



Information Technology Association of Canada

**RE\$EARCH**  
Infosource Inc.

# **Can the Private Sector Get Canada into the Top Five Innovative Economies of the World by 2010?**

**Views from Leaders of Canada's Innovation-Intensive Firms**

**Final Report  
September 2003**



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## Executive Summary

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The idea of defining a new category of “innovation-intensive” company based on R&D intensity emerged from the federal government’s 2001 Throne Speech. That goal is for Canada to move into the top five innovative economies of the world by 2010. Canada would be much more prosperous and the standard of living of all Canadians would be significantly higher if this goal were achieved. Our traded economy would increase by about \$160B or by 50% and our Gross National Product would increase by between 10% and 20% at minimum. All Canadians would benefit through increased wealth, more jobs and increased resources for a higher quality of life. That is why we need to pursue this goal.

To achieve the goal, the private sector would have to win all of those new, largely export, revenues and would have to invest at least 12% of these revenues in the innovation required to fuel the growth. That would be about 70% of the increment required to get us to the goal<sup>1</sup>. The additional 30% increment of public tax-based investment needed in innovation would be sustainable only through the success of the private sector.

How many innovation-intensive companies do we have in Canada? If the country as a whole will need to spend over 3.1% of GDP on research and development by 2010, then let’s look at companies that are spending 3% or more of revenue now. To be conservative, let’s also restrict ourselves to those firms spending less than 50% of revenue on R&D<sup>2</sup>. Finally, to ensure we include significant contributors on this time scale, let’s only include firms spending \$3 million or more.

I was shocked to learn that the number of these innovation-intensive enterprises, on which Canada’s ability to move into the five top innovative economies of the world hinges, was a group of about 120 companies. They are primarily in Information and Communications Technology and in Biopharma areas. These companies could take us to the goal by growing revenues annually at an average rate of 15% and investing on average 13% of revenue on the innovation to fuel the growth.

I was, however, more shocked to learn that the leaders of these key innovation-intensive enterprises were notably not present in the strategic consultations around Canada’s National Innovation Strategy. So, with the assistance of Dr. Jeffrey Crelinsten<sup>3</sup>, I decided to engage at least 30 of them. I presented the above view of how the innovation-based goal could be reached, and asked them three questions. First, do you see yourself as a player in achieving this goal by 2010? Secondly, what changes could Canada make that would help you and, thirdly, would you be prepared to be an advocate for these changes?

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<sup>1</sup> To get into the top five innovative economies by 2010 Canada would have to increase its investments in Research and Development to over 3.1% of GDP, which is almost doubling the current level.

<sup>2</sup> Those spending more are likely to contribute to Canada’s performance in a longer timeframe than by 2010

<sup>3</sup> President, Research Infosource Inc.

What we learned from those thirty plus conversations with CEO's, was that:

- these companies are all committed to growth by innovation,
- most believe that they have the potential to be a participant in Canada reaching that goal
- they are global players with a small base of business in Canada,
- they are loyal Canadians torn by the economic imperatives that tend to take their enterprises out of Canada as is the case for most small countries,
- they are convinced that Canada's economic and commercial culture needs significant change, and
- they are prepared to represent these views to Canada's leaders in circumstances where real communication can occur.

We also heard many specific things that Canada could do that would be helpful to them. Many of those fell into three broad themes:

**1. Culture – What's Important?**

Canadians must become more understanding and supportive of their commercial enterprises. Canadians need to become more competitive and aggressive in the global economy. They need to be more supportive of their global players and more comfortable and even proud of them excelling in their commercial choices. Our commercial leaders in innovation-intensive industries feel isolated and even alienated. Only a change in values, understandings and beliefs about what's important will improve the situation. Learning, concepts and behaviors must change. Canadians must understand the goal, why it is important to them, and align themselves within the means to reach it or we will not succeed. The government needs to promote innovation and explain the key role of innovation-intensive enterprises in the growing economy so that Canadians understand how and why it is important to them.

**2. Education and Training**

Canada must become more strategic in preparing its people for the competitive knowledge-based economy. The pool of suitably skilled and knowledgeable people needed for the innovation-intensive enterprises of Canada is already too small and lacking in key areas of learning for knowledge-based commerce. Canadian companies have moved substantial parts of their enterprises to other countries where the pool of qualified people is larger and better. Highly populated, lower cost countries such as India, China and Russia are educating their people and attracting the investments in innovation from the USA and Europe today. Canada will increasingly compete on the knowledge skills of its own people. This must be a focus in education at all levels. The post-secondary system must not be distracted by inappropriate focus on research for revenue generation to the detriment of education and skill-building of the next generation of Canadian workers.

**3. Public Support**

There must be increased strategically competitive public support for innovation-intensive enterprises. Every successful developed economy does this better than we do. This is not picking winners. It is backing winners. It requires innovation to do what's needed in ways that are not labeled as subsidies. In Canada, we support start-ups quite well but we need to find ways of supporting medium-sized enterprises that keep them growing and prospering in Canada. Not a few of the companies in the Canadian base are uncertain about whether they

will be in Canada by 2010. The leaders are loyal Canadians who are often torn by the hard economic decisions they have to make for success.

Some of the support that Canada must give its innovation-intensive firms is financial but it is much more.

(i) The political relationships between nations and particularly with the USA, have significant effects on commerce. Companies often find that locating in another jurisdiction is the only way to deal with the borders and the politics. This is also true within Canada. There needs to be real commitment and determination by all levels of government to nurture and support commercial success.

(ii) Inefficiencies in the untraded 70% of the economy (where we do things for ourselves) burdens the traded economy (where we do things for others outside our economy and they for us) in ways that makes it uncompetitive. These inefficiencies may be reduced through a number of measures: eliminating tax burdens, changing regulatory, judicial or bureaucratic values, reducing time delays and costs. All individuals and groups within the nation must work in concert to ensure that Canada excels in its economy, internal and external, and in its social and human systems. This will require strong leadership, vision, concerted actions and cooperation among different groups.

This research indicates a strong need for the leaders of our federal and provincial governments to meet individually with CEOs of Canada's innovation-intensive firms. These CEOs see small, intimate meetings as the only way for meaningful communication at this time. At present, these committed individuals are not connected to the national innovation discussions. They are generally not aware that they are key players in reaching Canada's innovation-based goal but, when approached, they have a wide range of ideas – both short-term and long-term – about how to facilitate business and global activity.

