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The Way Ahead

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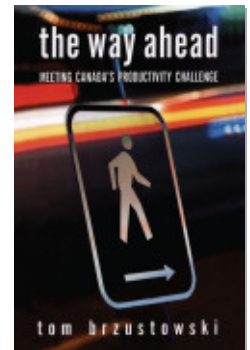
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Improving Things

*“After all is said and done,
much more has been said than done.” —Bob Rae*

The quotation with which I ended Chapter 1 has angered me for years, because it’s too close to the truth. It makes me think of the Avro Jetliner, the Avro Arrow, the vertical wind turbine, Telidon computer graphics, the Bras d’Or hydrofoil, and other examples of Canadian inventions that might have become major innovations in the fields with which I am familiar. For various reasons, they were abandoned, and the opportunities were left to others to exploit. And I know that other people have their own lists of Canada’s missed opportunities in other fields. But anger can be motivating. Because of that comment, I decided to learn why Canadians often fail to realize the commercial benefits of inventions that our excellent science and engineering make possible, and to try to improve things.

The concern with Canada’s innovation performance is widely shared. Over the years, roundtables, think tanks, expert panels, committees, organizations, and institutions in the public and private sectors have studied, discussed, and debated various aspects of this problem, and proposed improvements and new strategies. In this chapter, we will look at a small sample of such studies, two

The Way Ahead

recent reports by the Canadian Manufacturers and Exporters, and by the Conference Board of Canada, as well as one not-so-recent one by the Ontario Premier's Council. We will conclude by comparing the Science and Technology Strategy recently published by the Government of Canada with earlier proposals.

CME 20/20

Canadian Manufacturers and Exporters (CME) is an association representing the interests of Canada's manufacturing industry in all sectors. In 2005, they published the results of a Canada-wide consultation called "20/20 Building Our Vision for the Future" (98 meetings across Canada with 2,500 manufacturers and stakeholders).¹ The consensus that emerged from this process was that "business as usual is not an option."

The 62 recommendations can also be interpreted as a list of the perceived needs of the established manufacturing industry in its current state. They are labeled "A Call to Action" and directed to ten target groups: "Canada's manufacturers"; "Workers and labour groups"; "Canada's school systems, colleges, universities, and training programs"; "Research centres and industrial assistance programs"; "Canada's business and financial services sector"; "Community leaders and economic development agencies"; "Local governments"; "Provincial governments"; "Canada's Federal Government"; and even "All Canadians," so nobody can feel left out. And for utter completeness' sake, the list also includes a commitment by CME itself to undertake 22 supportive actions. Manufacturing seems to be everybody's business.

The list of needs is long and comprehensive, and it's obvious that the CME consider all of them important. The calls to action are all imperatives, with most of the target groups being

Improving Things

told that they “must” or “have to” do something. However, there is no indication of how these things are to be done, what the costs might be, and who is expected to pay. Nevertheless, the call for better support of Canadian manufacturing is too important to be left just as an exhortation, so it is a good thing that among its own 22 commitments, the CME includes some follow-up actions.

For the purposes of this book, it is enlightening to go through the CME list of the 62 needed actions and note any references to “productivity” and “innovation.” There are surprisingly few direct ones, and the phrase “value-added” doesn’t appear at all. Here are the two statements I consider most revealing:

Canada’s manufacturers must:

Adopt Lean and other best practices to improve *productivity*, manage change, and sustain business growth;

Significantly increase investments in market-driven *innovation*, product design, engineering, and automation capabilities.

The introductory text about innovation is more informative. It underlines the gap between the perception of innovation by the manufacturing industry on the one hand, and how it is seen by the public sector and treated in public policy, on the other. To put it bluntly, and at the risk of some exaggeration, the manufacturing industry is interested only in sustaining innovation and improvements in the existing system; government and academia think only of disruptive innovation arising out of research. This gap may not be the major determinant of Canada’s poor innovation performance, but it surely doesn’t help to improve it.

