"UNFINISHED BUSINESS"

An address to the Canadian Club of Toronto

by

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Monday, November 20, 2006

CHECK AGAINST DELIVERY

Introduction

I am delighted to be here today, and grateful to the Canadian Club for this opportunity to address such a distinguished audience. I am also humbled to speak on behalf of an institution whose history, for 179 years, has been woven into the fabric of our city, province and nation.

More than a million University of Toronto graduates have gone on to help build our country up to its present stature. Today the University has 11,000 employees. We spend about $1.7B per year, serving over 65,000 students, 7,000 of whom are international. And we are busy not only sharing knowledge but creating new knowledge. Based on total publication output in computerized indices compiled by Thomson ISI, the University of Toronto generates more research than any other publicly-funded university in the world. Add in the private universities and only Harvard publishes more.

It has obviously been a long journey for what began as King's College in the Town of York, a small university chartered to fill a colonial vacuum. In this afternoon's remarks, however, I want to look around and forward, not back, and talk to you about what I believe is a critical moment in the evolution of Ontario and Canadian society.

Canada's Place in a New Knowledge Economy

It's a platitude to assert that a new knowledge economy is sweeping the world. That message is so banal that it's already fashionable to discount it. The all-Canadian contrarians already grumble: Aren't we the top-performing economy in the G8? What's wrong with a resource-based economy that plays to our natural advantages? Why shouldn't we be hewers of softwood and drawers of oil? We have great mineral wealth. Who cares if the head offices sit in Europe or South America, so long as the companies make more jobs for Canadians? Anyway, the contrarians say, we have other time-honoured advantages. Compared to the US, we manufacture cars efficiently because we have a well-educated and stable workforce that receives publicly-subsidized healthcare. Isn't that enough?

And the answer is: No. In fact, for the long haul, it's nowhere near enough. By all means, let us have a thriving resource-based economy. Let's celebrate a Canadian success like Barrick – the world's top gold producer,

turning things upside down with Canadians in charge of mineral resources elsewhere. And by all means, let us compete ruthlessly to lure Japanese or American auto manufacturing concerns to Canada. But I am talking about our national asset mix -- a responsible diversification of our portfolio of economic activities so that Canada can claim a very serious share of knowledge-based global industries. That change in our economic base is surely vital if future generations of Canadians are to enjoy sustainable prosperity, and if there is to be more balanced development across the various regions of this sprawling dominion.

Consider, for a minute, how we fare in brand names compared to other nations with small populations. Sweden, a nation of 10 million people, has Saab and Volvo, Ericsson, Ikea, Tetra-Pak, and Astra-Zeneca. South Korea – a nation occupied and devastated in the early 1940s, then split by a civil war – has Hyundai and Kia, Samsung and LG.

Yes, we have our own innovation success stories. At the moment, Research in Motion [RIM] is our best poster child – here's hoping its run is long and strong. But Canada's drive towards a bigger stake in the knowledge-based global economy may already be stalling out.

Ranking the overall economic performance of nations, of course, is about as precise as ranking universities or colleges. But the indicators and rankings keep triangulating in some unsettling ways. One of the latest is a report released in September by the World Economic Forum. In it, Canada fell in "Business Competitiveness" from 14th to 15th, while in "Global Competitiveness" we went from 13th to 16th.

I suggest to you that, in laying the foundations for a knowledge-based economy, this country has unfinished business -- an urgent need to think through the strategies, investments, and incentives that will change our economic framework fundamentally. In the rest of these remarks, I want to focus specifically on where higher education -- and especially where research-intensive universities -- fit into this big picture.

The Shifting Goalposts

A decade ago, a Liberal Government in Ottawa launched a national innovation agenda that saw a major expansion of government investment in R&D, together with efforts to align incentives more favorably for industry in

some respects. We are waiting now to see how the new Conservative Government will put its stamp on a research agenda for Canada.

Believe me, we need to get moving, because each month we are losing more ground. China plans to build 100 new universities over the next decade. More than 5 million new students enrolled in Chinese higher education institutions last year, up almost five-fold over the enrolments in 1998. I know that some observers remain confident: "Don't worry", they say. "Their engineers and scientists aren't very good." Right…Between 1997 and 2004 the Chinese output of articles in international science journals grew at least fourfold and the number of patents issued to Chinese researchers grew almost 20-fold. R&D spending in China has been growing at an annual rate of about 17%, far higher than the 4% to 5% annual growth rates reported for the US, Japan and the European Union over the past dozen years.

In the interests of time, I won't even get started on India.