We heard many specific suggestions and have recorded many in the body of this report. It is tempting to identify a few as top priorities and proceed to act on them. Clearly there are actions that should be taken but this work has shown that more significant change is needed and we should not delude or distract ourselves about that. We have had the goal to increase our R&D intensity for over 20 years with little success.

The change needed is leadership that provides a unifying focus. It is personal. It is a change in communication between leaders who probably agree on the goal but need to hear each other on the means and the meaning of reaching it. The major issues of competitive environment (culture and public support) and of skills (education) can only be addressed if there is increased understanding and alignment of our political and commercial leaders.

The goal and vision set for Canada over two years ago is remarkable in its potential to unite Canadians in reversing the declining economy and standard of living we've been experiencing over the last thirty years. Reaching that goal will require realism and focus of a kind we have not been able to bring ourselves to embrace in the recent past. Canadians are intelligent, resourceful people who have demonstrated an unusual ability to support their leaders. This group of innovation-intensive enterprise leaders is prepared to be part of the new leadership energy that this goal and vision requires.





## BACKGROUND

Early in 2002 the federal government released two papers that laid out a blueprint for a Canadian innovation strategy.<sup>4</sup> Long-term goals and objectives were laid out and issues delineated for discussion. Industry Canada organized a series of cross-country, multi-stakeholder consultations, culminating in a national summit in November 2002. Summary reports emanated from these consultations, and Industry Canada has undertaken a number of follow on actions, particularly related to commercialization.

The government's innovation strategy set an ambitious goal for Canada to be among the top five innovation-based economies of the world by 2010, as measured by R&D spending as a percentage of GDP. This goal is highly desirable for Canadians. It is big enough and sufficiently pervasive to unite us all in a common purpose. Achieving it would bring us back into a much stronger economic position in the world and more in line with our expectations of ourselves.

What does this goal imply in real terms? In 2001, Canada invested 1.9% of GDP in private and public sector research and development. The public sector share of that investment was \$8.8 billion. The private sector accounted for \$12 billion or 57.5%. Assuming that other countries increase their own R&D investments consistent with recent history, Canada would have to increase its R&D investment to \$47 billion by 2010 or 3.1% of GDP.

The federal government set a specific target for itself in its innovation strategy to double its own R&D spending by 2010. If the total public sector investment doubled it would be \$17.6 billion in 2010. The private sector contribution would have to increase to \$29.4 billion by 2010 or 145%. That would require a compound annual growth rate of 10.5%. This sustained growth over a decade is a tall order.

Dr. H. Douglas Barber, former CEO of Gennum Corporation and Vice Chair of the Ontario Science and Innovation Council, was involved in the innovation strategy consultations. He was struck by the absence of private sector players from innovation-intensive companies at the consultations and set about trying to engage some of his private sector peers in bringing their voice to the table.

Using Research Infosource Inc.'s database of Canada's top corporate R&D spenders, Dr. Barber identified a group of 120 companies in Canada that spent more than \$3 million and between 3% and 50% of revenue on R&D in Fiscal 2001<sup>5</sup>. This group of innovation-intensive firms had total revenues of about \$73 billion and spent on average 14% of revenue on R&D. Dr. Barber calculated that at an average compound annual growth rate of 15%, and spending on average 13% of revenue on R&D, this group of companies would be contributing over \$150 billion in new revenues to Canada's economy by 2010 and spending an additional \$20 billion on R&D. This performance would be adequate to move Canada into the top five innovative economies of the world using the percentage of GDP spent on R&D as a measure.

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<sup>4</sup> Achieving Excellence: Investing in People, Knowledge and Opportunity (Government of Canada, 2002)  
Knowledge Matters: Skills and Learning for Canadians (Government of Canada, 2002)

<sup>5</sup> The lower limit of 3% reflects the 3% of GDP that Canada will need to spend by 2010 to meet the federal target. The upper limit of 50% excludes firms that are investing in R&D at unsustainable levels, characteristic of start-ups or firms in a temporary situation of intense product development or reduced revenues.

In March 2003, the Information Technology Association of Canada (ITAC) and Research Infosource Inc. published a White Paper by Dr. Barber suggesting that this relatively small group of innovation-intensive enterprises may be able to lead Canada into the top five innovative economies of the world.<sup>6</sup>

With assistance from ITAC and Research Infosource Inc., Dr. Barber distributed his White Paper by email to over 170 executives and asked them to confirm whether they thought their own firm would fall into this innovation-intensive group over the next decade and, if so, what obstacles did they foresee might impede their anticipated growth. Dr. Barber received replies from about 5% of the sample. Appendix 1 gives a summary of these replies.

Based on this initial response, Dr. Barber proposed a more concerted effort to contact a larger sample of company CEOs from among the 120 innovation-intensive firms. ITAC proposed a follow-on project to Industry Canada to conduct telephone interviews with at least 30 CEOs or their direct reports. The interviews were conducted by Dr. Barber and Dr. Jeffrey Crelinsten, President of Research Infosource Inc., whose firm also contacted the firms and organized the interviews.

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<sup>6</sup> H. Douglas Barber, "Can Canada's Private Sector Do Its Part to Move Canada Into The Five Most Innovative Economies of the World?" (Ottawa: ITAC/Research Infosource Inc., March 2003)

## INTRODUCTION

Dr. Barber has a unique perspective on innovation and its implications for Canadian society and the economy. As a founder and former CEO of one of Canada's highly successful innovative firms (Gennum Corporation), he understands the world of commerce and how government policies can assist or hinder commercial activity. As a former council member of NSERC and a member of the Board of Governors of one of Canada's research-intensive universities (McMaster), he also understands the university research environment.

During the regional and national consultations on Canada's innovation strategy, Dr. Barber was disturbed by the absence of an important voice – business leaders who are running Canada's innovation-intensive firms. While some were invited to the meetings, very few attended. Dr. Barber's primary goal in undertaking this project, to which he is contributing his own time without compensation, is to hear this voice and give it the opportunity to be heard by policy makers in government.

