



**Science Day in Canada  
Opening Address**

***Going for Gold—Reaping the Benefits of Investments in Research***

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**Thank you and introduction**

Thank you David.

I am honoured to open today's events. My thanks to David Mitchell and the Public Policy Forum for giving me the opportunity to speak on a day devoted to science in Canada.

The Public Policy Forum is an important voice for sound public policy in Canada and I feel fortunate to have served on the Board for three years. David Mitchell is a splendid choice for the PPF's new CEO and I congratulate him and the PPF for taking a lead in organizing Science Day.

I also applaud Preston Manning for advocating for the need for better communication on the impacts of the investments in research and innovation, especially in this difficult economic time. Of course, I wouldn't expect anything less from a University of Alberta alumnus!

Preston Manning has never been one to be shy away from speaking out and demanding better. His insistent belief that Canada has enormous potential that we cannot afford to lose is hard to ignore.

Last month, I heard another Canadian express a similar sentiment.

At the PPF's annual testimonial dinner, Alex Baumann, two-time Olympic champion in swimming, said that he believes that Canada can finish No. 1 in the medal standings in the 2010 winter games in Vancouver.

In fact, he moved back to Canada after years in Australia to work with "Own the Podium"—an organization devoted to making it happen.

Imagine that—Canada aspiring to be No. 1!

I may not be an athlete, but I appreciate excellence and laud the hard work that goes with the quest to be the best.

So, I say: why stop with winter athletics?



Let's also aim to be number one in science and technology research and innovation.

The search for new knowledge, like athletic excellence, is built on human talent, years of training, and a culture of high achievement.

If Canada succeeds in its Olympic goals, it will be because our talented athletes have received the financial support, time, and facilities to train at the level needed to achieve global excellence.

Canada's time has come to aim for leadership in knowledge, technology, entrepreneurship and innovation—it's time to take individual and team gold medals - Nobel Prizes in Academia, global leadership in business and social innovation.

We have never been better positioned to make the daring calls and take control of the game that faces us.

However, extra-ordinary individuals or innovative research teams, like elite athletes, need the support of the public and private sectors to achieve global excellence.

Canadians will not reach our goals without the right mix:

- world-competitive universities;
- collaborative, visionary corporations and an ingenious social sector;
- and a public sector that understands the new worlds in which we operate.

Together we must put in place the infrastructure to make the partnership among us—universities, industry, and government—reach ever-higher levels of performance.

### **The competition**

We are up against some stiff competition.

President Barack Obama has earmarked billions for scientific research in his stimulus package, reinvigorating the US research community. Countries such as India and China are surging to the fore.

And, the playing field has been changing as fast as the players.

Three powerful technologies – information and communications, molecular biology and nanotechnology – have emerged and are interacting with one another. They are unleashing innovation on a scale we have not seen in decades.

Business is riding these three waves of innovation . . . and are focusing their research and development activities on creating new products and services



In some cases big innovations—like Google and I-Pod—are not derived from formal research and development at all, although they are now being advanced by R and D efforts.

To speed the innovation process and the generation of new ideas, businesses are connecting into global networks, consisting of customers, suppliers, universities, government agencies, and other companies around the world.

So the playing field is changing along with the players. What will it take to build a globally competitive research climate in Canada?

What will it take to harness research investments to make Canada a global leader in innovation and entrepreneurship?

### **Research at universities**

Let me start by looking at what universities can do.

As President of one of Canada's leading research universities, it is my job – and the job of my colleagues – to identify talented people.

And then, it is our job to develop and support their capacity for extraordinary achievement, and to enable them to teach and develop the next generation that will stand on their shoulders.

The potential impact of a single, extraordinary individual pursuing curiosity-driven, basic research cannot be under-estimated.

An excellent example is Dr. Raymond Lemieux, a University of Alberta chemist whose fundamental research paved the way to his ground-breaking discovery of the synthesis of complex carbohydrates called oligosaccharides.

This led to the development of antibiotics, vaccines, and improved treatments for organ transplantation.

Lemieux's legacy did not end there; it now resides in a major research centre with 10 principal investigators, along with 79 research staff and graduate students from various fields of study.

The societal value of such breakthroughs are rarely apparent at the time of discovery.

When Michael Faraday discovered electromagnetic induction in the 1830s, British Prime Minister William Gladstone asked him what use it would be.

He is supposed to have replied “As much use as a newborn, and someday you may be able to tax it”.

