

++ Action Item: Please contact CATAAlliance President, **John Reid**, at email jreid@cata.ca to discuss how you can best be engaged to advance and/or add to the recommendations presented in the Innovation Nation document, entitled, "The Challenge of Survival for Canada's ICT Sector".

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June 2008

The Challenge of Survival for Canada's ICT Sector

Notes for the Science, Technology & Innovation Council

Canada prides itself on being a technologically advanced nation, with a vibrant and successful telecommunications and computer systems sector. Given our geography, it was only natural that Canadian institutions and companies would focus on the rapidly growing field of telecommunications. So when data processing and telecommunications, driven by incredible advances in both areas, merged into a gigantic global industry over the last half century, Canada was already well positioned. Over the decades, literally thousands of companies employing hundreds of thousands of highly skilled Canadians, have created many billions of dollars of value for their companies and the nation. But the world is still changing rapidly, and our advantage is quickly slipping away in today's globalized technology and business environment. Today, the telecommunications component of the ICT sector is in serious difficulty, as evidenced by the rapid decline of the once famous "Ottawa Telecom Cluster". While the Ottawa companies may be the 'canary in the coal mine', many of the same problems are now being experienced by Information and Communications Technologies (ICT) companies in other parts of Canada as well. This paper outlines some of the factors affecting Canada's ICT sector, and proposes some measures that would assist the entire high-technology field.

Background:

Anyone in the telecommunications industry is familiar with the leading role that Canadian companies have taken in developing and bringing to market some of the world's most advanced communications technologies, from the first telephone successful experiments of Alexander Graham Bell in 1874, to the optical networking technologies that make possible today's Internet, and many others in-between. Among the best known manifestations of this focus on telecommunications has been the "Ottawa Telecom Cluster", a centre of expertise and critical mass of commercial companies and government labs that led the way in this field for 50 years.

At the turn of the millennium, Canada's telecom systems sector saw no limits on the horizon. By late 2002, new telecom technologies developed primarily in Canada and the U.S. had been rapidly deployed by carriers around the world. However, combined with a downturn in the economy at the time, this resulted in significant over capacity globally. Suddenly, the major customers that had been behind the rapid growth of Ottawa stars such as Nortel, Newbridge and JDS Uniphase were no longer buying. Thousands were laid off, and dozens of companies closed entirely. In today's post 'Telecom Bubble' environment, ICT companies are much smaller, often recent startups, and offering fewer well paid engineering and research jobs than a decade ago. The total number employed in the industry is still significant, but many of the jobs are now at much lower skill levels, with corresponding lower wages. Now, many of those jobs are also at risk if Canada does not take immediate action.

Despite a few high profile Canadian successes, global brand companies like Nortel and RIM are the exception, not the rule. For those that did out last the '90s, their main challenge today is often basic survival, rather than managing growth. Regrettably, just when some of our Canadian companies are finding their feet again, the industry finds itself plagued by numerous new afflictions.

Recent events suggest an alarming increase in the speed of this downward trend.

For example, just in the Ottawa area:

- Nortel continues to struggle to be consistently profitable. JDS Uniphase has virtually left Ottawa, where it once employed 15,000. JDSU survives, but as a California based corporation.
- Tropic Networks, a developer of metro & regional optical carrier equipment, was sold to the French giant Alcatel last year, for a fraction of the funds that had been invested in it.
- Ubiquity Software, specialists in carrier grade voice and multimedia subsystems, was sold to U.S. based Avaya, and management transferred to the U.S.
- Cognos, Canada's largest independent software company with 3500 employees and sales of just under \$1 Billion, has been bought by IBM, and is being fully integrated into that corporation. 'Mind and management' will no longer be in Ottawa.
- Meriton Networks, a leading edge 'next generation network' company, was recently sold to a Texas based company for 8% of the monies invested in it, after finding itself unable to raise additional capital.
- Atreus Systems has met a similar fate with their recent sale to Sonus Networks, near Boston.
- Dell Computers has announced the permanent closing of it's 1300 seat Ottawa technical support call centre, opened with much fanfare (and provincial funding) just three years ago. The U.S. firm Convergys, with a 1100 seat call centre in Ottawa, may be next, as they continue to withdraw from Canada.
- Volex Canada, a division of a large U.K. group, is closing it's Ottawa plant this summer, leaving only 8 engineering and sales staff, releasing 32 others. In 2005, the firm employed 125.

The ongoing problems with Ottawa's "telecom cluster" are thus continuing, and having an impact on local unemployment rates. Further job losses are probable. Unfortunately, a similar trend is now emerging in other aspects of the IT and Telecommunications (ICT) industrial sector, across Canada.

- Recent StatsCan data indicates that the Ottawa-Gatineau unemployment rate is rising, gaining another .3% to 4.9% for April, 2008. A further 1600 technology sector jobs were lost in April alone, bringing the reported numbers down to 60,900, down 10,600 or a 15% drop since just October last. These figures do NOT yet include major layoffs at Dell, nor the other recent announcements.

The Causal Factors:

**Consider briefly some of the factors which have given rise to this 'Perfect Storm',
overwhelming the IT and Telecom industry in Canada:**

I) The Lack of Venture Capital;

Venture capital is one of the primary sources which new technology companies rely on for both initial R&D funding and product development work, and later for financing expansion. Yet VC funding for IT and telecom companies in particular has not been this poor for over 20 years.

- New venture funding in the U.S. for 2007 was reported to be \$34.7B, compared to only \$1.2B in Canada, 70% of which went into Quebec specific funds. This is far from the usual 10:1 ratio one expects to see reflected in U.S. / Canada economic indicators, and should be a significant 'red flag' for Canada.

- Across all sectors, just 165 Canadian start-ups received venture funding in 2006, compared to 225 in 2005, with about half of that in the ICT sector. 2007 saw about 170 deals, but value figures were down a further 33% to \$123M.
- In Ottawa back in the year 2000, there were 74 disclosed funding deals representing over \$1.25B in inward investment. Last year, only 14 and the total value had dropped to less than \$200m. So far this year, just eight with a total value of \$43M. Even in the years, 2001 and 2002, after the Telecom Bubble burst there were still over fifty transactions in Ottawa alone.
- The Canadian Venture Capital & Private Equity Association (CVCA) reports that the average domestic capital investment over the past five years has been only \$2.7M. On average, Canadian venture capital investments are about 1/3rd the size of the investments made in similar U.S. companies.
- Thompson Financial and the CVCA report that returns achieved by VC investments in Canada over the 10 year period prior to end of June 2006 were only about 2.5% compared to 20.7% in the United States. The CVCA believes that this is partly due to the “vicious circle” caused by the significant under capitalization of Canadian companies, who are then unable to become the ‘market leaders’ that U.S. firms can, which in turn discourages private equity from investing in Canadian companies.