Specific objectives of the project are:

- To compile views on the feasibility of reaching the federal government's goal from a significant sample of CEOs of the innovation-intensive enterprises that must be looked to for the wealth generating 70% of the activity and that also enables the remaining 30% which is funded from the public tax base.
- To confirm whether business leaders believe they will maintain growth levels and R&D investments comparable to Dr. Barber's initial estimates over the next 7-8 years
- To identify specific challenges faced by innovation-intensive firms that can be addressed by government policy and by national leadership
- To identify private sector spokespeople who are willing to talk to policy makers about the innovation-based economy

We conducted qualitative telephone interviews (40-80 minutes in length) with a total of 31 senior executives. Over 75% of these individuals held one or more of the top positions (Chairman, CEO and/or President) in the firm (see table). Two-thirds of the interviewees were from the information and communications technology sector and one-fifth from the biotech/pharma sector.<sup>7</sup> Slightly over two-thirds were from Canadian-owned firms and the rest were from foreign-owned subsidiaries operating in Canada. Appendix 2 lists the names of the individuals interviewed and includes some additional demographic information.

| Position of Individuals Interviewed |    |
|-------------------------------------|----|
| Chairman /CEO/President             | 24 |
| COO,CFO,CTO                         | 3  |
| VP                                  | 4  |

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<sup>7</sup> This distribution is similar to that of the 120 companies (see Appendix 6 for the complete list).

The interviews were structured around three questions:

1. Do you expect your firm to fit into this high-growth, innovation-intensive group over the next 7-8 years? (Specific figures were discussed in confidence, and only aggregate responses are reported in this report.)
2. If you expect to be in this group, what obstacles or challenges do you foresee that government policies might help to alleviate? (Most of the discussions focused on this question.)
3. Would you be willing to add your voice to a group of CEOs talking publicly or privately with the government on these issues?

The following report summarizes the information obtained from these interviews. This report is strictly qualitative in nature. It reflects the view of the respondents and does not necessarily reflect the views of Industry Canada, ITAC or Research Infosource Inc. Because of the small number of interviews, and because they were not drawn randomly, this report provides only directional information. However the sample was over 25% of the 120 firms and represented over 75% of the total commerce of the group giving confidence that the response carries weight.

## KEY FINDINGS

- A majority of executives project that their firms will remain at growth and R&D investment levels consistent with our definition of innovation-intensive firms. While some see diminished growth from previous levels, they expect to remain innovation-intensive.
- Executives emphasized that the “top line”, or revenue, is what drives R&D investments. Companies are not in the business of doing R&D for its own sake, but innovate to create value for customers.
- Most executives believe that the federal government target is achievable in principle, and that the challenge will be to make Canada an attractive place to do business for maturing innovation-intensive firms. A major obstacle identified is negative Canadian cultural attitudes toward business, wealth generation and commercial innovation.
- Other factors identified that determine whether Canada is or is not attractive include: availability and cost of qualified people, regulatory environment, fiscal and political environment. Interviewees emphasized that all these factors must be tackled in a focused and coordinated manner.
- Executives feel that Canada has historically demonstrated some competitive elements helpful to innovation-intensive enterprises. Examples are a base of highly educated people, a relatively tax-friendly environment for business doing R&D and a number of government support programs, especially for early-stage firms.
- However, in the current environment, these policies need to be strengthened and expanded to reach the goal by 2010. Corporate leaders of innovation-intensive firms in Canada are facing increasing competition from other countries that support their domestic innovation-intensive enterprises better.
- The competitive situation in Canada is exacerbated because some government support programs for industry that were highly effective in the past have since been terminated, and competitor countries have become more aggressive in their support of domestic innovation-intensive firms.
- The top challenge facing leaders of innovation-intensive firms in Canada is the isolation experienced within a non-entrepreneurial culture that mistrusts business and doesn't understand the links between customer needs, knowledge, innovation, productivity, wealth generation and a higher standard of living. Most interviewees feel that Canadians and their government do not value their businesses. They perceive a culture of indifference and even hostility toward business.
- Interviewees believe that the innovation target set by the federal government will be achievable only with a strong commitment from government leaders and a vision of Canada that aligns all jurisdictions, departments, institutions, enterprises and citizens of Canada in innovation towards a common goal. They cite examples of other countries where government leadership and vision was effective in focusing the nation on commercial success through innovation.

- Respondents are generally committed to staying in Canada, but they are global players who must make the tough competitive economic decisions about where to locate their activities.
- Interviewees most often mentioned two specific challenges facing innovation-intensive firms: an uncompetitive tax environment and difficulties sourcing and retaining skilled people.
- A poor relationship with the U.S., an uncompetitive regulatory environment and misguided policies regarding universities and industry are other significant challenges.
- Information and communications technology firms expressed concern frequently about the overall business environment and the pool of highly qualified people. Biotech/pharma firms are more concerned with regulatory issues, access to capital (for the startups) and dealing with government as a customer. Interviewees believe that these two groups require special attention from government if the national goal is to be achieved.
- Corporate leaders feel that Canadians need to work together to make Canada a place where innovation-intensive enterprises can develop, grow and compete globally, generating wealth and social benefits for all of us.

## DETAILED FINDINGS

### Revenue Growth and R&D Investment Levels

The goal of this part of the research was to determine whether executives expect to maintain growth and R&D investments characteristic of innovation-intensive firms.

#### Summary of findings:

- Not all respondents reported growth projections but those who did projected growth rates in the order of 10-20% or more for the period.
- All respondents emphasized that innovation-intensive enterprises innovate to meet customer needs and to meet them better than the competition. That is why R&D is critical for company survival and growth.
- Respondents further noted that to move into the top five innovative economies of the world requires Canada's innovation-intensive enterprises to excel and to meet global needs better and more competitively than most.
- A majority of respondents expect to remain in the innovation-intensive category as defined by Dr. Barber over the next 7-8 years.
- Most respondents are projecting R&D intensities from 3% to 30% over the period, with a majority in the 8-20% range.
- Respondents facing declining revenues are maintaining R&D expenditures, in many cases despite pressures to cut R&D costs.

Slightly more than half of the executives interviewed projected growth rates in the order of 10-15% or more for the period of interest (the next 7-8 years). Several did not address growth at all, either because of confidentiality issues or due to the fact that they are currently dealing with depressed revenues and visibility is difficult. Several interviewees were optimistic about future growth after completing a turnaround period in the next year or two, but did not suggest specific numbers. A few predicted that growth levels seen in the past few years will not return in their industry, and growth will be slower than 15%.

