



Advisory Council  
on Science and  
Technology

Conseil consultatif  
des sciences et de  
la technologie

# Stepping Up

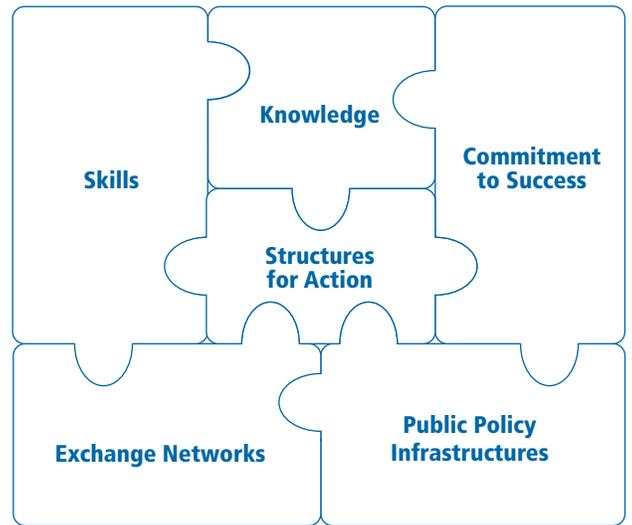
## Executive Summary

---

Report of the Expert Panel on Skills

# Executive Summary

**F**or industry sectors, regions and entire countries to succeed in the knowledge-based economy, skills are vitally important. But the recipe for success is complex. The following elements are essential: creating and applying new knowledge and technology; building networks to disseminate ideas and information, and connect people and communities; and adopting appropriate public policies. Moreover, the key players in the economy must have a strong will to succeed and build the structures needed to transform collective will into concrete action. Every one of these ingredients must be present to ensure success.



Our report's analysis and recommendations, therefore, cover all of the basic ingredients: from education and training systems, to attitudes toward success and failure, to immigration, labour market information, capacity for research and development, and the country's digital infrastructure. We also propose new decision-making structures to help Canada and Canadians chart the most prosperous route into the knowledge economy.

## Mandate and Approach

The Expert Panel on Skills was appointed to examine the skills picture in five strategic industry sectors: aerospace, automotive, biotechnologies, environmental technologies, and information and communications technologies. We were asked to identify current or potential skill shortages and suggest ways of ensuring that firms in these industries have access to the skills that they need to compete in the global, knowledge-based economy. The Panel was also asked to assess whether or not Canada's labour market monitoring systems are providing the information that individuals, employers, governments, and education and training providers need in order to plan effectively for the future.

We based our sector-specific conclusions in this report on commissioned research and on discussions and detailed interviews with senior corporate executives and industry observers. Our recommendations also stem from enquiries made into

broader labour market issues, through an extensive research program, expert seminars and workshops held across the country, and through open dialogue with interested Canadians via the Internet. Another very valuable information source was a fact-finding survey of national and regional approaches to skills and enterprise development in the United Kingdom and Ireland.

The action steps we propose are directed not only toward the five strategic industry sectors, but also to all stakeholders in the Canadian economy in general. The recommendations also extend well beyond Canada's skills development and learning systems. This is a reflection of our belief that an adequate supply of skills is but one of several interrelated and essential ingredients for growth and wealth creation in the knowledge economy.

## Main Findings

### Is There a Skill Shortage?

In the five industry sectors examined, we found no current evidence of a generalized and persistent shortage of *technical skills*. On the whole, Canada's education and training providers and immigration system appear to be keeping up with the demands of Canadian employers for technically skilled people. Indeed, in some highly specialized and advanced fields of study, Canadian universities are producing more graduates than Canadian firms currently can absorb.

We note, nevertheless, that in all five sectors, some firms are already incurring difficulties recruiting and retaining the technically skilled workers they need in a number of niche areas. These challenges will grow and become more generalized in the coming years. In the automotive and aerospace sectors, for example, a wave of retirement among skilled tradespeople will strain supply channels over the next decade. In other sectors, due to rapid growth or the requirement for extremely specialized skills, some firms may find it very difficult to fill positions with fully qualified people. However, based on reports from industry executives, at the moment most firms are coping adequately with these difficulties, which are not inconsistent with the normal ebb and flow of dynamic labour markets.

In sharp contrast with the technical skills picture, but equally critical to the competitive success of Canadian industry, is a persistent shortage of people who combine strong technical abilities with *essential skills* (e.g. communications and teamwork) and *management skills* (e.g. cost control and budgeting). In all five sectors, executives reported that finding technically competent people who can work in teams, communicate effectively and apply their technical knowledge to real world business problems, is a significant challenge.