Meanwhile, our great neighbour to the south has awakened to the threat to its R&D dominance. Earlier this year President George Bush tabled a Budget for 2007 that requested a total of $137 billion for Federal Research and Development. My best estimate is that Federal R&D spending per capita in the USA is and will remain at least twice as high as in Canada.

The language surrounding these American investments is telling. Speaking in February, President Bush said: "My 2007 Budget recognizes the importance of innovation to our economic future—fostering and encouraging all the components that make our economic engine the envy of the world. In partnership with the private sector, State and local governments, and colleges and universities, the American Competitiveness Initiative will promote new levels of educational achievement and economic productivity. With the right policies, we will maintain America's competitive edge, we will create more jobs, and we will improve the quality of life and standard of living for generations to come."

Creativity and Innovation

Let me highlight another point about these new American investments in R&D. They are unabashedly oriented to supporting fundamental research. Not applied and incremental research, but the paradigm-shattering and disruptive discoveries that flow out of first-class research institutions. In fact, President Bush referred specifically to "high-leverage, innovation-

enabling fundamental research designed to underpin and complement shorter-term research performed by the private sector".

We all know the old axiom: Necessity is the mother of invention. In truth, it's the other way around: Invention is the mother of necessity. Here in the audience is Professor John Polanyi, who won a Nobel prize in Chemistry at the University of Toronto in 1986. When John Polanyi started studying infrared chemiluminescence almost fifty years ago, who could have imagined the eventual application of lasers in everything from CD players to medical devices today?

Fundamental research always has unexpected impacts on society, whether in the humanities, the social sciences, or the sciences. Among those unpredictable impacts are changes in the way we understand different cultures and societies, highly-successful spin-off companies, or even the birth of whole new sectors of the knowledge-based economy.

Those impacts aren't automatic. Today in Canada, we also need some careful investments by the federal and provincial governments in two dimensions of commercialization. The first is in what I'll call translational research facilities – initiatives that will take university-based research just a few steps closer to the marketplace. Those steps can help transform a set of discoveries from theoretical intellectual property sold to a US firm at discount prices, into job-creating made-in-Canada companies. The second set of investments is much trickier. We still need to figure out the incentives and disincentives that affect Canadian entrepreneurship, and find a way to facilitate seed-stage investments that will spawn new knowledge-based enterprises.

More than S&T

Let me emphasize again that when we talk about a knowledge-based economy, we must look beyond science and technology. The social sciences and the humanities -- including the creative and performing arts -- are also an integral part of a knowledge-based economy. They make a huge difference to our quality of life. And they help all of us to understand and navigate this complex and shrinking world. The arts and entertainment sector, in particular, is a wonderfully 'green' job creator, be it in film production, animation, music, or other outputs from our cultural industries.

People, not Patents

Considering all these ways that Canadians can be creative, one critical fact jumps off the page. The main output of research universities is not patents or companies. It's people: Ingenious people hard-wired for creativity and innovation -- people who are able to engage with the rapid pace of global knowledge creation.

Mike Lazaridis, the co-CEO of RIM, has repeatedly made this point. Dr Lazaridis argues that patents for disruptive technologies can sometimes be developed in the product laboratories of truly innovative companies, but the right mind-set to generate those patents can only be developed in the research and teaching laboratories of fine universities. The same, arguably, can be said for the creative impulse in a wide range of activities cutting across knowledge-based industries, including arts and entertainment.

In this regard, investment in higher education gives the US an ongoing advantage over Canada in economic competitiveness --- not Nobel prizes or research competitiveness, but in our ability to educate and train leaders for our businesses and our professions. In 2003, American universities awarded 19 times more master's degrees and 12 times more doctoral degrees than Canadian universities, despite having only 9 times more people in the 25 to 34-year-old cohort. A 2004 report from Canada's Institute for Competitiveness and Prosperity estimated that in Ontario, the loss from our education gap was $907 per capita. If that's accurate, we're talking about a national loss in excess of $30 billion per annum.

Clearly, higher education is an investment with phenomenal economic leverage, and yet we keep thinking of colleges and universities exclusively as cost centres with benefits that accrue primarily to individuals.

In that regard, I do want to compliment Premier Dalton McGuinty and Minister Chris Bentley for their major investment in graduate education for Ontario. Over the next few years, as many as 14,000 new Masters and PhD candidates will be enrolled in the Ontario post-secondary system. This is a very important and welcome investment.

In lockstep, I strongly urge the federal government to support a major suite of graduate scholarships that would help the next generation of young Canadians to pursue advanced degrees. Let us put those funds not in the hands of the provinces, where they can be used to offset other investments,

or in the hands of institutions on some formulaic basis. Let us do something un-Canadian – let the best students apply, let the best students win, and let them go wherever in Canada their ambitions take them.