Virtually all of the executives interviewed confirmed that R&D is the lifeblood of their business, because customers demand innovation and will get it from someone else if we can't provide it more competitively. As a result, executives are maintaining their R&D levels, even in cases where revenues have dropped. This situation yields higher R&D intensities than corporate leaders feel they can sustain over the longer term. As revenues improve, many executives anticipate that R&D intensities will drop to a more sustainable level. In the information and communications technology sector, this level is in the range of 8-20% of revenue. In other sectors, R&D intensities can range from 3-15%. Of those interviewees that gave actual numbers, only one person projected R&D intensities less than 3% in the next 5 years.

*"R&D has to make business sense. Success comes when you 'catch the wave' and gain the ability to be the first mover. The first mover will drive the market. If you're too early, you fail. If you ride the wave properly you succeed. Too early or too late won't work. It's a narrow range of existence."*

*"R&D is our life-line. Our future depends on the speed of R&D."*

*"Cutting back on R&D would be suicide."*

For start-up firms, the most important issues are maintaining cash flow and retaining skilled employees. This group of innovation-intensive firms, however, did not include many start-up firms, due to the design of the sample.<sup>8</sup> For this group of firms, business issues and customer needs drive the R&D activity. These innovation-intensive companies maintain relatively high R&D intensities in order to develop new products and services and to find technology niches in which they can be global leaders. For these firms, especially information and communications technology firms, important issues are funding new product development while keeping R&D costs at a sustainable level, and finding and retaining skilled people. For biotech and pharma firms, the regulatory environment is also a major concern.

A unique situation for innovation-intensive companies arises from the fact that they are global players. For these firms, whether domestic or foreign-owned, the key issue is the overall competitive environment of Canada versus other countries. Factors that determine whether Canada is attractive include: cultural attitudes toward business, the pool of skilled people, regulatory environment, fiscal and political environment.

Executives emphasized that corporate decisions about where to locate R&D facilities are being made in a global context. Many established Canadian firms are setting up R&D centres in other countries, such as Europe and the U.S., because certain skill sets not available in Canada are available there. The percentage of off-shore R&D done by Canadian firms interviewed can be 30% or higher. Many note that large American firms have been moving R&D facilities to India and are concerned that opportunities in China will explode in the next five years. In the biotech/pharma sector, the regulatory environment and access to government markets figure prominently in such decisions as well.

Some interviewees pointed out that Canada needs a better mix of innovation-intensive firms of different sizes, and that government policies have tended to be directed predominantly toward start-ups and smaller firms. A number of factors were identified that conspire against Canadian innovation-intensive firms growing successfully to mid-size. The business culture encourages venture capitalists and entrepreneurs to sell their firms, and there is a much larger market for companies in the U.S. than in Canada. Some executives noted that Canada also lacks some of the skills in management and marketing that are needed to grow firms to mid-sized.

*“Canada needs to grow small companies into medium-sized companies which are globally focused and robust.”*

Some interviewees noted that Canada not only needs to support the growth of larger firms, but that Canada needs to appreciate more the large firms that are already operating in this country. They identified major benefits that accrue to Canada by having large innovation-intensive firms, foreign-owned as well as domestic. Large firms can partner with smaller firms, providing financing, facilities, people and training and experience in management, marketing and

*“There’s a perception that big firms are focused on protecting what they’ve got, so innovation comes from startups. That’s wrong. Customers need major players to bring them innovation and apply it in an actual system. They need solutions, not the ‘hot box’. There is more focus on business and less on technology.”*

<sup>8</sup> Firms with research intensities (R&D expenditure/revenue) of more than 50% were excluded, which removes most start-up firms that typically have little or no revenue.



sales, distribution, etc. Large firms can also be a source of I.P. for a spin-off company. For example, a technology developed in-house might generate sales that are too small for the originating large firm. Employees may form a start-up and develop a viable business.

Typically for these innovation-intensive enterprises Canada represents a small fraction of their business. In light of this reality, interviewees posed the following important question for Canada:

- How can we encourage domestic firms to grow into medium and large companies while keeping their headquarters and R&D in Canada, and how can we attract foreign-owned multinationals to locate and grow their enterprises in Canada?

### Isolation of Canada's Innovation-intensive Enterprise Leaders

The individuals interviewed for this project are all accomplished people, working in firms that are enjoying varying degrees of success. They care about Canada and want it to be a wealthy and healthy place for their families to grow and prosper. They face tremendous challenges brought about by globalization, which makes national borders increasingly porous. Nonetheless they remain committed to finding ways to continue generating wealth for Canada through their businesses.

Yet these highly successful and committed people feel alone. Very few of them were consulted by the government during its extensive consultations on the federal innovation strategy. Many had not heard of the exercise, and others who did, had decided it was a waste of precious time. Hardly any of them attended the regional and national summits, and those who did were largely disappointed. There were too many diverse voices and the final results were diluted and unfocused. The initiative now appears to them to be stalled.

These leaders' perception of not being appreciated and not realizing their own importance to Canada is the most significant and far-reaching finding of this research. Quite frankly, it came as a surprise. While a small group of innovation-intensive companies hold the key to Canada's success as a nation in the knowledge economy, their leaders feel isolated and unappreciated by Canada's leaders and its citizens.

As a result of the interviews, executives strongly expressed willingness to talk to government

*"Smaller targeted meetings are more effective but they are harder to organize and participate in for government. It's much easier for them to show up in one room and meet 200 people and say that they have covered the waterfront. It is understandable, but at the end of the day a waste of effort for both them and the regional people."*

leaders, both federal and provincial, about the issues for Canada. However, they emphasized that small, private meetings are more effective than large, public ones. This issue is about leadership and vision. It requires commercial and political

leaders to have frank, open discussions that focus on solutions.

While interviewees discussed many specific issues and made a number of suggestions, the over-riding message was the need for cultural change in Canada. They sense a lack of understanding or support for wealth generating activity from their fellow citizens, the media and from their governments. When they visit other countries they see more commitment, more understanding and more support for both themselves and their competitor firms.

