is a Fellow of the Royal Academy

of Engineering (1996) and of the Royal Society (2006). He was made a CBE for services to the computer industry (2007).

Ari Huczkowski
CEO, Otaniemi Marketing Ltd

Ari Huczkowski is a professional commercializer, international brandbuilder and marketer, startup company growth advisor, generalist on nanotechnology, open innovation, science and technology parks, high tech ecosystems and a few other things. Mr Huczkowski is currently employed by Otaniemi Marketing Ltd as its CEO to internationally build the brand and market Northern Europe's biggest high technology hub, Otaniemi in Espoo, Finland. Ari holds a MSc.Econ. degree in International Business from the University of Vaasa, Finland. In addition to marketing and international marketing Mr Huczkowski has also studied financial accounting, management, journalism, languages and political science. In addition to Finland, Mr Huczkowski has studied in Sweden, Norway and USA.

Ari lives with his wife Tarja and their 2 sons Tobias and Elias in Espoo. His hobbies include playing piano, jogging, reading, gardening, cars, languages and travel. As a goal in his life Mr Huczkowski actively seeks and meets new challenges and he strives to be a positive factor wherever he is."

Mag Iskander
President, Information Systems, MDA

Mag Iskander is President, Information Systems, MDA.Prior to this appointment, Iskander held the position of Executive Vice President and General Manager, Space Missions, MDA from 2005 and Vice President and General Manager of MacDonald Dettwiler Robotics division from 1999. He joined Spar Aerospace in 1990 as Program Manager and held a number of positions, including Director of Manufacturing and Vice President, Space Station Program. Mr Iskander worked for several other companies, including Canadair/Bombardier from 1976 to 1988. A native of Cairo, Egypt, he attended Cairo University, Faculty of Engineering, where he received a BSc. Industrial/Production Engineering degree in 1973. Iskander immigrated to Canada in the same year. In 1982, he obtained a Master's degree in Business Administration from McGill University in Montreal. Iskander is President of the Canadian Foundation for the International Space University.

John McDougall
President, National Research Council of Canada

Mr. John R. McDougall, a leader in Canadian science and technology policy and innovation, was appointed as NRC's President in April 2010. Born and raised in Edmonton, Alberta and honoured as one of the province's 50 most influential citizens, Mr. McDougall's career spans many sectors, with a broad and far reaching range of accomplishments and roles to his credit. Until recently, Mr. McDougall served as President and Chief Executive Officer of the Alberta Research Council (ARC), a position he has held for the past 12 years. Mr. McDougall's career began with a decade served as a petroleum engineer. This quickly evolved into the ownership and management of an international engineering consulting firm. Following this, he held a number of influential positions with some of Canada's most innovative research and manufacturing businesses, consortium and not-for-profit organizations. Always an active participant in professional and community affairs, Mr. McDougall has contributed to a number of prominent advisory boards and committees, both on the provincial and federal levels during the course of his 43-year career. He was a member of the NRC-Industrial Research Assistance Program (NRC-IRAP) Advisory Board from 2002 to 2006 and also contributed to the Natural Sciences and Engineering Research Council of Canada (NSERC), the AUTO21 Network of Centres of Excellence, the Edmonton Space & Science Foundation and the Environmental Protection Advisory Committee. A fellow of the Canadian Academy of Engineers and Engineers Canada, Mr. McDougall has a Bachelor of Science Degree in Civil Engineering from the University of Alberta, with a number of postgraduate courses in Environmental Engineering to his credit. From 1991 to 1997, he served as the university's first Poole Chair in Management for Engineers, a leadership position within the Faculty of Engineering. Mr. McDougall was founding Chair and President of Innoventures Canada.

Geoff Munro
ADM and Chief Scientist, Natural Resources Canada

Geoff Munro was appointed the Assistant Deputy Minister of Natural Resources Canada's newest sector, the Innovation and Energy Technology Sector (IETS) on April 14, 2009. IETS is comprised of CanmetENERGY, the energy technology R&D arm of the Government of Canada, as well as the Strategic Science & Technology Branch. This appointment is in addition to his June 25, 2007 appointment as Natural Resources Canada's Chief Scientist. In these capacities, Mr. Munro works to position NRCan's science and technology and its energy research and development within the Canadian innovation system and in broader international arenas, as well as lead the implementation of the department's science and technology strategy. Mr. Munro came to Ottawa in December 2004 to take over the responsibilities of Director General of Science and Programs for NRCan’s Canadian Forest Service. Prior to that, Mr. Munro was previously the Director General of the Canadian Forest Service – Great Lakes Forestry Centre in

Sault Ste. Marie, Ontario. Geoff has also worked as a Director of Research and Development for the fish/forestry/wildlife programs for the Ontario Ministry of Natural Resources.

