



**“Are Canada’s Business R&D Incentives Working?”
The Sixth Annual RESEARCH MONEY Conference
8 March 2007, National Arts Centre, Ottawa, Ontario**

Conference Proceedings

Prepared by Tim Lougheed

Panel 3: The Future of Incentives for Knowledge-based Business

Panelist: Bob Fessenden, Deputy Minister, Alberta Advanced Education and Technology

Panelist: Alastair Glass, Deputy Minister, Ontario Ministry of Innovation and Research

Panelist: Geneviève Tanguay, Assistant Deputy Minister, Ministère de développement économique, innovation et exportation, Québec

Moderator: Peter Calamai, Science Writer, *The Toronto Star*

Calamai set the stage by referring to Gillespie’s comments about Canada’s characteristically decentralized decision-making process, which was well represented by the makeup of this panel, and the prime directive of that process being the fostering of business innovation. He then asked Fessenden what that process means, what we are trying to do and who we are trying to do it with.

Fessenden suggested that what we should be doing is fostering the growth of knowledge-based companies, because they’re the companies that create wealth from knowledge. This contrasts with Canada’s traditional strengths in technology premised on resource development. He therefore maintained that we should be creating a policy and program environment directed toward nurturing these knowledge-based enterprises. And this could in fact be measured in terms of gross sales or employment by these enterprises. Yet another measurable would be the proportion of world trade in technology-based products and services that we capture. Currently we have a deficit in this form of trade.

Glass highlighted the need to focus on outcomes, to understand where we’re going and what we need to do to get there. He does regard technology as an important component of that, but he says business and social sciences are likewise important. That said, the technology-based aspects of the economy are undoubtedly those that are growing the fastest, so the outcomes will likely reflect this fact.

Tanguay suggested that there are many ways of approaching this issue, with direct measures from industry and indirect tax measures, as well as creating an environment for these enterprises to flourish. Just a few months ago the Quebec government introduced tools to implement some

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of these strategies. Those tools include tax credits as well as direct contributions to technology-based companies, even if those companies are contained within a university setting. And further to Glass's point about the increasing value of the social sciences, Quebec is also investing in social innovation, enabling research to be integrated into the province's social fabric. They are also investing directly in university research, with close attention to specific fields they have identified as important; this is complemented by a focus on highly qualified people, and much like NSERC, scholarships directed at young people to further their careers.

“It's multifactorial, much like growing a plant. You can water a plant but if you don't add nitrogen, it still won't grow. And if we look at all of the factors that need to be there, if we're not being successful, it's not clear necessarily what's missing.

It's only when you get all of the factors together that you have a better idea.”—

Bob Fessenden, Alberta Advanced Education and Technology

Fessenden then suggested that a major emphasis should be placed on the development of highly qualified personnel, all the way from entrepreneurs to skilled technical people, trades people, and even those in the humanities. He also argued that various types of physical and institutional infrastructure need to be addressed. Access to capital is another important factor, especially in terms of mid- to late-stage investment. “As a country, we're doing some of those things very well, and there's some of the things we're not doing so well. In Alberta in particular I think we've done a fairly good job in terms of infrastructure, both physical and institutional. Where we haven't done a good job is in terms of tax and fiscal policy, and in terms of access to capital.” He noted that for the past 14 years, the Alberta government has been non-interventionist, preferring a low overall tax environment that lets the market take care of itself. The industrial structure that has emerged reflects this outlook, which yields a robust resource-based economy but not a knowledge-based economy.

Glass noted that as part of public consultations his Ministry has done leading up to the drafting of a strategic plan on research and innovation, they were told that research and innovation activities must take place in a strategic context, i.e. considering how Ontario will benefit from the knowledge that is created. Ministry officials are looking at mechanisms for moving research activities into the marketplace, including entrepreneurial training programs, business support programs, funds for development as well as research, and investing in early stage companies through a venture capital program in collaboration with the private sector. They also wish to brand Ontario, telling the world about the province's strengths, some of which are unknown to people. Another important feature is measuring the progress toward these goals, and sustaining the innovation agenda over the long term. “All of those issues are addressed in the plan, and we have a number of vehicles for sponsoring programs behind that.”

Calamai acknowledged that he was initially thinking of incentives in terms of money, while the talk amongst the panelists reveals that incentives take many different, non-monetary forms.

Glass agreed with this observation, suggesting that the real driving force is the culture of commerce (to use Doug Barber's expression).