*"We need a cultural change. Commerce and trade are not synonymous with greed and corruption. We're on the West coast and far from the media, but our growth should be a good news story."*

*"People look at R&D tax credits as some kind of handout, and that's absolutely the wrong way to look at it. R&D spending is the growth engine of the country. What do you have to do to make sure that that growth engine is first attracted to this country (because we're all citizens of the world), and second that the spending can keep the R&D engine becoming more and more powerful and not diluted in some way."*

Executives highlighted some critical issues for Canada:

- Canada is a small country and all small countries have unique challenges in the global competition.
- It is natural for companies in small countries to migrate to their biggest customers who tend to be in larger economies. We need to create an environment in which innovation-intensive firms grow and stay in Canada.
- We need visionary leadership to support the best in wealth creation and innovation and to make Canada a magnet for the best.
- This is a national issue. Its solution involves everyone, including educators, bureaucrats, politicians, professionals, journalists and business people. No one is exempt and no one is unaffected.

## Two Major Challenges of Running an Innovation-Intensive Business in Canada

Most executives interviewed anticipate two specific challenges to growth in the next 5-8 years:

- maintaining a competitive tax regime to attract people and investment for R&D activities in Canada<sup>9</sup>
- attracting and retaining skilled employees

### *Uncompetitive Tax Regime*

Executives of innovation-intensive firms must ensure that the company excels in creating new value for their customers. While R&D drives the business, it is also an expense. High levels of R&D expenditure require understanding shareholders. Interviewees generally feel that governments' approach to helping Canadian firms deal with this challenge is piecemeal and uncoordinated. Other countries have aggressive programs to help their innovation-intensive firms fund their R&D. While many specifics were mentioned in the interviews (see Appendix 3), the key message was for

*"The capital markets punish companies for R&D investments to develop new products."*

*"Government needs to take a more holistic view of R&D. It should work with provincial ministries of industry."*

government to embrace a vision of supporting innovation and then work out the details from there. Several executives emphasized that government should resist the temptation to design direct interventions and focus its efforts on improving the overall environment (fiscal, regulatory, political, cultural, educational).

### *The People Challenge*

In order to understand the people challenge faced by corporate leaders running Canada's innovation-intensive firms, it is helpful to underline the well-known fact that people innovate.

CEOs report difficulties attracting employees from abroad, especially from the U.S., because of our higher personal income tax rates, particularly at the high end of the salary scale. Presidents of Canadian subsidiaries tell of ongoing battles with headquarters abroad to maintain and grow R&D centres in Canada. The high quality of Canadian graduates has helped win these battles, but many of those interviewed see India and China, as well as Eastern Europe, increasingly threatening Canada's ability to compete for skilled people. As one respondent put it, "The really scary phase of migration is yet to happen. I sat and watched 'blue collar' jobs migrate to Asia. It will start to happen at an alarming rate in the next five years in knowledge jobs as well. A big time bomb is ticking."

*"Human resources are the biggest challenge for firms our size. Where will we get the people we need?"*

*"People availability is a number one challenge. We're looking for a 5-6 times increase in size."*

*"The number one predictor of the economy is the number of postgraduates in the educated workplace."*

*"If you're serious, you need to commit for a decade. You need a sustained strategy, funding and tactics to get enough people."*

<sup>9</sup> The largest single cost associated with R&D is salaries, so these two challenges are closely linked.

The identified challenges were not exclusively financial. CEOs report difficulties recruiting senior level people due to bureaucratic immigration procedures and uncoordinated regulations at different levels of government. Several executives, especially those contemplating significant growth over the period to 2010, expressed alarm at the small pool of suitably skilled people for commerce in Canada. Several CEOs feel that skills enhancement strategies, especially in management and marketing, are crucial for Canada.

There was strong consensus among respondents that it is easy and attractive for companies to migrate. Many Canadian firms have set up foreign R&D centres or bought foreign companies to acquire specific skills not available in Canada.<sup>10</sup> The key challenge is how to keep Canada attractive enough to keep companies maintaining knowledge investments in Canada. As with the issue of government funding support for industry, interviewees had many different ideas (see Appendix 4), but their main concern was that the Canadian government needs a vision and a strategy to source and retain people here. The details will flow from this commitment.

*“For organic growth, firms are influenced by economics and the availability of talent. Decisions are based on*

- *Availability of talent*
- *Government funding*
- *Ease of import (immigration)*
- *Community of practice”*

## Additional Challenges

### *Strategic Procurement*

Several interviewees, especially those dealing with military or government customers, have experienced difficulty competing with foreign firms for government contracts. Governments in Europe and in the U.S. aggressively support domestic firms, much more than Canada does for Canadian firms. Foreign governments also tend to defend domestic firms' intellectual property from firms in other countries, more so than Canada. Several Canadian companies have bought U.S. or European firms in order to gain access to government business. In one case, a Canadian firm sold itself to a U.S. firm for the same reason. (See Appendix 3 for more on procurement.)

### *Uncompetitive Regulatory Environment*

Canada's regulatory environment, especially in the pharma/biotech sector, is uncompetitive compared to Europe and the U.S.<sup>11</sup> Many CEOs suggested that economic development branches of the government and regulatory branches should communicate more and work together to ensure that Canada's larger economic and social goals are coordinated. For example, by making Canada the fastest and highest quality regulator, Canada could gain a competitive advantage internationally and attract more R&D activity to this country. Even in other sectors, regulatory barriers impede the growth of businesses. Specific examples relating to new technology, exports and immigration are listed in Appendix 5.

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<sup>10</sup> For example, customer-centred marketing, general business management, or technical know-how around a specific technology.

<sup>11</sup> It takes Health Canada twice as long to approve a new drug as other countries.

### *Misguided Policy on University Research*

A number of interviewees noted that government policies related to Canada's universities has not been helpful to industry. Virtually all respondents agreed that increased funding for university research has been important because it is important to fund basic research and train new people. However, funding programs that try to encourage university researchers to

commercialize technology are largely unhelpful to industry. Most firms prefer bilateral funding arrangements with universities for specific projects, a practice which is common and easily managed in the U.S., for example. In Canada, universities tend to be suspicious of such arrangements, especially around intellectual property, although a few interviewees have successful partnerships with some Canadian universities. (See Appendix 3 for more details on grants.)

"Tangible payback models beyond five years are increasingly difficult. Governments and universities can play a part in longer time horizons."