Years later Prime Minister Margaret Thatcher remarked that Faraday's invention had generated more wealth than the entire London Stock Exchange.

In spite of the enormity of the potential pay-off, we as a society are uncomfortable taking risks on high flyers such as Lemieux or Faraday.



## **How can we nurture talent?**

This is particularly pressing for us here in Canada—where we have had few Nobel prizes. Why? What are we doing...or not doing...to create and retain extraordinary minds?

Here's where government is now playing a key role in nurturing individual talent. The Canada Excellence Research Chairs or CERC program recently announced is a departure from the conventional Canadian way and is one of the indications that we are, indeed, aiming to go for gold in international research.

Investing \$10M over 7 years on each of 20 extraordinary leaders, in areas where there are Canadian clusters of global excellence is a bold step.

The CERC program is a great complement to the Canada Research Chairs program, which helped Canada avert a “brain drain” over the last decade. We have attracted top researchers from all over the world—but in particular from the US.

Even with President Obama's infusion of dollars, many tell me that they plan to stay here—because Canadian researchers spend less time writing grants, do not have to fund their summer salaries, and have lower overhead costs.

Although US federal funding for research will increase in the short-term, state funds and university budgets are shrinking and the US is facing massive debt.

Our focus, then, on attracting and nurturing extra-ordinary talent is starting to pay dividends.

The next generation of extraordinary thinkers is another part of the picture.

The recently announced Vanier Scholarships, which are open to Canadian and international students, will enable us to be a magnet for the best and the brightest. Ideally, these scholarships will grow in prestige equal to the Fulbright and the Rhodes.

## **Importance of InterD research**

As critical as one individual can be to the advancement of discovery, universities have also been keenly aware that extraordinary research teams are a key part of the process of discovery and innovation.

But, the composition of research teams is changing within universities to reflect the increasing complexity of questions and problems in all fields.

Disciplinary specialization and segregation is giving way to interdisciplinary integration and collaboration.

For example the understanding of the human mind - memory, emotions, and what it means to be human - will be advanced through collaboration between neuroscience and the humanities.



Major research programs such as CFI, and specific programs funded by the Tri-Councils, has led to better coordination between universities and their researchers, stimulating the crossing of disciplinary boundaries as well as those between institutions and potential funding partners.

Our support for excellence must span engineering, the natural and health sciences, and include the human sciences – the social sciences, humanities and the arts.

Learning, culture and societies are being transformed in this rapidly changing, technologically driven world. The human sciences will be central to understanding and advancing human and social well-being in this new mileu.

And, as I mentioned earlier, research and development in universities, business and even in the social sector is moving towards an open innovation model—where there is collaboration among all arenas.

### **E-coli story**

Let me tell you a story about what is possible in this country when this kind of collaboration happens:

Ever since the tragedy of Walkerton, every Canadian knows about the devastation that E-coli bacteria can wreak on human populations.

Because of a major collaboration among scientists at two Canadian universities, the Alberta Research Council, and Bioniche Life Sciences Incorporated, a vaccine is now on the market that inoculates cattle, vastly reducing the amount of E-coli they shed into the environment.

It began with basic research by UBC researcher Brett Finlay—a U of A Ph.D let me add. His work showed how bacteria attach to cells.

Then it involved University of Saskatchewan animal scientist Andrew Potter's applied research. He developed a vaccine that prevents the attachment of the E-coli bacteria to the intestinal surface of cattle.

Then the team hit a road block. Major pharmaceutical companies weren't interested. Why not?

They couldn't see why cattle producers would buy a vaccine to fight bacteria that doesn't make cattle sick. You see there's the rub: although E-coli is very dangerous to humans, it has no impact on cattle.

So a great idea without a market.

Through some ingenuity, Lorne Babiuk, then head of University of Saskatchewan's Vaccine and Infectious Disease Organization, went to Macdonald's and Superstore and asked what they thought of the possibility of the vaccine.



Considering how damaging one E-coli outbreak can be for their businesses, they responded by saying that if such a vaccine existed, they would require that all meat they purchased came from vaccinated cattle.

Now cattle producers have a reason to buy the vaccine, and with that, the vaccine went into product development, testing, and certification.

This story, I think, illuminates four critical points:

First, that without the ingenuity of extra-ordinary individuals and interdisciplinary and inter-organizational collaboration none of this would have been possible.