Most employers expect, and by and large find, that recent post-secondary graduates are technically competent. They believe, however, that young people will only acquire the "softer" management and essential skills through progressive work

experience. This finding provides some explanation for the seemingly contradictory situation in which employers complain of skill shortages while many young post-secondary graduates have trouble finding their feet in the job market. We believe this finding holds important implications for Canada's primary and secondary schools as well as for the post-secondary education system. It strongly suggests the need to revisit both what and how young people are taught and whether or not schools and businesses could prepare them better for the world of work.

## Dealing with Issues of Scale

The vast majority of firms in the five sectors studied fall into the category of small and medium-sized enterprises (SMEs). Many face problems in areas such as recruitment, retention and skill development, access to capital, technology transfer, commercialization of research and development (R&D), and export marketing. Often these difficulties are the direct consequence of their small size and limited financial and management resources.

These problems are not new. For decades, governments in Canada and elsewhere have developed policies and programs to help SMEs overcome the disadvantages of smallness. We believe there is an important role for governments in this area. Programs observed in Ireland and the United Kingdom were particularly impressive. By reinforcing capacity, these programs provide small firms with the means to upgrade different types of skills in their existing work force and to hire highly educated, but inexperienced, university graduates whose knowledge and skills will help them to innovate and grow over the long term.

At the same time, in four of the five sectors studied, the work of organizations known generically as industry sector councils was impressive. Companies have formed sector councils, in most cases with government assistance, to provide members with sophisticated human resource management programs and services that few firms could afford to develop on their own. We believe that sector councils hold enormous potential to address human resource and other management challenges, such as pre-competitive research, the commercialization of R&D, and export marketing, in all industry sectors dominated by small firms.

## The Supply of Labour Market Information

Individuals and organizations need accurate, timely information on trends and conditions in the labour market to make sound career and learning choices, and investment decisions. From discussions held with leading authorities, it can be concluded that Canada's labour market monitoring systems, although among the best in the world, will have to improve in order to keep pace with economic and technological change. In particular, the basis for data collection must shift away from occupational titles and focus more specifically on the skill sets actually required for any given – often rapidly changing – occupation. Equally important will be enhancing Canada's capacity to analyse labour market information and put it to use.

## A Skills Development System Under Stress

Although we found no evidence of a current shortage of technical skills, we cannot afford to be complacent. The pressures of economic, technological and scientific change, combined with an ageing work force, and intensifying global competition for skilled people, will soon strain our skills development system to the limit. Indeed, the signs are already present.

A persistent and generalized shortage of management and essential skills among technically trained high-school and post-secondary graduates has already been noted. In several occupations, the demand for skilled tradespeople will soon outstrip supply. Demographic trends also raise alarm bells related to the skills of both entering and exiting workers. With a relatively smaller youth cohort reaching working age over the coming decade, we must ensure they are not only technically competent, but also adequately prepared for the world of work. This will not be achievable unless targeted changes are made to the funding of our education and training institutions. For the existing work force, new methods and initiatives are required to assure continuous upgrading.

The loss of some highly skilled people to the United States is also a concern, particularly in the information and communications technology sector. Although we believe this situation remains well short of crisis proportion, the “brain drain” draws attention to a very perplexing challenge. We not only have to ensure that Canadian firms have access to the higher-order skills that the knowledge-based economy demands. We must also ensure that highly skilled and educated Canadians have the opportunity to put their skills to work in Canada.

## Understanding the New Economy

As Canada makes the transition from the industrial to the Information Age, our stock of skills and capacity to develop skills will shape our economic prospects. But skills alone will not guarantee success. In addition to a strong skills development and learning system, we will also require the following:

- systems and processes such as R&D to create knowledge, put new knowledge to use through innovation and technology transfer, and translate new knowledge into commercial products;
- exchange networks to carry goods and services and, increasingly, information and ideas across the country and around the world;
- public policies to encourage wealth creation, sustain our social values and support public information systems that can help individuals, families, governments, and education and training providers to plan effectively;
- a broadly shared commitment to success, coupled with a willingness to set collective goals and work together toward them; and
- decision-making structures that cross traditional public and private sector boundaries and allow all of the players in the economy to pursue both individual and collective goals.

To compete and win in the knowledge-based, global economy, individuals, families, governments, private industry, education and training providers, and others must accept responsibility for ensuring that all of these interrelated elements are in place.