Also contributing to the sharp decline in VC funding availability for the IT & Telecom sector is that the equity industry now considers it significantly easier to make profits at relatively low risk by buying out existing established companies, rather than investing in new ideas. Combined with new classes of ‘debt instruments’, hedge funds and leveraged buy-out companies around the world are financially engineering ‘venture like’ returns for large investors, significantly impacting the whole venture capital industry globally.

Last year, the international consulting firm McKinsey and Co. reported that the Canadian private equity industry is growing rapidly, but the industry has shifted from being primarily a venture capital supplier to largely financing buyouts. Their data indicates that;

- From 2002 to 2006, buyouts by Canadian private equity increased from 43% to 58%, while their venture capital investments dropped from 47% to 34%.

Government development agencies and government pension funds can certainly help to offset the ‘drying up’ of venture funding for Canadian technology companies, but are usually very conservative in their investment strategies, and very limited in the scale of their participation.

- Within the Federal Government, Budget 2008 sets aside \$75 million for the Business Development Bank of Canada to support the creation of a new, privately run, multi partner, later stage venture capital fund. However, it appears that much of this money will be used to provide additional support to current BDC investments, as there are much larger and more urgent funding requirements within their existing venture portfolio. In the short term, no action has yet been taken while the performance of BDC’s earlier VC initiatives is reviewed, at the direction of the current government.
- The Canada Pension Plan Investment Board (CPPIB) has itself allocated \$150M for venture capital funding, but this amount is spread across all sectors of the economy over multiple years. The largest investment to date appears to have been only about \$5M; far too little for most technology companies seeking expansion funding, which is the area of greatest need.
- In Quebec, the FSTQ (Solidarity Fund – QFL) has been an active venture capital investor, but it’s intention to invest further in the telecom area is reportedly on hold while strategic discussions take place with the Caisse de Depot.
- Last year, a Government of Alberta taskforce recommended creation of a \$100M Alberta Enterprise Fund which would invest \$33M in an ICT focused ventures funds. The necessary funding was announced in their most recent provincial budget, and enabling legislation passed this spring will establish the Alberta Enterprise Corporation. However, indications are that the provincial government will be willing to put money into venture capital only as a 1/3rd share minority investor in larger VC pools led

by private investors. If these other major partners can't be found, then the initiatives are unlikely to proceed, creating a classic 'Catch 22' situation.

- In Ontario, where overall venture capital funding has fallen from \$1.5B in 2000 to just \$236M last year, similar announcements have been made by the government, which has proposed to invest \$90M. It has now been confirmed that this will be combined with \$70 Million from TD Bank and OMERS, plus added monies from financial sector partners, to create a "fund of funds" with \$205M to be managed by TD Capital Private Equity Investors. British Columbia is also considering such an approach.

These government initiatives are certainly welcome, though small in comparison to overall need. Unfortunately, at the same time that there appears to be some willingness to invest public monies to help stimulate new venture capital funds (under certain conditions), the traditional technology support programs of government economic development organizations have been cut back. The loss of the former Technology Partnerships Canada (TPC) and its replacement by the narrower "Strategic Aerospace & Defence Initiative" has significantly reduced the federal government role in this sector. This is in sharp contrast to many of Canada's trading partners and global competitors, which proactively support their new technology SMEs.

Quick action is necessary to address this major problem of a lack of venture funding, beyond the helpful steps already being taken by several governments to try to make some money available for new shared VC pools. Amongst the steps that can be considered are;

1. *Canada should examine the possibility of eliminating capital gains on investments in leading edge technology companies, thereby helping to address concerns raised by the OECD, which has cited Canada as one of several nations with particularly high tax rates on capital. SR&ED and NRC-IRAP records can be used to differentiate companies engaged in technology research and related product development.*
2. *To compensate for the loss of the former "Technology Partnerships Canada" (TPC) program, either the replacement "Strategic Aerospace and Defence Initiative" (SADI) should be broadened to include other functional areas, or similar targeted programs established for which the ICT and other sectors can qualify. Any such program needs to be flexible and quick to respond, so as to be an effective partner for today's fast moving technology industries.*

II) Canada's Tax Treatment of Foreign Private Investors:

Closely connected to, and at least partially to blame for, the lack of venture capital for investment in new Canadian technology companies is our tax treatment of foreign private equity investment. In the United States in particular, private equity firms which have invested money in venture capital pools, as well as pension funds and even university endowments, which invest in both venture capital funds and private buy-out funds, are the largest source of potential funding by far for Canadian companies. Yet, in a global economy in which promising new companies and new technologies are in competition for scarce start-up and expansion funding, Canada is still perceived as not particularly friendly to outside investors.

Venture capital firms are almost invariably set up as limited partnerships with perhaps 20 or even 100 or more limited partner investors. They invest in minority positions in private companies at the seed, early-stage or later-stage levels, when such companies often have no positive cash flow, and in some cases no revenues yet at all. When such (often U.S. based) funds look for Canadian opportunities, they are attracted by our high levels of education and skills, innovative technologies, and government support for basic R&D. And under the existing Canada – U.S. tax treaty, one would expect that they would be able to easily invest in Canadian start-ups secure in the knowledge that they'll not be subject to double taxation, required instead to pay tax only in their home jurisdiction. The same would apply to Canadian investments in an American firm. However, despite the existing treaty, Canada forces foreign private equity investors through a gauntlet of administrative and bureaucratic measures that have scared away foreign investors and made it near impossible to obtain venture funding from U.S. sources.

For example, for years now the requirement for a CRA issued 'Section 116 Certificate' has directly inhibited venture investment.