The Way Ahead

This is how the CME makes its point²:

Innovation. Canadian manufacturers must be recognized as the benchmark of the world for innovation, flexibility, and continuous improvement. Innovation must be an integral part of business strategies aimed at managing change Innovation and continuous improvement must be priorities throughout manufacturers' supply chains.... Public support for innovation must be driven more by market opportunities for commercial application and less by research agendas or the goal of pushing technology into the marketplace. Research and development activities on the part of universities, colleges, and research centres must respond more effectively to the needs of manufacturers. Research centres must base their activities in areas of the country where they are closest to their industrial customers. And, stronger linkages are needed among manufacturers, universities, colleges and research centres.... Manufacturers need speedier and easier access to government support programs aimed at enhancing innovation, including the SR&ED tax credit system.... Finally, procurement by governments and public agencies must aim to promote the cost-effective development of new industrial technologies.

The contrast between these words and the "Porter Admonition" quoted in Chapter 5 is striking. What CME describes as a major thrust for the future, Porter describes as passé—the initial condition for change that competitive companies already take as a given.

But change must begin with the here and now. That means that the needs identified by the CME should be taken very seriously. And it turns out that the CME is not a lone voice.

Six quick hits for Canadian commercialization³

The Conference board of Canada (COBC) has long had an interest in the country's economic performance. An important

Improving Things

series of annual diagnostic reports entitled “Performance and Potential”⁴ has been identifying many aspects of the problem. A major, recent four-volume study under the title “The Canada Project—Mission Possible”⁵ has dealt exhaustively with many of the issues raised in this book. A recent study entitled “A Report Card on Canada”⁶ is another important source of relevant material.

“Six Quick Hits” describes six very specific changes that could improve Canada’s innovation performance in the short term. These are the recommendations of the “Leaders’ Roundtable on Commercialization,” a group of 47 senior people from government, business, and academia including myself in an earlier capacity. They are as follows:

- **Industry-led Collaborative Research Networks (ICRN):**
“The goal of this quick hit is to establish collaborative research networks that bring together suppliers, research labs and anchor businesses to improve the level of innovation in supply chains.” The idea makes eminent sense and is based on the Beacon Project initiated between General Motors of Canada and the universities—including, significantly, the new University of Ontario Institute of Technology (UOIT). That means that the lessons being learned in the Beacon Project are already available to guide the creation of other such networks. However, the language describing the ICRN is surprising for its total lack of reference to engineering. Design, development, and testing will undoubtedly prove to be important in the work of these networks, and engineers are the technical people leading those activities. It is my impression in reading many Canadian reports that they show a lack of understanding about what engineers do in the

The Way Ahead

economy. We can only hope that this lack is limited to the people who write the reports.

- **Regionally-based Commercialization Internships:** This proposal is intended to address the country's "*paucity of skilled and experienced entrepreneurs capable of transforming new ideas into products and services that customers want.*" The proposed remedy for this is to expand the existing and very successful activities of the WestLink Innovation Network. I believe that the need is serious, and that the proposal would work because WestLink has a proven approach.
- **Angel Tax Credits:** The goal of this proposal is to make it easier for entrepreneurs to find risk capital in Canada, particularly in amounts less than \$5 million. The mechanism is a tax credit for angel investors who would provide seed financing, as proposed by the National Angel Organization (NAO). This is a well-reasoned and compelling proposal because it can deal with two of the entrepreneur's most important needs at one time. "*The most effective source of seed financing is the individual who has invested before and understands the risks: the angel investor. The Canadian population of angels is very small—particularly when compared to that of the United States. We need to establish effective tax incentives that will attract more investors to the angel community. Entrepreneurs rely not only on angel investment—early-stage high-risk capital—but they rely also on the mentoring, knowledge and experience that angels bring with them.*" [emphasis in the original]
- **Pilot Program to Expand R&D Tax Credits:** The goal of this proposal is both clear and important: "... *a pilot program should be established to enhance the effectiveness of the Scientific*