## Recommendations

The Panel's recommendations reflect our belief that, in the knowledge-based economy, much like in a healthy ecological system, all of the elements necessary for success must be present for countries and regions to prosper and grow. In order to achieve these winning conditions in Canada, **the Panel calls for specific actions to address six main challenges.**

### Public Policy Infrastructures

#### **The challenge: labour markets are increasingly complex and dynamic**

Individuals, employers, education and training providers, and other stakeholders require help to cope with the growing complexity and increasing pace of change in labour markets. By taking steps to meet their needs, we can improve the performance of our labour markets and hence, our economy.

### Recommended Actions

#### **To strengthen our capacity to understand labour markets, by**

- identifying and documenting the skills required in science and technology occupations;
- encouraging stakeholders to adopt standard definitions, measurements and terminology in relation to skills;
- creating a new federal/provincial/territorial Labour Market Research Fund; and
- providing additional funding to the Social Sciences and Humanities Research Council for graduate training and targeted research on labour market issues.

#### **To make better use of labour market information, by**

- creating a Centre for Labour Market Statistics at Statistics Canada, under federal/provincial/territorial direction;
- engaging employers, unions and sector councils in the collection and dissemination of sector-specific labour market information; and
- establishing competency standards for career and employment counsellors.

**To overcome barriers to labour mobility within Canada, by**

- sustaining and further developing Prior Learning Assessment and Recognition (PLAR) expertise and services; and
- ensuring the full implementation of the mobility provisions of the Agreement on Internal Trade by July 1, 2001.

**To improve Canada's ability to compete for highly skilled workers from abroad, by**

- involving employers in the selection of skilled immigrants;
- making it easier for Canadian universities and colleges to recruit highly talented foreigners to faculty positions;
- making it easier for foreign nationals studying in Canada to become permanent residents;
- requiring professional regulatory bodies to “fast track” the accreditation of immigrants in regulated occupations; and
- making Prior Learning Assessment and Recognition (PLAR) part of the review process for skilled workers applying to immigrate to Canada.

## Knowledge

**The challenge: skilled Canadians are facing a shortage of opportunities**

Canadian post-secondary institutions produce some of the most talented and sought-after graduates in the world. Unfortunately, many firms, especially SMEs, have difficulty absorbing highly educated graduates, particularly in science and technology. In addition, our investments in R&D remain small compared with most other G7 nations. As a result of these factors, there is a shortage of opportunities in Canada, which is leading some of our most highly qualified people to seek employment elsewhere.

By taking steps to expand investments in basic and applied research, by directing part of these investments toward the most promising fields, and by helping knowledge-intensive SMEs to grow, we will create new opportunities, reverse the “job drain” and allow highly skilled Canadians to apply their talents at home.

## Recommended Actions

**To boost the capacity of our universities and colleges to do high quality basic and applied research, by**

- allowing federal granting councils to underwrite not only the direct, but also the indirect costs of the research that they support.

**To improve the return on public and private sector investments in science and technology, by**

- creating a process through which our best science and business minds can project current science and technology trends into the future and identify high-return areas for current and future investments in research and development (R&D).

**To stimulate growth among small knowledge-intensive firms, by**

- establishing up to 20 “enterprise incubators” on university and college campuses across Canada, particularly outside of major metropolitan areas, to provide a full range of scientific, technological and management services to small knowledge-intensive firms, particularly in the startup phase; and
- establishing a program to help knowledge-intensive small and medium-size enterprises (SMEs) absorb recent graduates in science and technology while helping participants to acquire business management skills.

## Skills

**The challenge: our learning systems are under growing stress**

There is no evidence of a generalized shortage of technical skills in Canada at this time, although shortages do exist in specific sub-sectors of industry. On the other hand, our education and training systems are showing unmistakable signs of stress. Many high-school, college and university graduates lack the essential skills and management skills that most employers seek. The current intake of our apprenticeship programs will not be adequate to counterbalance a wave of retirement among skilled tradespeople over the coming decade. Moreover, a decade of budget restrictions has significantly weakened our college and university establishments. Although there is much talk about the importance of lifelong learning, we are in fact only beginning to put theory into action.

To succeed in the knowledge-based economy, relieving these points of stress and modernizing our formal and informal learning systems are clear priorities.