- The issuance of a 'Section 116 Certificate' from CRA is necessary when a foreign investor wishes to avoid withholding tax on capital gains from the sale of taxable Canadian assets at some point down the road, when the company then (hopefully) has significant value. This is an onerous and lengthy process requiring analysis and approval by CRA of each and every application. Moreover, most private equity funds are limited partnerships, and CRA treats each individual investor as requiring a separate application. To further complicate matters, CRA will not even consider such applications until the applicant applies for and is issued a Canadian tax identification number.
- Then, even after being granted a 'Section 116 Certificate', the "non-resident" is also required to file a Canadian tax return for the year of sale, to report the sale of the holding, even when a tax treaty would spare the investor from ever paying taxes in Canada. While the initial steps are bad enough, being extremely onerous and time consuming, knowing that each individual investor in a VC fund must file a foreign tax return upon sale is the last straw, as many funds are specifically prohibited from providing such private information about the financial circumstances of their investors to foreign governments.

Federal Budget 2008 proposed to address the 'Section 116 Certificate' issues regarding the withholding tax and tax filing aspects by "streamlining" the process, but the implementation details haven't yet been seen. To date, it appears the solutions proposed may be very limited, and the most important aspects may apply only to the existing definition of "excluded property". If so, this would include exempting from the Certificate requirement the sale by foreign investors of shares of companies listed on any stock exchange in OECD countries with which Canada has a tax treaty. While a good first step, this provision is likely too restrictive to resolve the issue for start-ups, as it would require VC funds to commit in advance to retaining ownership interests in the form of shares or convertible warrants until such time as the company launches an IPO, rather than exiting earlier if conditions were right for a sale. In any event, the proposed changes have not yet been implemented.

Consider as well the related area of Canada's treatment of Limited Liability Corporations.

- In the case of U.S. & Japanese venture capital funds structured as Limited Liability Corporations (LLCs), CRA does not accord investors in such funds the benefits of the tax treaties designed to avoid double taxation. This is a result of a Supreme Court decision some years ago, requiring that tax be paid in Canada when an LLC sells its portion of a Canadian company they have invested in. Since the individual investors in such a 'flow through' LLC already must pay tax personally on their earnings in their home jurisdiction, this creates a double taxation burden which makes investing in Canada out of the question.

A September 2007 amendment to the Canada-U.S. Tax Treaty (first announced in the 2007 federal budget) attempts to address the issue of U.S. Limited Liability Companies, extending recognition to LLCs in a manner similar to other investment funds. However, the new provisions have not yet come into force, apparently due to ongoing trade negotiations in other areas. Meanwhile, this source of potential investment money has dried up completely.

The combination of these two distinct but related issues has created serious roadblocks for many foreign VC funds when they are most needed in Canada, and explain in part the 'drying up' of foreign VC funding in new Canadian high-tech companies. Canada's current treatment of foreign private investments in high-tech SMEs, particularly in the case of venture capital investments, does nothing for Canada and drives away badly needed investment not otherwise available in Canada. We are now at the point where many foreign venture capital funds have essentially given up on Canada, and are focusing their investments on other (often much larger) countries considered more amenable to foreign direct investment.

Canada needs to counter this now strong foreign perception that we're not interested in venture capital funding for our high-tech companies, and it will take more than simply making the needed changes and expecting the world to notice and respond. We need to also send a bold signal to the global venture funding markets.

Amongst the actions that can be taken in this regard are;

3. *Immediate action needs to be taken to implement the Budget 2008 provisions, and then to go beyond this to eliminate the Section 116 Certificate requirement completely, since the impact far outweighs the benefits of ensuring Canada's tax rules are being adhered to. Additional steps may*

need to be taken to ensure that foreign holdings in Canadian technology SMEs not yet traded on public markets are considered “excluded property” for purposes of Section 116 of the Tax Act.

4. *The proposed changes in tax treatment of American Limited Liability Companies (LLCs) first announced in Budget 2007 and addressed in the Tax Treaty amendments of September 2007, need to be implemented as quickly as possible. Similar provisions need to be extended to Japanese and other LLCs so as to encourage their investing in Canadian technology companies.*
5. *An active international marketing campaign targeted specifically at foreign equity sources, and particularly U.S. based venture capital funds, will then need to be undertaken in order that these investors, many of whom no longer focus on Canada, are made aware of these changes, and appreciate that Canada welcomes their investment in our technology SMEs.*

III) The Impact of Canada’s Rising Dollar:

There is no doubt that the 60% rise in the value of the Canadian dollar since just 2004 is devastating the manufacturing industry in Canada. Export markets are rapidly drying up and job losses mounting. Resource boom jobs, often in the skilled trades, can offset these losses only partially, and are not usually in the same region of Canada and where most manufacturing jobs are being lost. And Canadian companies are overly dependent on more traditional, “low-tech” manufacturing, which compounds the problem and can only result in further job loss.

- OECD data shows that Ireland generates about 21% of its total value from high & medium technology manufacturing, while Canada generates only 6%. This will only continue to drop as our dollar remains near or above par with the U.S. currency.

Canada appears to have caught a rather virulent form of ‘The Dutch Disease’; the term economists gave to the phenomenon seen in the Netherlands after North Sea oil revenues caused a rapid appreciation of the Dutch Gilder in the early 70’s. The resulting rise in the cost of Dutch manufactured goods caused massive job losses in manufacturing at the same time as export figures and government revenues were reaching new heights.

- StatsCan has announced that Canada’s merchandise trade surplus rose for a 3rd straight month to hit a 10 month high of \$5.5 Billion in March, as commodity exports grew and imports declined. The March trade surplus with the U.S. hit a two year high of \$8.6B.
- The main factor was soaring commodity prices; especially for oil and gas, with energy exports up 6.6% to a new record of over \$10B in the month. Meanwhile, auto and truck sales fell sharply, as did other manufactured goods, and forestry exports again dropped.

Manufacturing in Canada is further hampered by our existing tax structure, in comparison to our major competitors. While overall corporate tax rates have been coming down, Canada’s capital cost allowance (CCA) rates are currently lower than those of our major competitors, and technological change is reducing the useful life of many assets. The OECD has pointed out that Canada’s tax treatment of capital is putting it at a distinct disadvantage compared to our major competitors.

Similarly, the higher costs of Canadian expertise finds its way into the cost of exported new products, technologies and intellectual property, even affecting our ability to carry out corporate product development work within Canada.