Improving Things

Research and Experimental Development (SR&ED) tax credit by including corporate expenses related to the broader innovation process, not just to R&D.... The pilot program will test the expansion of the tax credit to include market assessment activities....” Obtaining market intelligence is the first such activity that comes to mind. Given the importance of speed in innovation, as already discussed in Chapter 5, market intelligence must not only be thorough but, to be useful, must also be kept up to date. While the network of Canadian trade and technology representatives in our embassies and consulates abroad can be helpful, detailed market intelligence associated with the possible introduction of new products is best left to companies, and money spent in obtaining it is an important part of the cost of commercialization. The SR&ED program is a known quantity, and the proposed pilot program could lead to an important improvement in its effectiveness.

- **Strategic Procurement:** This is a good proposal for good reasons. *“Governments and large businesses can drive commercialization through the purchase of leading-edge Canadian technologies.... Yet we seem to have lost the ability to use government expenditures as a way to help Canadian companies build the experience they need to become strong contenders in the global markets.”* It is not only embarrassing, but may be fatal in marketing new Canadian products abroad, if the Canadian vendors must admit that their own government and big businesses are not customers. At its best, strategic procurement by government exerts a market pull that can promote the development of new technologies in useful forms, and at the same time share the financial risks involved. This is not about “picking winners,” an expression

The Way Ahead

used too often with too little regard for its appropriateness. It is about encouraging Canadian industry to meet the needs of its government for goods and services with new products that would be better than anything available from anywhere else, and then encouraging them to sell those new products in global markets.

- **Federal Seed Capital Investment:** This quick hit proposal differs from the others, in that it deals with more effective management of funds already committed. The Government of Canada had committed seed capital funds to be managed through the Business Development Bank of Canada (BDC). In the words of the proposal, the quick hit is that “*These funds should be used to lever private funds and attract **experienced** venture capitalists who can provide financing, insight and mentoring to Canadian businesses*” [emphasis in the original]. While the language of this recommendation is not direct, it is clear that as of the time of writing the quick hits (April 2005), the BDC had not moved as far as hoped in leveraging the federal government’s money, and the Roundtable was prepared to offer its help to both the government and BDC to speed things up. At the time of this writing (August 2007), it is difficult to find the numbers to judge progress, but an important condition for success is in place. The website of BDC shows that Technology Seed Investments, a dedicated business unit founded in 2002 and referred to in the quick hit proposal, has a management team of nine executives with impressive educational credentials and relevant business experience.

It is clear that quick hits 1, 4, and 5 echo the call of the CME. The remainder, 2, 3, and 6 deal with starting new ventures. But there’s nothing new under the sun ...

The Ontario Premier's Council

The Ontario Premier's Council was a multi-sector advisory body set up by Premier David Peterson in 1986 to "*steer Ontario into the forefront of economic leadership and technological innovation.*" There were 22 members from business, labour, and the universities, as well as six Cabinet ministers. The Chair was the Premier himself, and the secretary was the Deputy Minister of Industry, Trade, and Technology. The Council's first report came out in 1988.⁷

The objectives of the Council are worth stating in full because they are just as important and current today as they were 20 years ago.

Ontario should:

- Encourage all industries to move to competitive higher value-added per employee activities which can contribute to greater provincial wealth.
- Focus industrial assistance efforts on businesses and industries in internationally traded sectors.
- Emphasize the growth of major indigenous Ontario companies of world scale in those traded sectors.
- Create an entrepreneurial, risk-taking culture that fosters an above-average number of successful start-ups in internationally traded sectors.
- Build a strong science and technology infrastructure which can support the technological needs of our industries.
- Improve the education, training, and labour adjustment infrastructure to levels adequate to sustain the province's industrial competitiveness and help workers weather the technological change and adjustment necessary to move to higher value-added per employee activities.

The Way Ahead

- Follow a consensus approach, like that embodied in the Premier's Council, in the creation of both economic strategies and specific programs and in the mobilization of public support for the new directions.

Twenty years later, these are still pressing objectives.