“Once we get the culture right, the a lot of the rest follows. The relationship between universities and industry, the market awareness of researchers when they do their research — all that has to improve, and when we get there, the research is actually a lot more fun. When you can see value being derived out of your research, it's a much more fun, creative environment.”— Alastair Glass, Ontario Ministry of Innovation and Research

Fessenden confessed that there were no clear answers about how to change this culture in the desired ways. “The notion of trying to get closer connections between our universities and our businesses, the notion of trying to coach our business schools to get involved, programs that start to put technology and business graduates into companies that are creating technology products and going to market — we're not doing terribly well in Alberta on this, but we are doing some things.” By way of example, he offered the Alberta Ingenuity Foundation, which has an industrial associates program to fund recent graduates in companies. “There's a lot of things we can do. But if we ask the right question, which is ‘how do we do that?’, then I think we can start to get at the right answer. If we focus back on how to increase business expenditure on R&D, then I think we ask the wrong question.”

Calamai recalled from his own experience in the late 1960s and early 1970s that there were a number of government agencies established to deal with some of these same issues, but today there are few traces of these organizations or their activities. He challenged the panel to suggest that today's efforts would yield any better results.

Tanguay responded by describing her work with the Centre québécois de valorisation des biotechnologies, which is dedicated to technology transfer, where they bring together people from industry and academic circles, with each side expressing its needs as well as what they can offer. As these groups began to work together, they began to coalesce in a productive way that she regards as typical of the success of Québec's biotechnology industry. In much the same way, she added, Quebec has changed the way in which it funds such work. “We are bringing these people together from many institutions and from many different fields at the same time.” She cited a similar strategy by CRIAQ (Consortium de recherche et d'innovation en aérospatiale au Québec), where industry leaders tell them what kind of research this organization should be pursuing.

“Twenty years ago you couldn't talk to university researchers about this. They weren't willing to sit at the same table. But with money, we did bring them together at the same table, and things are happening. So I think we can change

culture.”— Geneviève Tanguay, Ministère de développement économique,
innovation et exportation, Québec

Glass concurred, suggesting that this perspective was becoming unanimous across the country, with people appreciating the need for change, based on statistics and indicators that are hard to dispute. Collaborations and convergence that might have been difficult even a few years ago are now eagerly embraced in light of observations about such factors as productivity and global competition.

Fessenden asked if the culture is changing, then changing to where? He acknowledged that the political culture in Alberta has changed over the last decade as the Alberta Science and Research Authority has had more opportunity to influence them. Now premier Ed Stelmach was once chair of the Alberta Agriculture Research Institute, where he became much more comfortable with the concept of the role of innovation. In fact, this has been part of a systematic strategy within the province, which has five institutes — i.e. strategic advisory structures — each co-chaired by a back-bench MLA, some of whom go on to become ministers. Most recently, for example, the chair of the Alberta Energy Research Institute Mel Knight is currently the Minister of Energy. If the political culture can be changed, then, Fessenden observed, one could consider changing that the culture of citizenry at large is a much more challenging task, but not an impossible one. He suggested that this process follows from celebrating successes and having big ideas that could capture the public’s imagination.

“The US has been very good about getting their innovation done around big ideas — put a man on the moon by the end of the decade, Star Wars, pick your big vision. Compare that to what we do here in Canada, which is that our universities go forward and say ‘please may we have more?’ Where’s the passion and the vision in ‘please may we have more?’” — Bob Fessenden, Alberta Advanced Education and Technology

Calamai then asked the panelists if their respective provincial efforts to effect change and action are being matched in any way at the federal level. And if those efforts are not being matched, he added, can you make it work through the provinces alone?

Glass responded that the federal government has been remarkably silent on this subject, but recent moves to focus the activities of the NRC and concentrate on climate change and biotechnology do represent some steps in the right direction. “But we’re all holding our breath. We’re waiting for what’s going to happen next.”

“The Chancellor of Germany is a physicist who can’t stop talking about science. Do you remember the prime minister ever making a speech in which the words

“innovation”, “research”, and “development” were mentioned?”— Peter Calamai,
Toronto Star

Tanguay pointed out that Quebec is waiting to see what might happen at the federal level, but they have spurred some movement of their own through organizations such as Genome Québec, starting their own suite of genomics programs with private firms in the province. Those firms have responded enthusiastically, so these efforts are actually succeeding with private funding.