Most economists are of the view that there are only two antidotes to the “Dutch Disease”. One is segregation of the new distorting resource revenues into longer term State managed ‘Future Funds’, often held in offshore investments and out of the domestic economy. This is the Norwegian model, but certainly not the approach of any of Canada’s provinces. The other is increased manufacturing productivity.

International monetary markets are as unpredictable as commodity markets (and obviously closely linked), and it would be unrealistic to suggest that Canada take measures to force the value of the dollar lower against the currencies of its competitors. Such an approach is as unlikely to be successful as suggestions some years ago that Canada should take steps to push up its undervalued currency as a way of reducing

inflationary pressures. However, there are some actions that can and should be taken by government, focusing instead on the need for the nation to address our lagging productivity, compared to our largest trading partners.

6. *While lower corporate tax rates are certainly helpful for profitable companies, in order to assist Canadian technology SMEs manufacturing in Canada (including those not currently profitable), programs should be introduced to provide further acceleration of capital equipment write-offs for manufacturing, combined with refundable tax credits or direct grants & contributions support for acquisition of advanced manufacturing systems and equipment for those not yet able to benefit from tax relief measures.*
7. *Existing SMEs directly engaged in manufacturing need to be assisted to 'move up the value chain', concentrating on more complex, specialized and customized equipments where lowest unit cost is not as critical to success. Such more advanced manufacturing jobs will also be more likely to sustain the present significant wage advantage of manufacturing hourly average pay compared to retail hourly pay.*
8. *The federal and provincial governments need to work together to expand funded participation by high-tech SMEs in trade missions and shows abroad, for those interested in, and capable of, selling into the region the mission is targeting.*

IV) Low levels of Business Funded & Managed R&D:

Surveys continue to show that Canadian firms are often unwilling to accept the inherent risk of investing in R&D, despite potential payoffs. They tend to put more faith in marketing what they already sell, rather than in improving their products and introducing innovative new ones. This, of course, is also tied to the difficulty in obtaining outside investment funding for such development work or expansion.

- Amongst the OECD countries, Canada is ranked 15th in terms of business R&D expenditures.
- Only 9.1% of business R&D funding in 2005 came from foreign sources (StatsCan), placing Canada 8th of the OECD members, well behind (for example) the U.K. at 19.2%. (OECD)
- OECD data now indicates that Canada has just 7.2 researchers per 1000 employees, compared to 16.5 per 1000 in Finland.
- A 2003 OECD study shows that a sustained .1% increase in business sector R&D (as a percentage of GDP) would pay back about a 1.2% GDP increase over the long term, or a factor of about 12 times.

Whether a company is headquartered and managed within Canada appears to be one critical determinant in the willingness of a corporation to carry out R&D here. For small and medium enterprise, (which dominate in Canada,) R&D is normally a head-office function, and is therefore usually carried out at or near the corporate offices of the company. This only changes once a company reaches at least "Fortune 1000" status, at which point geographic dispersion of R&D activities becomes more common, with corporate R&D facilities established in a number of countries, under the direction and control of the parent.

The rapid rise in the value of the Canadian dollar against our major trading partners, as outlined above, is also having a significant impact on the extent of R&D work done in Canada. When combined with high quality education systems in the major low wage economies of China and India, we are seeing a significant increase in the number of corporate R&D centres in these developing nations, at the expense of the traditional high technology centres of Europe and North America.

- Nortel's VP - R&D, recently announced at a conference in Ottawa that Nortel has reclassified Canada as a 'high cost environment', and is moving more of its R&D work into lower cost jurisdictions. The company, which annually spends about \$1.7B in R&D work, has already consolidated down to just two major "full spectrum" R&D centres; one in Canada, the other in China.

Canada needs to recognize that we are now in direct competition with countries like India and China which are annually turning out tens of thousands of highly qualified engineers, technologists and software programmers willing to work at a fraction of the cost of their Canadian counterparts. Moreover, unlike the assembly lines of the industrial age, intellectual or 'knowledge' work is easily moved offshore, often with the help of the very network technologies Canadians have helped develop.

While there remain significant barriers to foreign venture investment in Canadian companies, there are literally no controls preventing our high-tech companies from having much of their R&D work done in lower cost jurisdictions. Canada may see itself as a leader in the 'knowledge economy', but now we see that even our knowledge and expertise is becoming too expensive to compete on the global stage.

European countries have already suffered the consequences of the new global realities. Many formerly large corporate R&D organizations have been reduced to a small core of highly experienced managers in contracting oversight and management roles, with any significant research and technology development work done in new corporate centres in India and China. Meanwhile, the number of corporate R&D centres in China has been growing rapidly, where a recently graduated engineer can be hired for 1/5th to 1/7th the annual salary of a North American.

Failure to commercialize university R&D findings:

At the academic level, Canada now has one of the world's most extensive government funded systems of university research chairs and scholarships, including in a number of high technology fields. However, the pay-off of such research is usually only in the long term, often taking from 5 to 10 years. There are a number of critical steps between the fundamental science research done in a university environment, and launching a marketable technology product on the street. Research labs are usually not well suited for this work, though Canada's National Research Council labs tend to be better at commercializing their work than many universities have been. All major universities and some large hospitals operate 'technology transfer offices' with some even banding together to improve their capabilities (like the MaRS Discovery District project in Toronto,) but more needs to be done in this area. Many technology SMEs find it difficult to deal with university tech transfer offices, noting the lack of business experience of staff, and an unrealistic expectation of immediate royalties for the institution.

Some have argued for greater support within the university environment to encourage researchers to personally take on commercialization of their discoveries. This has been highly successful in certain major American universities such as M.I.T. and Stanford. But studies such as those by The Conference Board of Canada suggest that this country needs to find better ways to help companies with this challenge of moving from concept to product, rather than helping university based researchers become entrepreneurs. One example suggested is a common, commercially oriented, intellectual property rights regime across all Canadian R&D institutions, focused on encouraging the use of Canadian developed IPR by Canadian companies.