Alistair Nolan
Senior Policy Analyst, OECD Education Directorate

Alistair Nolan has worked with the OECD since July 1997. Since February 2004 he has worked as a member of a team in the Directorate for Education co-managing work on the development of a strategy for an OECD-wide quantitative assessment of adult competencies. For the bulk of his time with the OECD he has specialised in all aspects of public policy towards entrepreneurship, with a focus on the links between firm creation and the development of local and regional economies. Mr. Nolan played a key role in the preparation of the OECD's 1998 flagship publication Fostering Entrepreneurship and was also responsible for two OECD books on business incubation: Business Incubation: International Case Studies (1999) and Good Practice in Business Incubation (2000). He has also been responsible for OECD policy recommendations on business networks and enterprise clusters. He is the author of the 2003 OECD book Entrepreneurship and Local Economic Development, which reviews knowledge in the field of entrepreneurship and sets out detailed programme and policy guidance for central and local governments. He has also specialised in the evaluation of public policy, and is the editor and co-author of the 2005 OECD book entitled Evaluating Local Economic and Employment Development: How to Assess What Works in Programmes and Policy. Prior to joining the OECD he worked as one of a small group of staff responsible for monitoring and evaluating the technical assistance programme of the United Nations Industrial Development Organisation. In this context he was responsible for evaluating projects and programmes in fields ranging from training to technology transfer, environmentally clean production and investment promotion. Over a number of years with UNIDO he also occupied posts in research, policy and the design of technical co-operation. Mr. Nolan holds a M.Phil. from Cambridge University in the Economics and Politics of Development, as well as post-graduate qualifications in corporate finance, financial economics, and studies in environmental economics and project finance. He is registered on the Phd in Economics at Cambridge University.

Jérôme Nycz
Senior Vice-President, Strategy and Corporate Development, Business Development Bank of Canada

Jérôme Nycz joined BDC in 2002. He is responsible for BDC's strategic planning, enterprise risk management and knowledge management, including corporate and economic research. As such, he is responsible for developing the indicators by which BDC measures its performance. Previously, Mr. Nycz worked in the federal government,

notably as Senior Economist and Policy Advisor at Finance Canada, Industry Canada and National Defence. He has also worked at Export Development Canada and as an investment officer at the Canadian Consulate in Boston. He is a member of the board of CIRANO and the Advisory Board for International Competitiveness of the Desautels Faculty of Management of McGill University. Mr. Nycz holds an IMBA from Hartford University.

Allyson Reed
Director, Enterprise and Communications, Technology Strategy Board, UK

Allyson Reed, Director of Enterprise and Communications at the Technology Strategy Board, is a commercial business leader with a scientific academic background. She was previously Director of Innovation Partnerships at QinetiQ plc and prior to that Commercial Director of a national research laboratory where she headed technology transfer, developing a substantial commercial collaboration programme including licensing and setting up CLIK, the technology transfer company, the Rainbow Seed Fund, a portfolio of spin-outs, and a joint venture science park and incubator with an RDA. Following early research as Rosalind Franklin Fellow at Cambridge University, Allyson has held senior management roles in a number of international healthcare, engineering and communications businesses. Until recently she was CEO of 3CResearch, a company commercialising research in new digital media. She has extensive experience of public and private sector innovation, of the business and people skills needed to accelerate sustainable new business and of engaging large and small organisations in enterprise.

Laurier Schramm
President & CEO of the Saskatchewan Research Council

Dr. Laurie Schramm is the President and CEO of the Saskatchewan Research Council (SRC) where he has led SRC to quadruple in size over the past 9 years, positioning the company as Saskatchewan's premier provider of applied research, development and technology demonstration and commercialization. This has enabled SRC's work to contribute over $3 billion in economic activity in Saskatchewan alone, over the past seven years. He has over 30 years of R&D experience in the applications of nanotechnology, colloid and interface science, and has published 9 books, over 300 scientific reports, and 17 patents on his inventions, many of which have been adopted into commercial practice. He has received major national awards for his work, and his development of oil-tolerant foams for enhanced oil recovery was judged to be a "Milestone of Canadian Chemistry in the 20th Century". Laurie recently served on the Expert Panel on Oil Sands for the Canada Foundation for Innovation, and before that on the National Panel of Experts on Sustainable Energy Science & Technology for Natural Resources Canada.

He is currently on the Board of Directors of Innovation Saskatchewan Inc. and he is also the Chairman of the Board of Directors of Innoventures Canada Inc., an alliance of Canada's research and technology organizations from coast to coast.

Logan Stanton
Director, Head of North America, World Economic Forum

Logan Stanton is currently serving as the Director, Head of North America for the World Economic Forum charged with the engagement of governments from North America in various Forum policy initiatives. He manages a team responsible for integrating the industry, regional and global agendas from a North American perspective, into the myriad of interactions facilitated by the World Economic Forum. Previously, Logan completed eight years of service as an Infantry officer in the United States Army. His assignments included the 101st Airborne Division (Air Assault) and company command in 1st Battalion, 506th Infantry (Currahee), Republic of Korea. His last assignment was with 3d Ranger Battalion, 75th Ranger Regiment, Special Operations Command (SOCOM), with combat tours in both Iraq and Afghanistan. Logan studied Political Science and International Relations at the University of Utah. He also holds a Master in Public Administration from Harvard University with a concentration in Negotiation and Conflict Resolution and a Master in Global Leadership from the World Economic Forum. He is a founding editor and sits on the editorial board for the "Korea Policy Review" journal at Harvard's Kennedy School of Government

Mario Thomas
Senior Vice-President, Ontario Centres of Excellence

Dr. Mario Thomas is an accomplished strategic executive with impressive international credentials in the commercialization of research. With over 30 years in leadership roles directing corporate growth, he creates remarkable value for all stakeholders. Mario Thomas brings extensive experience filled with achievements driving successful development collaborations and financial ventures. Dr. Thomas was promoted to Senior Vice-President, Ontario Centres of Excellence in June 2010. Before being appointed Managing Director of the Centre for Commercialization of Research at the Ontario Centres of Excellence in April 2009, Dr. Thomas was Partner in the venture firm T2C2 Capital. His previous experiences include CEO and co-founders co-founding roles with two start-up companies; and senior positions in business development, marketing and scientific research.