*"Universities are in the business of education and research, but not creating businesses."*

*"Federal funding agencies hope that private sector partners will lead to commercialization of university research, but that's not happening."*

### *Lack of International Civility*

Several firms have experienced a negative change in attitude toward Canadian firms in the U.S. due to recent statements from Canadian politicians. Respondents took pains to emphasize that while political decisions need not always be aligned, civility should be the norm in dealing with our largest trading partner. The negative fallout for business has been significant for some.



## Appendix 1. Summary of Responses to White Paper

Dr. H. Douglas Barber's White Paper on the private sector's role in Canada's innovation-based economy was sent to over 170 company executives.

A response rate of 5% yielded nine responses. Eight out of nine anticipated that their company's growth rate would be 10 per cent per year or higher over the next 8-10 years. And these R&D intensive companies expect to continue to invest in R&D. Three out of the nine expect to invest between 5 and 10 per cent of revenues per year. Four out of nine expect to spend more than 15 per cent.

With regard to the largest challenges facing the achievement of their growth and R&D investment targets, half of the respondents (5) agreed with the view expressed in Dr. Barber's paper that the availability of qualified people would present the greatest obstacle. However, some disagreed, and other challenges were raised. Here is the list of identified challenges:

1. Scarcity of highly skilled people
2. Market/economic uncertainty
3. Challenges in developing competitive technology
4. Uncompetitive tax system
5. Difficulty finding excellent Canadian research
6. Poor understanding of the relationship between research and commerce
7. Overly restrictive foreign ownership regulation
8. Cost competition from low labour cost markets
9. Negative Canadian policy vis-à-vis U.S. military activities





## Appendix 2. List of Interviewees

Greg Aasen, COO, PMC-Sierra Inc.  
 Andrew Benedek, CEO & Chariman, Zenon Environmental Inc.  
 Pat Brockett, President and CEO, Zarlink Semiconductor Inc.  
 Dave Brown, VP Business Strategy, CREO Inc.  
 Savvas Chamberlain, CEO, DALSA Corporation  
 Mark Chamberlain, President & CEO, Wescam Inc.  
 George Cwynar, President & CEO, Mosaid Technologies Inc.  
 Frank Dottori, President & CEO, Tembec Inc.  
 Jean-Michel Halfon, President & CEO, Pfizer Canada  
 Barry Heck, President & CEO, Westaim Corporation  
 Lionel Hurtubise, Chairman, Ericsson Canada Inc.  
 Tom Jenkins, Chairman and CEO, Open Text Corporation  
 John Keating, CEO, ComDev International Ltd.  
 Mike Lazaridis, Co-CEO, Research in Motion  
 Mark Lievonon, President, Aventis Pasteur Limited  
 Paul Lucas, President & CEO, GlaxoSmithKline  
 David Martin, Chairman & Co-CEO, Smart Technologies  
 Terry Matthews, Chairman, Mitel Networks Corporation  
 Frank Maw, President, Motorola Canada  
 Bill McClean, VP, Manufacturing, Development & Marketing Operations, IBM Canada  
 Graeme McRae, President & CEO, Bioniche Life Sciences Inc.  
 Ian McWalter, CEO, Gennum Corporation  
 Greg Mumford, CTO, Nortel Networks  
 Gilles Ouimet, Chairman, Pratt & Whitney Canada  
 Jim Roche, President & CEO, Tundra Semiconductor Corp.  
 Pierre St. Arnaud, President & CEO, SR Telecom  
 Jozef Straus, Founder Emeritus & Advisor to CEO, Former CEO & Co-chairman, JDS Uniphase  
 David Sutcliffe, CEO, Sierra Wireless  
 Gregg Szabo, VP Corporate Affairs, Merck Frosst Canada  
 Steve Wilson, CFO, Husky Injection Molding Systems Ltd.  
 Ron Yamada, Executive Vice President, MDS Inc.

| Industry Sector of Firm |    |
|-------------------------|----|
| ITC                     | 21 |
| Biotech/pharma          | 6  |
| Aerospace               | 1  |
| Other                   | 3  |

| Domestic/Foreign Ownership |    |
|----------------------------|----|
| Canadian-owned firms       | 22 |
| Foreign-owned subsidiaries | 9  |

| Location of Headquarters<br>(or Canadian head office) |    |
|---|----|
| Western Canada  | 5  |
| Ontario   | 20 |
| Quebec  | 6  |
| Atlantic Canada                                       | -  |



## Appendix 3. Uncoordinated Government Support of Industrial R&D

An area of major concern to executives is the overall funding environment for R&D. Interviewees discussed four different ways that governments, including Canada's, provide funds to help domestic firms develop new products:

- tax credits and incentives,
- procurement,
- grants and
- loans.

Interviewees shared many specific examples of where Canada's policies in these areas are effective and where they are severely hampering the efforts of firms compared to competitor firms in other countries. The following is a summary of some of the key points for each of the four methods.

### Tax Credits and Incentives

- The recent economic downturn has sidelined approximately \$2 trillion in North America that will be invested during the next 3-5 years. The Canadian government has a unique opportunity to create an overall tax environment that will attract a significant fraction of this investment for new technology firms. This will require leadership and a national will to be better than any other jurisdiction in the world.
- In the past, Canadian innovation-intensive firms could apply R&D tax credits to manufacturing revenues, but as technology changes the economy and as manufacturing is replaced by software and services for revenue generation, Canada's tax credit system will have to change quickly for these firms to remain competitive in Canada.
- The Canadian SR&ED system is difficult to use for some firms. Eligibility language does not reflect the reality of some innovation-intensive firms' R&D activities.
- Revenue Canada allows Canadian firms to set up offshore corporate entities to avoid tax, but interviewees prefer coordinated tax schemes that attract R&D investment to Canada.
- Canada's existing fast-track tax credits for start-up firms are highly competitive compared to other countries. This has resulted in a proliferation of start-up firms in Canada. However, the current tax credit system is not useful for established firms in down cycles.<sup>12</sup> Innovation-intensive firms need to access tax credits even in years when they are losing money.
- No tax incentives exist in Canada for large firms to give IP to employees wanting to spin-off technology to create a new company.
- A tax loss/carry forward scheme, whereby a small firm with an operating loss could sell the loss to a larger firm, could help small companies get money for R&D.
- Bureaucratic procedures are delaying disbursement of tax credits by years for some established firms.<sup>13</sup>
- Innovation-intensive firms have difficulty recruiting skilled people from offshore because existing personal income tax rates are uncompetitive, especially at the high

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<sup>12</sup> For example, the information and communications technology and aerospace sectors are currently suffering a downturn and cannot access tax credits because revenues are down.