The same need arises, incidentally, for international graduate scholarships. Canada actually has one the world's most important comparative advantages --- our ability to embrace talented and energetic immigrants from every conceivable corner of the planet. Why not make it easier for the best and brightest from around the world to come here? If they stay, we've got outstanding new citizens. And if, sooner or later, they return to the country from whence they originated, we have life-long friends – individuals likely to take leadership roles in their countries, potential trading partners or political allies.

Moving beyond a Non-Sustainable Non-System

Just as cultural diversity and economic diversification are positive developments, so also do we need a diversified system of higher education. Our acute need for knowledge workers isn't confined to the output of graduate schools. We, as a province and as a nation, still don't have a comprehensive systems-based approach to apprenticeships, colleges, and universities. I am here to champion research-intensive universities from Dalhousie to UBC, but let's not lose sight of the fact that without outstanding community colleges, without primarily undergraduate universities, without comprehensive universities that have a greater or lesser vocational focus, we can't meet the needs of society.

For that matter, without a better system, we may be unable to meet the educational aspirations of the younger generation. U of T Professor David Foot has forewarned that Canada's post-secondary institutions face massive enrolment pressures because of the Echo generation --- the children of the Baby Boomers.

These enrolment pressures may well last only 15 to 20 years, but they are already being felt everywhere in Canada. Outside of Alberta, I suspect our universities and colleges alike will struggle to respond. In real terms, Canadian universities on average are now receiving $2,800 less operating support from government per student than was provided at the beginning of the 1990s. At beginning of the 1980s, Canadian universities actually received $2,000 more per student than their US public counterparts. Today the US invests $5,000 more per student than Canadian governments.

There are also disparities inside Canada, and they are affecting Ontario's universities. I worry deeply about our undergraduate experience at the University of Toronto, and I know that other university presidents in Ontario have similar concerns. As one indicator of the fiscal pinch, our student-to-faculty ratio is almost twice as high as at the University of Calgary.

You may ask: How can that be the case in the second-richest province in the federation? Are provincial taxes lower than elsewhere? Are we over-spending on other programs?

Well, Ontario spends roughly at the national average per capita for Kindergarten to Grade 12 Education. The province spends almost exactly at the national average for health care. Our provincial taxes are also at the national average. But we are dead last in per capita spending on higher education, and we have lagged other provinces in post-secondary funding for more than fifteen years. Meanwhile, per capita spending on both health care and higher education is substantially higher than Ontario in two equalization-receiving provinces – Manitoba and Newfoundland.

I don't pretend to have a solution to the endless fiscal wrangling that occurs among the provinces or between the provinces and the federal government. But I can tell you this much: Our first-year students would have no problem figuring out that those funding numbers don't add up. I also hope that we someday get to the point where Canadians can all focus on growing the national pie together, instead of fighting over the size of the provincial slices.

Here in Ontario, of course, the Government's Reaching Higher Plan for post-secondary education has been unfolding for the last 2 years and will continue for 3 more years. It's a progressive and praiseworthy plan. But most of the plan hinges on access -- on volume enhancements, not quality enhancements. It's a positive step, but it simply cannot close the 15-year cumulative gap in spending between this province and others.

So, here's a nice irony. At Canada's finest university, I dream of becoming average. Give my colleagues the average per-student government funding provided in the other nine-provinces and we'll give your kids an undergraduate experience that is competitive with any in the world.

Research meets the Undergraduate Mission

I've said before that we need a system of higher education that allows institutions to pursue their different missions with appropriate incentives. These days, however, some skeptics go further, and assert that research and undergraduate education don't really mix.

I accept that a U of T undergraduate education isn't right for every smart teenager leaving high school. But for those young women and young men with a critical edge, with a real instinct for innovation and creativity, an undergraduate education at any of Canada's research-intensive universities can be a very powerful experience.

Three of my colleagues are guests at the head table who exemplify this culture at the University of Toronto and I want to introduce them to you…

Professor Doug Perovic holds the Celestica Chair in Materials for Microelectronics. He is an expert on materials and nanotechnology. Professor Perovic does research on how materials are made and selected for use in products, their development at a molecular level, and their damage and repair. After the Columbia shuttle disaster, media around the world consulted him about the destruction of the heat tiles on the spacecraft.