The most effective program in Canada for support of SMEs attempting to commercialize new technologies is currently the NRC managed Industrial Research Assistance Program (IRAP), which includes a strong advisory services component. The IRAP program is highly respected amongst high-tech companies, but unfortunately, overall budgets and program funding levels are not keeping up with the times, being limited to just \$500K/yr support for qualifying R&D, paid in arrears. Despite the small amounts available, a company's ability to win IRAP funds is seen by outside investments as a strong endorsement of the technology aspects, given NRC's high credibility in this area.

Canada's SR&ED tax regime for the treatment of R&D expenditures:

Canada's SR&ED program is the federal government's tool for encouraging corporate R&D and is copied directly by several provinces as well. (Alberta being the most recent to 'join the fold'.) Finance Department studies show that SR&ED tax expenditures account for over 10% of total reported R&D activity in Canada. However, this must be considered in the broader context that Canadian companies rank well down the OECD list in terms of willingness to spend their own funds on R&D, as noted above.

In addition to the SR&ED Investment Tax Credits (ITC) allowing a profitable company to reduce its tax payable, refundable tax credits are available for Canadian Controlled Private Corporations (CCPCs) that are

not yet profitable, or of limited profitability, under certain limited circumstances. This particular aspect is of great importance to new start-ups needing to invest heavily in R&D work before revenues would normally permit such expenditures. Unfortunately, the program has a number of significant flaws.

The Department of Finance carried out a review of the SR&ED program in 2006 and 2007, with input from Canadian industry groups such as the Canadian Advanced Technology Association (CATA). The government announced changes in the 2008 Budget Plan to improve the program, and administrative improvements were also promised. These improvements include;

An increase in the expenditure limit for Canadian controlled private corporations from \$2 to \$3 Million,
An increase in the upper limit for taxable capital phase-out from \$15M to \$50M over time,
An increase in the upper limit for taxable income phase out from \$600K to \$700K, and
Extending the income tax credit of SR&ED to management of certain R&D activities outside of Canada.

However, there is still a strong feeling in Canada's high-tech community that the changes should have gone much further than merely tinkering with the upper limits for refundable ITC claims by CCPCs. (Untouched since 1985, so the recent proposed increases noted above do not even keep pace with inflation.) Numerous other difficulties were identified by the many groups which participated in the consultations process. Yet aside from the increased limits noted above and a small concession to the partial costs of Canadian resident staff managing R&D projects outside Canada, none of the other difficulties were addressed, or potential improvements adopted.

For the Canadian regime to remain competitive on a global basis, significant changes are required. At present, companies that do not qualify for the refundable tax credits or that are currently not profitable do not consider the R&D credits program in any decision on where to locate their R&D or how much to invest.

Canadian controlled private corporations investing heavily in R&D activities feel that the refundable aspects should certainly be expanded, such as in the United Kingdom. They would also like to see more flexibility around ownership and investor rules which can now result in a company being disqualified simply for having any foreign investors or non Canadian Board members.

Other improvements should be introduced as well, so as to remain competitive with other jurisdictions. One such positive change would be to permit companies to utilize SR&ED tax credits against so-called employer taxes where they do not yet pay income tax, as is the case in some other jurisdictions. Similarly, removing the Taxable Capital phase out provisions entirely, or at least implementing the proposed increase to \$50M more rapidly, would be helpful for high-tech SMEs.

Regarding the taxable capital provisions, one long standing provision of the SR&ED regime is particularly troublesome for new high-tech start-ups which are part of a group of "associated" companies with a total taxable capital of more than \$15M (to rise to \$50M eventually). Even when the start-up may be only partially held or supported by a larger group, and have no access to the capital assets of other members of the group, it is currently unable to qualify for refundable ITCs. Yet there is clear evidence that the kind of "Ecosystem Model" used by some larger companies such as Nortel, or Newbridge (pre sale to Alcatel), has been highly successful in fostering and supporting numerous new R&D intensive start-up companies. Why such new high-tech companies that receive some degree of early support and equity investment from already successful larger companies should be penalized in this manner is not at all clear. The current rule clearly disadvantages what are otherwise amongst Canada's most promising new technology SMEs.

Companies who've used the program also complain that the administration of SR&ED applications by CRA has been heavy handed and overly bureaucratic, starting with a mindset that appears to consider every application as a potential fraud. There have been repeated calls (and repeated promises from CRA,) to address this situation by providing a more professional and dedicated cadre of SR&ED specialists within CRA, and ensuring they are given clear guidance as to appropriate and consistent interpretation of R&D expenditure qualification requirements.

For companies not able to take advantage of the refundable ITCs to help support their R&D work, current rules permit R&D ITCs to be carried forward almost indefinitely. However, this is of little benefit to companies at the time they most need the help, and when combined with provincial programs, may actually encourage the 'reverse take over' sale of high-tech start-ups at an early stage. Companies not yet profitable enough to

have been able to use their ITCs built-up over a number of years frequently find themselves approached by highly profitable companies in other fields such as resource extraction, seeking a leveraged buy out by the tech company, so as to gain the advantage of the unused ITCs. Unfortunately, this does not result in a strong and profitable technology company with some interests in natural resources, but a natural resource company that quickly sells off the intellectual property of the tech start-up, retaining little more than the name once it has made use of the tax credits.

One would think that there would be greater interest within the federal government in improving the program and particularly its application to Canadian controlled SMEs. After all, the December 1997 evaluation report by the Department of Finance estimated that for every \$1.00 of support the government put into the program, it generated approximately \$1.38 of additional R&D spending by companies. And the current government did indicate in its earlier election campaign document "Stand up for Canada" that they planned to work with stakeholders to explore the expansion of the SR&ED tax credit system.

R&D intensive start-ups are frequently sold off prior to commercial success:

An alarming trend in the high-tech area has been the tendency of small Canadian start-ups to offer themselves for sale (often to U.S. or European investors) during the early technology development stages, well before they actually have a viable product ready for market. While this is sometimes driven by the difficulty in obtaining venture funding, as noted above, in other cases it appears to have been an intentional business strategy to position the company for quick sale to larger already successful (and usually foreign) companies in the same field. A common approach amongst new tech start-ups in the late 1990s and at least the first half of this decade has been a 'get rich quick' objective which relies on the rapid development of early intellectual property and quick sell-off to achieve high returns. This delivers little in the way of longer term benefit for Canada.