<sup>13</sup> One respondent noted that a federal-provincial pilot project is testing a new way of processing tax credits that has improved the situation. It is about to be rolled out more generally.

end. A competitive income tax could support a strategy to recruit expatriates from the U.S. and Europe to work in Canadian innovation-intensive firms. This would help recruit more people with marketing, sales and management skills, which are in short supply in Canada's innovation community.

- Tax relief on capital gains and stock options, intelligently applied, would attract a significant amount of offshore investment to Canada.
- The U.S. government provides tax refund credits to state governments to use in attracting Canadian and other foreign firms to locate in areas where employment levels are low.

## Procurement

- "Procurement is the most powerful tool government has to develop technology. It forces companies to build a product."
- Compared to other countries, Canada does not use procurement to support national goals. An innovation-based strategy, to be effective, will require an intelligent procurement policy that supports its objectives to create and grow Canadian technology companies.
- The U.S., Israel, France and other European countries use military procurement to support new technology development by domestic firms.
- Other countries such as Japan, Korea, Singapore, Sweden and Ireland use procurement to support national objectives.
- Canada used to have an Unsolicited Proposals (UP) program that many firms used to kick-start their new technology development. The UP program, or something like it, could be reinstated to help Canadian firms compete globally with new products.

## Grants

- IRAP grants to small firms were critical in helping a number of the interviewees' firms get started, but no similar program exists in Canada for established firms wanting to develop new products.
- Industrial grants for new technology development are available in the U.S., France and other countries.<sup>14</sup>
- A prevailing attitude in Canada against government helping industry has prevented government from establishing any granting programs for technology development in industry.<sup>15</sup>
- The government's emphasis on funding university research as a means of accelerating commercialization of technology has been largely unhelpful in supporting new product development in Canada's innovation-intensive firms.

## Loans

- Many countries give companies grants and contracts for R&D to help domestic firms fund their longer term R&D. Many interviewees point out that even repayable loans would help immensely for new product development.

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<sup>14</sup> For example, the Small Business Industrial Research (SBIR) grant program in the U.S.

<sup>15</sup> On the right of the political spectrum the argument is that government shouldn't pick winners or meddle in business affairs that it doesn't understand. On the left the argument is against "corporate welfare bums" taking tax payers' money to make profits. Neither argument recognizes the unique nature of innovation-intensive firms and the economic and social benefits they bring to the country.

- \$0.5-1M loans aren't useful for a firm doing new product development. Loans of \$5-10M over 10 years would help firms produce more and more products.
- Some of the firms interviewed have used Technology Partnerships Canada (TPC) effectively, especially in aerospace, but also in information and communications technology and biotech. The current limitation of only 20% for non-aerospace firms is limiting its use for other sectors that could really use it. Respondents suggest expanding TPC without reducing the amount available for aerospace would be one way to help innovation-intensive firms in other sectors.
- Canada's prevailing attitude against government helping industry has been reflected in negative press around recent Technology Partnerships Canada announcements.
- For drug development firms in biotechnology, loans (or other forms of financing) for production facilities are critically important.<sup>16</sup> A strategy that supports the growth of biotechnology firms must take this into account.

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<sup>16</sup> Phase III trials must be carried out using the commercial product. Firms must therefore build a production facility, which requires an investment of about \$50M, in order to carry out the Phase III trial. Only 1 in 10 Phase III trial drugs make it to market.



## Appendix 4 – The People Challenge

The number one issue for a majority of executives interviewed was recruiting and retaining highly qualified people. Given the downturn and the numbers of highly qualified people released in the last two years, this was surprising. However, it appears that there are less of these people available than might be thought, and these executives emphasized that there is a limited pool of highly qualified people.

Not only quantity issues concern them, but also quality. Canada is weak in areas such as marketing and sales, as well as management. While most respondents feel that Canada has good quality people, they feel that policies need to focus on maintaining and growing our strengths, and making it easier to move people across borders, both into and from Canada.

Immigration is seen as part of the solution at best. Respondents feel that we need to build an indigenous culture to compete ourselves.

CEOs running innovation-intensive companies are keenly aware of the fact that they must locate their business where they can find the skilled people they need. Their concerns fall into three key areas:

- Attraction and retention
- Quality and quantity of domestic supply of people
- Migration and immigration

### Attraction and retention

- “Due to the telecom downturn a huge number of qualified people are unemployed or trying to build a company. They could probably live for two years without a salary. They won’t stay in Canada long unless we do something to keep them here.”
- We need internships for people in the workforce who want to upgrade skills. These people face formidable barriers. It costs about \$20,000 to leave the workforce, go back to school and come back.
- Biggest challenge in getting Americans or U.S.-based expatriates to come to Canada is our uncompetitive tax rate. Firms are finding it impossible to get senior people. One multinational closed a division in San Diego and had to use short-term contracts to get some of the people up here. Some Western Canada firms are simply not able to attract senior people from the U.S.
- Some firms are starting to see expatriate Canadians come back to raise a family, but they have to make huge sacrifices because of the tax bite. Canada needs to make it easier, because people bring know-how and connections that are invaluable.

### Quality and quantity of domestic supply of people

- We can get qualified science and math students in Canada today, but it will be critical that this continues.
- Getting usefully trained people is a problem in Canada. France has a good program where a student works at a firm and submits a thesis to the professor for a degree. Such a program makes academics more industrially oriented.

- Management is the single biggest problem in Canada. Finding good managers with experience is difficult and importing them is expensive. We have few large companies to serve as a pool of experienced managers. An apprenticeship program for managers may be helpful, or mentoring retired people could be useful.
- IP value has shifted from hardware to software. "It's what's between the kids ears that's important." Need to invest in intellectual infrastructure. "We need a 'Superbuild' for innovation.

#### Migration and immigration

- We need the ability to recruit qualified people quickly from offshore.
- Impact of technology linkages between areas of the world with significant wage difference is a major issue for Canadian-based firms.
- Poor coordination among federal, provincial and municipal governments. Need coordinated policies to get spouses jobs and deliver necessary documents (e.g. drivers licence) to families in a timely manner.