Fourteen recommendations for follow-up actions were developed by the Council. Five of them were financial, recommending the creation of new incentives for: recapitalization of Ontario companies in traded sectors; increasing R&D expenses; risk sharing in new projects; early-stage VC investments; and IPO. Five dealt with various people issues: worker adjustment; worker ownership; technical personnel assistance for SMEs; education, training, and labour market policies; and excellence awards to individuals. One dealt with industrial restructuring in the traded sectors, one with redirecting government research to industry, and one with setting up a program for strategic procurement. Again!

The remaining recommendation to refocus the Ontario Development Corporations (regional development agencies) is reproduced below since it captures several themes that many might consider as national priorities today.

The Government should accelerate the refocusing of the Ontario Development Corporations according to the competitive priorities identified in this report. Specifically, this will require adjusting the ODCs' own priorities to:

- Provide assistance only to businesses in manufacturing and tradable services sectors.
- Build an active relationship with successful middle-sized companies and assist these firms to make the leap into world export markets.

Improving Things

- Improve ODC response times for reviewing and processing applications to match the best industry standards.
- Assist the development of Ontario's high growth industries by providing needed funds for prototype development and marketing as opposed to emphasizing fixed asset lending.
- Orient all assistance to encourage companies to move to higher-value-added products.
- Emphasize these strategic priorities even when pursuing regional development objectives.

A second report, "People And Skills in the New Global Economy,"⁸ dealt with education for the new millennium, the deficit in worker training, and adjusting to change. It included 32 recommendations. As it happened, however, the Peterson Government was defeated in an early election, and the recommendations in the two reports were not implemented.

We now turn to Canada's recently published science and technology strategy to see what improvements are recommended there and how they compare with the three sets of proposals that we've just looked at.

The new federal S&T strategy

In May 2007, the Government of Canada published the S&T strategy⁹ that had already been foreshadowed in an earlier economic plan¹⁰ and reinforced in the most recent budget.¹¹

My own reading of the main message behind the strategy is something like this: "Canadian university research has been raised to world class in many important areas, and we will invest to keep it there. But the country's economic performance is lagging because of weaknesses in commercialization by the private sector, and we will work with them to improve that."

The Way Ahead

The strategy is framed by three advantages: in knowledge, in people, and in entrepreneurship. The actions planned to achieve each of them are expressed as policy commitments. Some are quite specific as to how and when they will be funded and implemented; others are stated in general terms. Here is a list, in my own words, of those commitments that deal with some of the issues identified in the other reports discussed earlier in this chapter.

Focusing only on the entrepreneurial advantage, the government commitments are to:

- Make tax changes to help manufacturers invest in machinery and equipment;
- Improve the SR&ED tax credit program, including its administration;
- Create business-led research networks;
- Stimulate the supply of venture capital;
- Create new Centres of Excellence in Commercialization and Research;
- Fund community colleges to help small local businesses with technology.

But there is no mention of strategic procurement, even though the need for it has been identified by the three groups discussed above and many others as well.

The new program of Centres of Excellence in Commercialization and Research is important because it reveals a new approach. At one time, it seemed that government thought that the way to improve Canada's innovation performance was to make researchers into entrepreneurs. That would be resisted by most researchers, and it wouldn't work anyway, except for those few researchers who already happen to be natural entrepreneurs. The new program suggests that government now recognizes that

Improving Things

commercialization of inventions arising from research can't be an afterthought. It requires expert knowledge and skills just as research does, but of a totally different kind. The researchers need to become the best researchers they can be, just as the entrepreneurs need to become the best at what they do. Working together, they have a better chance to create innovations from inventions based on research results. I believe that these innovations are more likely to be important if the research is in strategically important fields in the first place, and I see the new Centres as the place where researchers and entrepreneurs can learn to work together in precisely this fashion.