## Recommended Actions

**To ensure that young people have a solid foundation for future learning and acquire all of the skills they will need to succeed in the knowledge-based economy, by**

- improving the learning environment for young children;
- making “work studies” and other experience-with-work programs more widely available at the elementary and secondary school levels;

- monitoring the acquisition of essential skills by elementary, secondary and post-secondary students
- ensuring that teachers are well equipped to deliver essential skills education;
- building stronger linkages between schools and the world of work;
- ensuring that there is a sufficient pool of qualified teachers of mathematics, science and technology at elementary and secondary levels; and
- attracting more young people to apprenticeship programs.

**To improve the capacity of post-secondary institutions to meet the skill needs of students and employers, by**

- increasing operating funding to post-secondary institutions to restore deteriorated facilities and equipment and to address strategic priorities;
- improving the recruitment of students and their retention through to graduation in science and technology programs, and enhancing the resources available to these programs;
- developing appropriate planning tools to help avoid an under-supply of university and college professors for the next decade and beyond;
- building stronger links between post-secondary institutions and employers; and
- improving the tax treatment of real property and stock donations to the capital campaigns of universities and colleges, and addressing regional biases in corporate and personal contributions.

**To improve our capacity to upgrade the skills of the existing work force and make lifelong learning accessible to all Canadians, by**

- making lifelong learning a national priority and ensuring that all policies related to education and training support that objective;
- helping employers, particularly SMEs, to upgrade the skills of their employees and managers;
- making Canada a world leader in the development and use of learnware and other new learning technologies; and
- helping Aboriginal communities address their special learning and skills development needs, particularly with respect to the knowledge-intensive areas of the economy.

## Exchange Networks

**The challenge: there is a risk of a widening gap between the “information-rich” and the “information-poor”**

Much of Canada’s social and economic success in the latter half of the 20th century has been due to an accessible primary, secondary and post-secondary public education system. As we move into the 21st century, we must ensure that all Canadians have access to the lifelong learning opportunities made possible through Information Technology. Making high-speed Internet connections widely available will open up huge learning opportunities for all Canadians. It will also create the opportunity for Canada to become a world leader in systems and applications for connectivity, Internet-based learning and electronic commerce.

## Recommended Actions

**To make Canada “first in the world” in connectivity and on-line learning, by**

- engaging the private and public sectors in providing affordable, high-speed Internet access to every home, school and business in Canada; and
- making learning opportunities more broadly available, particularly to rural and northern residents by transforming Community Access Program sites into true learning centres.

## Commitment to Success

**The challenge: attitudes toward entrepreneurship, risk taking and success are not changing fast enough**

As a result of globalization and rapid technological change, markets are placing a growing premium on innovation, entrepreneurship and risk taking. By and large, however, these are not the characteristics commonly associated with Canadians. Instead, we see ourselves, as do others, as being more concerned with fairness and equity than competitiveness and wealth creation. In fact, too many Canadians view these value sets as mutually exclusive. To prosper in the knowledge-based economy, we must learn to recognize that “being successful” and “being fair” are not incompatible. We must change our thinking about risk and innovation in order to create wealth and protect the values that we hold dear.

## Recommended Actions

### **To encourage the development of a more innovative and entrepreneurial culture, by**

- familiarizing young people with the basic concepts of risk management, innovation and entrepreneurship over the course of their elementary, secondary and post-secondary education;
- articulating a national vision that demonstrates the compatibility of risk, wealth creation and competitiveness with the values of fairness and equity; and
- celebrating the achievements of risk takers, innovators and entrepreneurs.

## New Structures for Action

### **The challenge: our machinery for making decisions and taking action about skills and enterprise development is inadequate**

For a country to prosper in the new economy, it must have decision-making structures through which all stakeholders can accept responsibility and work together as required to create the conditions necessary for growth and wealth creation. In particular, there is a need for decision-making structures that can integrate our national skills and enterprise development agendas. This reflects the necessity not only to improve our capacity to generate high-order skills, but also our capacity to deploy those skills among growing enterprises within our own borders. Many decision-making structures designed for the industrial age are simply not suited to the pace and complexity of the Information Age.

New structures are required that both respect market forces and our democratic institutions, and provide the means for making country-level decisions quickly and effectively on issues connected with skills and enterprise development.

## Recommended Actions

### **To create decision-making structures suited to the knowledge-based economy, by**

- establishing “Enterprise Canada”, a federally funded, private sector-led executive agency that will operate at arm’s length from government and work at the national, regional and local levels to integrate skills and enterprise development strategies.

### **To keep the skills and enterprise development priorities front and centre on the agenda of Canadians and their governments, by**

- appointing an “Ambassador for Skilled Enterprise” for a defined term, to monitor and report on the response of all stakeholders to the conclusions and recommendations contained in this report.