Fessenden responded to this point by insisting that their partnership with the federal government at the level of the public service is very good. He offered the collaboration on the National Institute for Nanotechnology as an outstanding instance of this positive relationship. “We all know that at the political level there are tougher issues that the politicians at the federal level are dealing with, and the issue of the science and technology agenda just hasn’t been in the top five.” Nevertheless, he insisted that this situation is starting to change and if stability can be achieved at the federal level, there will be lots of action.

Calamai suggested that money was one of the key drivers in prompting such action, and he asked what might be the best way of getting it into the system.

Glass portrayed the need for venture capital as urgent, nor is Canada the most business-friendly environment in the world. In Ireland, he recalled, he saw a much greater emphasis on inward investment and strong support for bringing innovative companies into the country. “They go after them,” he said. “They don’t just sit and wait for them. They say ‘who do we want?’ and they put money behind it. They’ll do whatever it takes.”

Tanguay explained that Quebec is putting \$400 million in new funding over the next three years into research and innovation, plus another \$82 million to increase the spread of the R&D tax credit, and \$420 million for essential infrastructure. Some \$221 million of this total is going directly into public research and developing strategic technologies such as genomics and photonics. Other funding is meant to encourage R&D activities in enterprises that have not traditionally had this as a component of their work, encouraging innovation in places like pulp mills, where it has not taken place before. All this plus another \$100 million to transfer research findings, with \$10 million of that dedicated to communicating science to youth and entice them into science, technology, and innovation. And after three years, she noted, they hope to be able to convince their treasury board to invest even more.

Fessenden agreed that funding is an important determinant, but it is only part of the answer. Much more critical, he argued, is finding agreement on shared objectives between the federal and provincial governments, then aligning their programmatic approaches to those objectives. “If you look collectively, we’ve got far too many programs operating at all levels of government. Simplification of what we’re doing would go a long way toward making a big impact. And that doesn’t necessarily cost money; in fact, it could save you money.” He offered the province’s nanotechnology strategy as an example of focusing on what is expected to be a highly disruptive

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technology that is bound to revolutionize many industries and find a substantial global market. A partnership with the federal government in this field, he concluded, should be logical.

“I don’t see why we couldn’t come together and agree upon a national nanotechnology strategy. That would then have us thinking in terms of growth of that industrial sector, companies that supply nano-enabled products into the marketplace, and it would start us into thinking about things like participating in global standards-setting. And there’s no reason we can’t unite behind that. It would get us thinking about what we need to do in terms of building manpower through our post-secondary systems. There’s a whole variety of thought processes that would come out of a big national objective like that.”— Bob Fessenden, Alberta Advanced Education and Technology

Tanguay admitted that as a Quebecker, she brings a different perspective to questions of national perspective. “We do not have to agree on everything,” she said, indicating the province’s plan for moving forward will not be dramatically altered to suit any federal initiatives that might come along. Nevertheless, broad objectives such as raising GERD or BERD will be more likely to find this kind of general agreement than the specific areas where Quebec has chosen to specialize, such as genomics, optics, nanotechnology, energy and environment, which have implications for older, established industries such as forestry and mining.

Calamai then asked Tanguay if these efforts extend beyond winning over policymakers, to win support directly from the general public.

Tanguay described the risk of alienating public opinion by rushing to adopt novel technologies of unknown scope and implications, and so the provincial granting agencies retain a branch devoted to ethics in science and technology, which now works closely with NanoQuebec, a non-profit organization jointly funded by the governments of Québec and Canada. “They’re all working together to bring together social scientists, people in communications, to really show us how to best bridge the gap between the public and what these new technologies can offer to us.” Glass maintained that the public will be involved in any such process. The leadership follows from a picking of the particular races you want to run. “Everyone would welcome leadership at the broader scale. People are waiting for climate change policy, waiting for energy policy, waiting for a focus on health activities. It’s just a matter of engagement.”

Fessenden concluded that this engagement must move past discussions of science and research per se, which are already heavily promoted. “What we haven’t talked about is the importance of entrepreneurship, the importance of creating wealth. I could imagine much more effort to celebrate our successes.” He suggested profiling successful enterprises to inspire the public and especially young people; but until this takes the form of a national objective, it will not happen.

A questioner endorsed this point, suggesting that business should be taught in high schools so that it no longer has a taint for Canadians who regard this as an unpleasant way of making ones way through life. And with respect to the idea of using the provincial government to leverage venture capital, this same questioner reminded Glass of the former Idea Corporation, a similar undertaking that was fraught with problems. In fact, he insisted that there is no real shortage of venture capital in Canada. “It’s probably the other way around. We’ve got a venture capital overhang. We’ve had too much money chasing too few good deals. There’s a shortage of good business ideas, and it all comes back to the fact we have a paucity of good strong business people in this country, and that’s what we’ve got to address. This is not a secret.”