Moreover, in such buyouts by foreign entities, what the foreign buyer is purchasing is the intellectual property of those who launched and funded the Canadian startup. What remains in Canada (if anything) is often restricted to being a corporate R&D centre for the purchaser, with the "mind and management" of the company now elsewhere. When R&D investments then lead to new products and sales the benefits accrue entirely to the foreign company, with the exception of the salaries of a handful of local Canadian researchers and their support staff.

To address these issues, a mix of new measures is required.

9. *More serious reform of the current SR&ED tax credits system to increase the availability of refundable tax credits for high-tech SMEs, and remove artificial impediments to access to the program for Canadian controlled corporations, should be undertaken without delay, so as to keep Canada's SR&ED system competitive with that of other jurisdictions. Provincial governments should be encouraged to immediately adopt any federal reforms so as to ensure program consistency.*
10. *In addition to improving the existing refundable tax credit aspect of the SR&ED tax provisions for small Canadian controlled private corporations, the federal and provincial governments should consider a program of direct subvention in support of new product development in technology based companies less than four years old and not yet taxable. For example, 50/50 cost sharing on the salaries of engineers, technologists and scientists directly engaged in product development activities would pull in significant new private sector investment, and encourage established companies to 'spin-off' new companies to develop new products and services to support their market needs.*
11. *To address concerns of the business community regarding the high marginal effective tax burden on business investments, efforts should continue to encourage provincial governments to reduce business tax rates for investments in innovation, and the federal government should continue to seek opportunities to similarly reduce the effective tax rate on business capital.*
12. *NRC's highly successful IRAP program needs to be updated, and the annual maximum contribution agreement for an SME's R&D program should be increased from \$500K to \$2 Million, with the overall program funding increased accordingly. IRAP's management advisory support services should similarly be expanded so as to provide greater benefit to Canadian technology SMEs.*

V) The Importance of government procurement:

Being able to point to the use of a product by one's home government is a critical advantage to companies selling internationally. Unfortunately, this is rarely possible for Canadian companies.

Traditionally, Canada's federal government has been extremely cautious about any overt steps to support Canadian technology SMEs through the \$20 Billion a year currently spent federally on goods and services. Despite its "Industrial and Regional Benefits Program" (IRB), Canada is notable for NOT having successfully implemented a national procurement strategy that complements or supports a national innovation strategy, unlike nations such as Finland, South Korea and Japan.

For its part, the United States has its 'Buy American Act', and 'National Security' restrictions, which in combination with its enormous defence spending create the world's largest preferred market for its own high tech industries. Recently, Canada's premiere space technology company, a division of MDA, was to be sold to a large American defence contractor, until the Minister of Industry refused approval. The basis for the sale was management's argument that only as part of an American company could the space systems division of MDA be assured of access to the large U.S. contracts necessary for future growth. The strategic importance of the company and its technologies to Canada's scientific & industrial future was never a consideration of MDA's management or Board, which has as its first obligation the responsibility to maximize shareholder value. It is in recognition of this reality that many nations not only scrutinize very carefully any proposed foreign acquisitions of high technology companies, but have procurement programs designed to ensure such companies have reasonable domestic market opportunities through the government's own procurements.

In Canada, government procurement challenges exist at both ends of the spectrum. Unlike some major nations, Canada has no program (such as the former Unsolicited Proposals program,) to broadly support procurement of new, leading edge, technologies developed within local companies. Instead, there are a number of narrow and specific procurement initiatives in selected priority areas, such as "The Chemical, Biological, Radiological-Nuclear, and Explosives (CBRNE) Research and Technology Initiative" (CRTI), "The Public Security Technical Program" (PSTP), and the "Defence Industrial Research Program" (DIRP).

By contrast, a number of our major competitors have much more robust programs designed to use the strength of government procurement to support and build local high-technology industries.

- The United States "Small Business Innovation Research" (SBIR) program, in place since 1982, requires all agencies spending over \$100M/yr to create a program for funding small business research awards. DoD alone spends over \$1B/yr on SBIR, attracting between 250 & 400 new contractors annually.
- The U.S. Small Business Technology Transfer Act of 1992 requires the five largest departments to set aside an annual 0.3% of R&D budgets for award to small business.
- The U.K. launched its own SBIR program in 2001 aimed at having government purchase at least 2.5% of R&D requirements from SMEs. The 2006 "Technology Strategy Board" review of public procurement also proposes greater use of "strategic procurement" to support SME innovation within the U.K.

Just as important as the lack of an early stage innovative technologies procurement program is the apparent disinterest amongst federal departments in ensuring already proven and marketed products from successful Canadian companies are acquired, even when they are clearly capable of doing the job. Lacking direction otherwise, and under constant pressure to reduce purchase time and cost, buying departments and PWGSC fail to consider the impacts of their procurements on Canada's high-tech SMEs. Suppliers, not given any incentive to include Canadian technologies in their responses to government bid opportunities, focus on strict interpretation of stated requirements, at lowest cost and risk.

The most significant factors which appear to be at play in this regard include;

- The lack of any coherent policy linkage between IC, PWGSC and DFAIT objectives, so as to maximize benefits of federal procurement for Canada overall,

- The use of onerous reference client requirements to demonstrate successful past performance, which can often only be met by bidders partnering with large foreign suppliers,
- The inclusion of requirements for very large insurance policies or performance bonds, designed to protect the Crown against any problems with inexperienced contractors or untried equipment,
- Poorly developed evaluation criteria that fail to incent suppliers to provide what the buying department claims to want in their requirements statements, and providing no recognition for the economic and societal benefits of including Canadian designed equipment,
- A tendency within large systems integrators to normally favour products from their (usually large multinational) partners rather than Canadian companies, and
- The failure of buying departments to construct their requirements and evaluations in a manner that would account for full life cycle costs, rather than just purchase cost.

The result of these practices is often to implicitly favour the large, well financed, multi-national companies, who are perceived as offering 'proven' technology from their global partners, at minimum risk. In the process, smaller Canadian technology suppliers are being frozen out. Some would say that 'The lowest cost, at any cost' has become the defacto procurement policy of Canada's federal government.