Second basic research, that is use-inspired, does not compromise serendipitous discovery or intellectual freedom as some might have you think.

Third, out of university-based basic and applied research useful and patentable products and systems can result only if there is a strong partnership with the private sector, leading to the creation of new products and new industries.

And, fourth, that transferring scientific discovery to the marketplace can easily flounder and fail.

In this case, it was fortunate that Lorne Babiuk is a virologist with a head for business and came up with an ingenious solution—you won't be surprised that the U of A has since recruited him to be our VP Research.

The facts show that Canadian universities excel in basic and applied research but are not as good at effecting knowledge transfer that inspires innovation in the private or social sector.

### **The need for a new deal**

How can we work together to maximize the innovation potentials of basic and applied discoveries?

There are some fascinating models on innovation that have taken hold in the past decade. Models built on open innovation.

Last week I visited Microsoft Research located at the heart of Cambridge University in the UK. The Microsoft Mountain goes to Moses!

By co-locating Microsoft Research at a leading university, and conducting basic research in-house, Microsoft remains in close contact with academia, at Cambridge and beyond.

From the vantage point on a university campus, Microsoft invests in the best talent of tomorrow through scholarships and internships;

they help university researchers identify challenging research problems to address real-world issues;

and they select pre-competitive research breakthroughs to create new products.



Intel, IBM, Tata, BP, BT and so on are co-locating at universities or embedding researchers in universities to foster co-discovery and innovation.

China and India are attracting global companies in order to build open innovation research facilities.

Large Canadian firms rank 24<sup>th</sup> in an OECD survey on collaboration in innovation activities with customers, suppliers, or research providers, especially higher education.

Companies in Finland and Sweden, two highly competitive economies, rank near the top on this metric.

The Council for Industry and Higher Education in the UK reported on the types of university industry interaction in the UK and US and their relative contribution to innovation.

From a survey of over 3000 companies in the two countries, 30 to 53%, cited the following factors in university industry interaction as contributors to innovation - informal contacts, internships, recruitment, conferences, publications, joint research, problem solving and consulting.

In contrast, only 4 to 17% of the companies cited licensing of patents as contributors to innovation.

At the University of Alberta, Jacob Masliyah, Murray Gray and their teams, have built extensive engagement of the former type through joint research, internships, recruitment, problem solving and consulting with the Oil Sands sector.

Their research has been supported by NSERC partnership programs over several decades and has resulted in significant improvement in the extraction of oil and the reduction of environmental impacts, not easily measured by patents and licenses.

Technology Transfer offices should focus more effort on enhancing this kind of engagement between researchers and industry.

The current focus of many Technology Transfer Offices in universities is on patenting and licensing arrangements, even when negotiating a simple research grant. This often pits industry and universities against one another. The results are often marginal—and they inadvertently stifle open innovation in Canada.

MARS in Ontario has been exemplary at encouraging effective engagement and providing support for innovation in nascent enterprises.

## **Conclusion**

If Canada is to have a truly competitive research climate, we need innovation, not just in research, but in the way we—in universities, industry, government, and philanthropy—think about our relationship to one another.

We need a model that answers the speed, fluctuations and global reach of the knowledge economy with nimble responses that produce fast, science-and-technology-driven innovations and commercialization.



I suggest the following guiding ideas.

Attract and support the best talent, faculty and students, and engage them with Canada's innovation ecosystem while enhancing global connections – internships, visiting professorships, conferences, entrepreneurship and international research collaborations etc.

Invest in world-class basic and applied research, whether it is curiosity-driven or use-inspired, in all areas, while preferentially investing in areas where Canada can lead the world with a competitive advantage. Using the language of Jim Collins in Good to Great, Canada needs some BHAG's- Big, Hairy Audacious Goals!

Stimulate open innovation and collaboration between businesses, customers, suppliers, universities and the social sector. Attract and retain global companies such as Microsoft and Tata, Google and Astra-Zeneca, encouraging them to co-locate or embed researchers in universities, fostering a culture of creativity and innovation.

The current financial climate gives us license to pause, take stock and create change. The time is ripe.

If we are going “own the podium,” we need to continue to make changes and bold investments and bold changes.

We cannot blink in the face of these difficult financial times. Indeed, downturns create opportunities for forward-looking organizations.

Regions and governments that do what is counterintuitive will come out ahead.

Let's work together to make sure that Canada emerges a winner!

Thank you.