## Appendix 5. Regulatory Barriers

- Regulators in all areas of government need to be committed to timeliness as well as quality in order to make Canada a preferred destination for innovation-intensive firms. Technology moves faster than regulations and the country, as a whole, needs to move in a timely fashion.
- Regulations need to permit new technologies to be used, especially if they are important for national needs (e.g. voice calls will be encoded in IP and run in data networks, but current regulations won't apply).
- At the provincial level, access to market for drugs is controlled in a patchwork manner that is not consistent from province to province and is often based on containing costs of drugs rather than delivering value for money in healthcare. These practices lead to delays, uncertainty and disincentive. "If GM or Ford had the same restrictions, there would be no jobs."
- Canada has the worst track record with regard to time-to-market for drug approvals.
- Patent protection for drugs is uncompetitive with the U.S., Europe and Japan.
- Bureaucratic immigration procedures and lack of coordination between different levels of government cause problems for new employees and their families.<sup>17</sup>
- Export licencing controls are too slow and uncertain in certain technology areas. There is no guidance about what is acceptable and decisions can take several months. Canadians are excessively scrupulous, unlike other countries.
- Transfer pricing regulations for firms selling equipment from division to division across borders is too bureaucratic and slow. Excessive documentation is unproductive.

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<sup>17</sup> Getting a drivers licence for a spouse took one new employee over 3 months. Another typical barrier is finding employment for a spouse.



## Appendix 6. List of 120 Innovation-intensive Enterprises

|   |  |
|---|--|
| A.L.I. Technologies Inc.                          | JDS Uniphase Corporation                         |
| Aastra Technologies Limited                       | Leitch Technology Corporation                    |
| Accelio Corporation                               | MDS Inc.   |
| AIT Advanced Information Technologies Corporation | MDSI Mobile Data Solutions Inc.                  |
| Apotex Inc.                                       | Mediagrif Interactive Technologies Inc.          |
| Applied Terravision Systems Inc.                  | MediSolution Ltd.                                |
| AstraZeneca Canada Inc.                           | Merck Frosst Canada Ltd.                         |
| ATI Technologies Inc.                             | MGI Software Corp.                               |
| Atomic Energy of Canada Limited                   | MIST Inc.  |
| Aventis Pasteur Limited                           | Mitec Telecom Inc.                               |
| Aventis Pharma Inc.                               | Mitel Networks                                   |
| Avotus Corporation                                | MKS Inc.   |
| Axcan Pharma Inc.                                 | Mobile Climate Control Industries Inc.           |
| Axia NetMedia Corporation                         | Mobile Computing Corporation                     |
| Basis100 Inc.                                     | Mobile Knowledge Inc.                            |
| Bayer Inc.  | MOSAID Technologies Incorporated                 |
| BCE Emergis Inc.                                  | Motorola Canada Limited                          |
| Belzberg Technologies Inc.                        | Multiactive Software Inc.                        |
| Bioniche Life Sciences Inc.                       | Nortel Networks Corporation                      |
| Bioscript Inc.                                    | Northern Digital Inc.                            |
| Biovail Corporation                               | NovAtel Inc.                                     |
| Broker Technology Group Ltd.                      | NSI Global Inc.                                  |
| Byk Canada Inc.                                   | Open Text Corporation                            |
| CAE Inc.  | Perle Systems Limited                            |
| Canadian Bank Note Company, Limited               | Pfizer Canada Inc. (fs)                          |
| Cangene Corporation                               | Pivotal Corporation                              |
| Cedara Software Corp.                             | PMC Sierra, Ltd.                                 |
| Centrinity Inc.                                   | Power Measurement                                |
| Certicom Corp.                                    | Pratt & Whitney Canada Corp.                     |
| CMC Electronics Inc.                              | Premier Tech Ltd.                                |
| Cognicase Inc.                                    | Psion Teklogix Inc.                              |
| Cognos Incorporated                               | QLT Inc.   |
| COM DEV International Ltd.                        | Research In Motion Limited                       |
| Coreco Inc.                                       | Schering Canada Inc.                             |
| Corel Corporation                                 | Siemens Milltronics Process Instruments Inc.(fs) |
| Creo Inc.   | Sierra Wireless, Inc.                            |
| CryptoLogic Inc.                                  | Silent Witness Enterprises Ltd.                  |
| CSI Wireless Inc.                                 | SLMsoft.com Inc.                                 |
| DALSA Corporation                                 | Softquad Software Ltd.                           |
| DataMirror Corporation                            | Spectral Diagnostics Inc.                        |
| Descartes Systems Group Inc.                      | Spectrum Signal Processing Inc.                  |
| ELCAN Optical Technologies                        | Speedware Corporation Inc.                       |
| Eli Lilly Canada Inc.                             | SR Telecom Inc.                                  |
| eNGENUITY Technologies Inc.                       | Stackpole Limited                                |
| Enghouse Systems Limited                          | SureFire Commerce Inc.                           |
| Epic Data International Inc.                      | Systems Xcellence Inc.                           |
| Ericsson Canada Inc.                              | TECSYS Inc.                                      |
| EXFO Electro-Optical Engineering Inc.             | Tembec Inc.                                      |
| Financial Models Company Inc.                     | Tesco Corporation                                |
| Geac Computer Corporation Limited                 | Triple G Systems Group, Inc.                     |
| Genum Corporation                                 | Trojan Technologies Inc.                         |
| Genpharm Inc.                                     | Tundra Semiconductor Corporation                 |
| GlaxoSmithKline Inc.                              | Unique Broadband Systems, Inc.                   |
| Global Election Systems Inc.                      | Wescam Inc.                                      |
| GSI Lumonics Inc.                                 | Westaim Corporation                              |
| Hoffmann-La Roche Ltd.                            | Wi-LAN Inc.                                      |
| Hummingbird Ltd.                                  | Xantrex Technology Inc.                          |
| Husky Injection Molding Systems Ltd.              | Xenos Group Inc.                                 |
| Hydrogenics Corporation                           | Zarlink Semiconductor Inc.                       |
| IBM Canada Ltd.                                   | ZENON Environmental Inc.                         |
| Janssen-Ortho Inc.                                |  |