Glass disputed this claim about venture capital, suggesting that it was reaching an all-time low in Ontario, but he readily conceded the necessity of encouraging an improved attitude toward business as a career.

Molly Shoichet, speaking in her capacity as an academic, disputed Fessenden’s assertion about the lack of passion in university circles. “Certainly at the University of Toronto and the field that I work in in regenerative medicine, tissue engineering, nanotechnology, stem cells — there’s a lot of passion and there’s a lot of big ideas.” She then asked for a more formal definition of what a knowledge-based company is, suggesting that it is something different for everyone.

Fessenden responded by recalling his own difficulties in using the term “knowledge based”, especially in the reaction it garnered from traditional resource industries that nevertheless see themselves as utilizing knowledge. By way of distinguishing this approach to knowledge, he pointed out that companies engaged in resource extraction might be highly technologically literate, but they acquire their technology in a turnkey fashion, rather than developing it for themselves (although some do). “On the whole, resource companies tend to be very conservative. They tend to compete on the basis of commodity. They compete by dropping their input costs, and they do that by acquiring technology. But they’re not technology developers, they’re not R&D-intensive.” Knowledge-based companies, by contrast, make their money off knowledge capital, with little or nothing in the way of natural resources or physical capital.

Calamai extended this point by noting that the technology our resource-based companies acquire has in fact been developed in countries where resource companies do in fact pursue innovation to this extent.

“The national tragedy for Canada is that we’ve never had an integrated industrial strategy.”— Bob Fessenden, Alberta Advanced Education and Technology

Another questioner asked for a description of the importance of cultivating entrepreneurial science as part of addressing these issues.

Glass acknowledged that such programs have been put in place, in order to try and cultivate this awareness in people who begin by doing research. Tanguay pointed out that you actually need

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different types of people at different phases of the growth of an enterprise. For this reason she returned to the earlier stated notion about celebrating failure to a more significant extent. “People who have failed usually do better the next time,” she said. “And we have to use these people a lot more than we have.” She suggested that part of the momentum of Quebec’s biotechnology industry came from the increasing use of such people, who are more and more successful each time around. And universities are also exploring these qualities more seriously, through programs devoted to the management of technology and identifying what makes for a good entrepreneur.

Fessenden pointed out that this particular discussion revealed the virtue of asking the right question, rather than dwelling just on raising BERD or mounting R&D incentives, but instead expanding the topic to consider more fundamental issues such as cultivating essential talent and experience.

Another questioner referred to a 2006 paper issued by the Council of Canadian Academies, called the State of Science and Technology in Canada, which identified the country’s greatest strengths, the country’s areas of greatest growth, and where the country should proceed. The questioner wanted to know if this paper’s observations could form the basis for uniting public and private sector interests in R&D.

Fessenden agreed that this could be the case, suggesting that our own sectors could serve as domestic markets for testing new products which then go global. Such a model could be stimulated through strategies such as procurement policy, which could be another way of building on our strengths.

Glass echoed that view, insisting that we should formally stake out areas where we can and will distinguish ourselves on a global stage, inspiring the Canadian public in the process.

Finally, Ron Freedman asked each panelist how he or she would spend an extra \$100 million a year over the next five years, betting their pension on the outcome.

Tanguay replied that she would bet on helping industry to innovate, getting it out as seamlessly as possible to build R&D capacity. More specifically, she would put engineers in companies that do not traditionally hire engineers, ensuring that new highly qualified people make their way into the system. Nor does her interest stop at Quebec’s border, since they also look to European practices as a guide.

Glass bluntly suggested that given a 20 year return on investment, he would sink the money into biorefining, which promises to add extremely high value and even transform existing industries such as polymer manufacturing.

Fessenden agreed with Glass that this is not an overly huge amount of money and should therefore be targeted narrowly into a proven area, topping up a program like NSERC or CFI. At a provincial level, he would put it into the nanotechnology strategy.

Crelinsten praised the value of this final round of answers, suggesting that these choices became lenses through which to look forward. “By picking one area like you were just forced to do, be it environment or health or communications, everything else fits into that. Your advice to try to pick one area where we could be a buyer, and as Canadians have procurement, where we can help our own country and then sell worldwide, I think that’s the only way it’s going to work.”