My final point deals with the policy commitment on managing the federal government's activities in science and technology. A new Science, Technology, and Innovation Council (STIC) is being created to advise the government on policy issues in S&T and to produce reports on Canada's performance. This new Council will report to the Minister of Industry. It replaces three earlier advisory bodies, one on S&T in general (ACST), one on the government's own science (CSTA), and one on biotechnology specifically (CBAC). I have great hopes for STIC. Its mandate is compelling, it has been given a strong chair¹² and its membership is impressive. But my expectations are less sanguine, because structurally STIC is the same as its predecessors, a body that produces advice to one minister, through one department, an arrangement that doesn't have a great record of making the advice influential. This issue is raised again in the final chapter of this book.

Last thoughts on improving things

We have seen in this chapter that over the years many committees, study groups, expert panels, roundtables, etc., have studied the challenges of improving Canada's innovation performance

The Way Ahead

and made recommendations on how to meet them. They have studied the issues in depth and proposed new programs, better incentives, changes in taxation, etc. Their recommendations have much in common; many of them deal similarly with the same issues. But another thing they have in common—unfortunately—is that few of them have been acted on.

But even if they had been acted on, would such proposals be enough to make our prosperity sustainable for the future? Probably not. Most of the recommendations call for quantitative change to the status quo: lower the rate of this, increase the rate of that, expand the scope of something else, do some more of this and a bit less of that, etc. In effect, they propose some fine tuning of the current system. But our future will be qualitatively different from our present in many ways. And preparing for it must go far beyond improving what we do today. To do things very differently, and to do very different things, is difficult. It requires leadership and it requires learning.

We look at preparing for the future in the next, and last, chapter.

NOTES:

- 1 Canadian Manufacturers and Exporters, “20/20 Building Our Vision for the Future,” a series of reports published by the CME with individual titles, including: “the Importance of Manufacturing in Canada” (2004); “Manufacturing Challenges in Canada” (2004); “The future of manufacturing in Canada—Perspectives and Recommendations on Workforce Capabilities” (2005); and “The Future of manufacturing in Canada—Executive Overview” (2005); no ISBN

Improving Things

numbers assigned, information available on the Internet at www.cme-mec.ca.

- 2 CME 20/20 Executive Overview, page 10.
- 3 “Six Quick Hits for Canadian Commercialization,” The Conference Board of Canada, April 2005, ISBN 0-88763-680-02.
- 4 For example, “The World and Canada—Trends Reshaping Our Future,” Performance and Potential 2005-06, The Conference Board of Canada, 2005, 183 pages, ISBN 0-88763-702-7.
- 5 “The Canada Project, Mission Possible,” Volume I: “Stellar Canadian Performance in the Global Economy” (126 pages); Volume II: “A Canadian Resource Strategy for the Boom and Beyond” (132 pages); Volume III: “Successful Canadian Cities” (121 pages); Volume IV: “Executive Summary—Sustainable Prosperity for Canada” (59 pages), COBC 2007, ISBN 0-88763-737-X, -737-8, -739-6, and 746-9.
- 6 “How Canada Performs—A Report Card on Canada,” COBC Report June 2007, 149 pages, ISBN 0-88763-779-5.
- 7 “Competing in the New Global Economy,” Report of the Premier’s Council, Volume 1, 249 pages, Queen’s Printer for Ontario, 1988, ISBN 0-7729-4062-2.
- 8 “People and Skills in the New Global Economy,” Report of the Premier’s Council, 237 pages, Queen’s Printer for Ontario, 1990, ISBN 0-7729-7320-2.
- 9 “Mobilizing Science and Technology to Canada’s Advantage,” Industry Canada 2007, 103 pages, ISBN 0-978-0-662-45155-6.
- 10 “Advantage Canada,” 2006.
- 11 “Aspire to a Stronger, Safer, Better Canada,” The Budget Plan 2007, Canada Department of Finance, March 19, 2007, 477 pages, ISBN 978-0-660-19711-1.

The Way Ahead

- 12 Professor Howard Alper of the University of Ottawa, an outstanding chemist and research administrator, and the inaugural winner of the Gerhard Herzberg Canada Gold Medal in Science and Engineering from NSERC, the country's top award for a research career characterized by both excellence and influence.