This preference for risk reduction and low cost over support for Canada's high-tech companies has recently come to the forefront in another context. In the case of both the planned naval operational replenishment and support vessels, and the frigate modernization program, the major potential bidders including Canada's most capable and experienced defence contractors, are withdrawing from the competitions. This, they have announced publicly, is largely due to their concerns that the government's expectations regarding what can be delivered within budget, and the degree of risk the contractors must carry, are unrealistic and render the projects commercially unviable. Clearly, not only Canada's high-tech SMEs affected by the current federal procurement environment.

Procurement staff at both departmental and central agency level do not appear to be motivated in any way to ensure that Canadian companies are included in corporate responses to their RFPs, often citing trade agreements (including the Agreement on Internal Trade) as their rationale for making so little effort in this regard. But trade agreements are by definition multi partner, and it is clear that Canada's major trading partners do not share the nervousness demonstrated by Canadian officials when it comes to ensuring their domestic technology companies are given every opportunity at home.

Moreover, there seems to be little effort made at the federal level to encourage larger scale use of technologies to reform or modernize public administration or service delivery, with government officials opting instead for minor incremental improvements, paying scant attention to whether real results are being achieved. Success, where it's measured at all, is seen in terms of on-time / on-budget delivery at minimum risk, with little concern for project or program outcomes.

Some provincial governments such as Nova Scotia are making an effort to be more inclusive of Canadian technology suppliers, but the results have been very mixed. Others openly state that best price and lowest risk will decide the successful vendor, regardless of other factors such as local origin. However, British Columbia and Alberta have both been quite successful of late in introducing new procurement approaches that are at least more results oriented or 'solutions focused', even if they've largely failed to date to also ensure opportunities are available for Canada's high-tech SMEs in the process.

In light of these difficulties, which stand out in such sharp contrast to our major competitors elsewhere in the world, steps need to be taken to address this situation. These could include;

13. *Canadian federal and provincial procurement practices need to be reformed to ensure departments are required to consider the impacts of their requirements and processes on potential Canadian suppliers, with a view to ensuring a 'level-playing-field' for existing Canadian products able to meet their operational needs.*

- 14. An adequately funded program needs to be established whereby Canadian technology companies can once again submit unsolicited proposals to departments that would allow for development and evaluation of Canadian technology products and services to meet departmental needs, prior to their full commercial availability.*

VI) Loss of 'Critical Mass' to Attract High-Tech Support Companies.

When a significant number of companies grow up together in a geographic area, forming a 'Technology Cluster' as they did in the Ottawa area, they create a critical mass. Specialist technology support organizations begin to open offices in the region, and hire local people. Specialized microchip designers & manufacturers, and research equipment makers are examples. But a secondary layer of indirect industry support positions in law, finance, patents, marketing, etc. is also created in the same geographic area.

Research done by David Wolfe of the Innovation Systems Research Network (ISRN) at the Munk Centre for International Studies shows that clustering creates an environment that generates significant income benefits for a group of clustered companies in an industry, compared to the same industries not clustered. And strategically located clusters have proven to be very successful in terms of attracting the world's best minds, leveraging R&D investment and supporting collaboration between the companies in the cluster and local universities. David Florida, now of the University of Toronto, has written extensively of the substantial benefits that are gained in turn by the cities in which well educated, highly trained knowledge workers, such as those needed by technology cluster companies, then congregate.

Unfortunately, much less leading edge development work is now being done by Ottawa industry, and the area has lost the 'critical mass' necessary to support the specialty companies at the next level. The recent announcement by Volex referenced on Page 2 is another example, since it's primary business in Ottawa was the manufacture of specialized technology cables and systems for which other local companies were formerly a significant market.

Concentration and gradual migration towards an industry 'centre of mass' is a normal phenomenon in many ways. Ottawa is not alone, nor is Canada unique in this respect. American technology investment and management companies are also reporting a continuing concentration of the IT and Telecom sector activities into the 'Silicon Valley' area around San Jose / San Francisco, with corresponding losses in the Boston and Dallas areas. But the American centres are much larger, and not in danger of losing 'critical mass', as is happening in Ottawa. Canada should not stand by idly and watch the continuing disintegration of either the 'Ottawa Telecom Cluster', or of other similar concentrations elsewhere in the country. There are still steps that can, and should, be taken.

- 15. One aspect of Canada's 'National Innovation Strategy', to which the Science, Technology and Innovation Council is currently contributing, should be to recognize both the inherent value of designating the specific 'technology clusters' that have developed in various parts of Canada, and to bring forward practical measures to ensure their continuing health.*

VII) The Growing Shortage of Adequate Expertise:

The availability of qualified and experienced engineering and related technical professionals at reasonable cost is essential to any innovative product development program. In the past, the high level of Canadian engineering and technology grads has allowed us to hire bright and energetic young workers, who supplement experienced personnel already in the company and quickly make a valuable contribution. But there has been a sharp drop off in the supply of engineering and technology graduates from Canadian schools, at the very time Canada is also experiencing significant retirements from the 'baby boom generation'.

- An examination of data from StatsCan reveals that university enrollments between the years 2001 and 2006 increased in every major program area with the exception of Mathematics, Computer and Information Sciences, which is down 20%. In fact almost three times as many students are now enrolled in programs associated with health, parks, recreation and fitness!

- Canada has the highest proportion of post-secondary educated workers, yet OECD data lists Canada as now 12th amongst 17 OECD nations, in proportion of grads with science and technology degrees.
- However, the latest 'Programme for International Student Assessment', undertaken by the OECD for the year 2006, measuring the performance of Canada's youth in science, reading and mathematics, showed that our 15 year old students scored higher than any other country in the western world with the exception of Finland.

Evidently, the capabilities are there, but the career choices are elsewhere. In the 'post telecom bubble' Canada, becoming an electronics engineer or computer programmer is apparently not considered an attractive and stable career.

There is also a decline in the number of foreign students coming to Canada, particularly from countries like China where the government has made major investments in tertiary education and has 'advised' the state-owned banks to implement interest free student loans. Canada is becoming an unattractive place to learn and a more difficult place to find a high-tech job. Increasingly, highly educated technology specialists in other nations are finding that they don't have to leave home to work on leading edge projects and make a decent living.

The challenges are not just in the technology disciplines. Once a Canadian SME reaches the point where substantial revenues are being realized and the company is beginning to grow rapidly, outside management talent is often an essential component for success. Indeed, once this point is reached, outside venture funding organizations will often insist that company founders with excellent technology backgrounds step aside in favour of experienced corporate managers that can take the organization to the next stage. The challenge, however, is to find suitable experienced talent in Canada.