Six years ago, Doug Perovic led the development of the world's first undergraduate engineering program in nanotechnology. Now he is leading a new initiative to launch an even broader nano-science baccalaureate program at the University. He describes the undergraduate students in his nanotechnology program as truly amazing, with an insatiable appetite for learning at the frontiers of science and engineering. They are also encouraged to engage in research. One fourth-year student project involved the study of degradation and failure of surgical instruments used in hospitals, and has already led to new guidelines for these instruments, as well as for their proper cleaning and sterilization during use.

Professor Sali Tagliamonte is with the Department of Linguistics at the University of Toronto, where she is the Undergraduate Co-ordinator. Professor Tagliamonte is a highly respected expert in linguistic variation and its social implications. Recently she has been studying teen language in Toronto, and she has become a magnet for undergraduates interested in community-based research. In the last three years, over 70 undergraduates have helped Professor Tagliamonte by interviewing pre-teens and teens from various socio-economic and cultural backgrounds. And they have built up a

major body of data. By the way, if you ever wondered why your teenagers always use words such as 'like' and 'so', Professor Tagliamonte is the one to ask.

Charles Deber is a professor of biochemistry at the University of Toronto, and Senior Scientist at the Hospital for Sick Children in Toronto. A Fellow of the Royal Society of Canada, Professor Deber is a recognized superstar in research on the genetic diseases of childhood as manifested through protein molecules. For seven years he has taught Introductory Biochemistry to second-year students at the University of Toronto. His classroom is Convocation Hall, and his audience, some 1,300 students. He works with a microphone in front of a 50 foot Powerpoint screen. Every class is a performance. His students love him, and he says that the design and preparation of lectures for the course have made him a better scientist.

Big classes can be a problem, but big classes also allow big numbers of students to meet big thinkers like Charlie Deber. And there is no place where undergraduates can meet more big thinkers than at this country's research universities. As my three colleagues illustrate, Canada's research-intensive universities offer something very special not just for graduate and professional program students, but for our undergraduates as well.

Conclusion

Earlier in this talk, I shared with you some concerns about how Canada is approaching the massive changes underway in the world economy. While other countries are infused with a sense of purpose, we seem to be sleep-walking.

And when I think about Canadian public policy, the metaphor that comes to mind is architectural. This is an extraordinary country, but inside it, we sometimes build social structures with strong floors and low ceilings. Places where the furniture is functional, but not very original or exciting. We spread the furniture carefully into every corner of each room based formulaically on square footage, not maximizing the opportunity for creative conversations or even enhancing the view from the windows. It makes for a nice tidy place, but it doesn't exactly engender ambition or foster innovation.

There *are* other ways to make policy. Just this month, the German Government selected three institutions from among its 102 universities as elite schools that will qualify for substantial new funding designed

specifically to take them to a higher level. The University of Heidelberg was not chosen as one of the three, but Professor Peter Hommelhoff, Rector of the University, said in response that most Germans accepted the idea that radical measures were needed to propel them back into competition with their rivals in Europe and especially to compete with the United States. Wolfgang Ketterle, a Nobel Prize-winning physicist who was a member of the selection committee, commented that "Germany was never a flat landscape. There were always hills and valleys. Our hope is that some of these hills will now grow into well-defined mountains."

In last month's Globe and Mail Report Card on Canadian Universities, Alex Usher of the Educational Policy Institute wrote about the challenges facing those Canadian institutions hoping to "grow into well-defined mountains". He characterized world-class universities as "the wellsprings of the innovative drive that powers modern knowledge economies…" Mr Usher described five Canadian universities as currently world-class - in his view, four of them are serious international competitors in at least one broad field, and one is already competitive across a wide range of disciplines – one that I have the privilege of serving. But Usher also cautioned that for any Canadian institutions to succeed in the intensified global race for talent and ideas, we, too, would need to make some hard choices and differential investments.

That doesn't mean devaluing or discounting institutions that have different missions. Instead, as I commented earlier, it means building a diversified system of higher education that will support a diversified knowledge-based economy.

I would remind you, in closing, that on January 18, 1904, Prime Minister Sir Wilfrid Laurier attended the first annual banquet of the Ottawa Canadian Club, and said, famously, "The nineteenth century was the century of the United States. I think that we can claim that it is Canada that shall fill the twentieth century." It is now conventional wisdom to dismiss Laurier's view as naively optimistic, but I'm not so sure. For a young small nation, we had a remarkable century. Now we have a new century and before us are new challenges and new opportunities. Canada's research-intensive universities are waiting to help this nation seize those opportunities --- to raise our ceilings; to move our chairs closer to the windows; to give this great country a wider view of a shrinking world; and above all, to open doors so that our young citizens can go out into that world and change it.

Thank you for your time and attention.