- Compared to the United States, only half as many company managers in Canada are university business program graduates,
- In the case of financial professionals, 2/3rd of such managers have university degrees in the U.S. compared to less than 1/3rd in Canada, and higher level degrees are also much less common

Unfortunately, just as there is a significant shortage of managerial talent for high-tech SMEs to draw on, there is a significant lack of investment in advanced business management techniques in this country.

- Less than 5% of SSHRC grants and fellowships went to business disciplines in their 2005-06 year, and only 20 of almost 1700 of the existing Canada Research Chairs are in management studies. (Though SSHRC did receive \$11M additional per year for research in these areas in the 2007 federal budget.)

Management of technology firms is a specialized area, requiring not only significant knowledge of general management, but specific knowledge of how to take a small start-up from its initial stages through to maturity, how to develop marketing organizations and implement channel partnerships, how to expand a company's sales territory beyond our small market in Canada, how to balance the need for outside venture investment with retention of local control, how to take advantage of such government programs as do already exist, and how to manage programs and projects within the company. Very few university level programs are yet offered in these specialized disciplines, and not enough Canadians have gained knowledge in these areas from hands-on experience.

Given the shortage of people with this specialized business background here in Canada, some companies have attempted instead to identify and 'import' senior managers from other industrialized economies with similar high-technology companies. But identifying a suitable candidate is just the beginning. For those who are convinced to emigrate to Canada and become permanent residents, the path is tortuous and lengthy.

- Examination of the Canadian High Commission's web site in the UK indicates that the processing time for a skilled worker, entrepreneur, investor or self-employed person is 42 to 48 months. This is a major disincentive for prospective specialists, particularly when already well employed at home.
- Data from Citizenship & Immigration indicates that the average length of time across all countries globally to process an application for permanent Canadian residence by a "Skilled Workers - Federal" applicant (including business managers) is three years. Even after more than 5 ½ years, only about 80% of applicants have had their case considered, and results are unpredictable.

As is evident from this data from DFAIT and CIC, for a company attempting to bring in skilled staff from outside Canada as immigrants, the obstacles are formidable. Then if they do succeed in settling in Canada, they face enormous obstacles in winning recognition for their 'foreign' education and credentials. Employers tend to distrust anybody who lacks 'Canadian experience', and Canada's professional regulatory bodies are all provincially based, without the size and resources necessary to research and understand the qualifications, degrees & diplomas individuals bring with them from other countries, despite the reality that today's immigrant is, on average, better educated than existing Canadian citizens!

An alternative considered by some is to bring in experienced business managers as 'temporary workers', but this too can be challenging. Though there have been recent attempts to address specific industry needs, such as in Alberta's energy project construction trades, Canada's temporary workers system appears to still be based on the assumption that companies primarily need uneducated crop pickers or temporary nannies and construction workers. Outside these special programs, a "Labour Market Opinion" is still required from HRSDC for each and every individual, which can take weeks for specialists and managers. Then the time for Canada's Citizenship & Immigration staff within each Embassy or High Commission staff to process an application can range widely, from days to many months.

Action is urgently required to deal with these human skills shortages, particularly since they will only grow worse with growing attrition due to retirements here in Canada, and the global fight for skilled immigrants. A number of steps can be taken by government(s) to ease this growing problem.

16. *Processing times for badly needed management and technology professionals must be drastically reduced if our high-tech companies are to find the people they need to grow and prosper. Special emphasis also needs to be placed on encouraging experienced technology company managers to take two to five year assignments with Canadian companies, including rapid processing of temporary worker applications in this field, favourable tax treatment and direct support for relocation costs.*
17. *To address the need for the more 'business savvy' senior managers that Canadian companies need to grow and succeed in the global marketplace, the Labour Programs division of HRSDC should consider funding business training courses for managers of high-tech SMEs, in coordination with the respected NRC IRAP system, which can assist in identifying needs.*
18. *SSHRC should continue to be encouraged to fund additional university grants and fellowships in business management, with a specific focus on the specialized skills associated with bringing young high-tech SMEs from start-up to mature global player.*

In Summary:

Canada's IT and Telecom sector is in serious trouble, and the "Ottawa Telecom Cluster" appears to be the hardest hit so far. There is increasing evidence that this previously successful grouping of specialized high-tech companies may be the 'canary in the coal mine', signaling of imminent danger for the rest of Canada's ICT sector or even all high-technology sectors. Few start-ups are now going all the way; from seed capital for R&D, to secondary financing for commercialization, to an IPO to create the currency to grow and become an international business. While there are still start-ups in Canada, many are acquired by U.S. based companies before they are able to fully commercialize their portfolios. As a result, the intellectual property is lost to Canadian industry and Canada begins to look more and more like a branch office or subsidiary of an American enterprise.

The most critical factor impacting the Canadian technology community at present is no doubt the serious lack of access to venture capital, at all stages of the life of a company. Canadian capital markets have largely stopped investing in high-tech SMEs, and Canada still has significant artificial blockages to foreign VC investment.

The rapid rise of the Canadian dollar against the American is having a major negative impact as well, and when combined with the existing difficulty in encouraging and supporting private sector R&D in Canada, more jobs are being lost in the Ottawa area each month. Canada is now considered a “high cost environment” compared to the quality R&D work that can be done in places like India and China. The trend is for larger corporations to reduce their Canadian R&D work, contracting out the work in lower cost jurisdictions instead.

Despite having leading edge technologies, the significant shortage of qualified Canadian corporate management people and difficulty in bringing in such individuals as immigrants or temporary workers are also weakening the ability of our high-tech companies to compete in business terms in the global marketplace.

Many of these factors have now combined to result in Ottawa losing the necessary ‘critical mass’ to sustain and build a cluster of successful technology companies, able to collaborate with others in the region and around the globe to achieve business success internationally. The same process is now becoming apparent in other parts of the country as well.

Government action, both in policy and program terms, is urgently required if Canada is to retain any hope of being a ‘global player’ in the next generation of the Information and Communications Technologies that are revolutionizing our world.

Wesley Clover
June, 2008