

Québec focus on jobs

Shaping an innovative economy

Research, Science and Technology

*Accelerating Research
and Innovation*

Foreword

by the Minister responsible for
Research, Science and Technology

March 1999

Madam,
Sir,

The Québec government has decided launch a major initiative with respect to research, science, technology and innovation in order to ensure the prosperity and the quality of life of Quebecers, particularly young people, through Québec's solid positioning in the new economy.

*University and public research institutions and innovative enterprises are at the heart of a series of measures presented in **Accelerating Research and Innovation**, which reviews all of the measures put forward by government departments within an integrated framework.*

I am especially proud to present Innovation Québec and Valorisation-Recherche Québec, two new bodies that will contribute to the realization of the mandate of the ministère de la Recherche, de la Science et de la Technologie, whose establishment will be proposed to the National Assembly.

The measures in this paper will be an integral part of the scientific policy to be elaborated with all research and innovation partners in 1999.

I would like to thank everyone who contributed to the preparation of this paper, in particular the team from the ministère des Finances.



Jean Rochon
Minister responsible for Research,
Science and Technology

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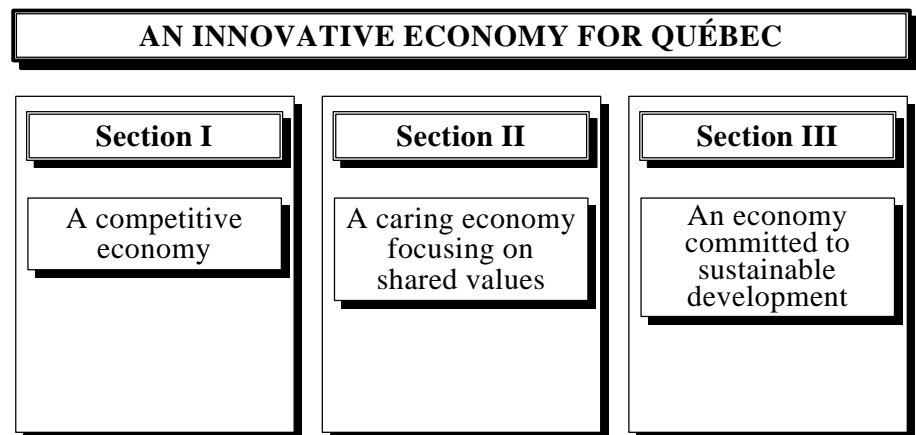
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***ACCELERATING
RESEARCH AND
INNOVATION***

Introduction

INTRODUCTION

Accelerating Research and Innovation is part of *Focus on Jobs*, the economic development strategy tabled in March 1998, which seeks to make Québec an avant-garde economy and create jobs. The development of the knowledge-based economy, research and innovation centre on issues that relate to each of the three sections of the strategy.



Research and innovation are essential for the development of a competitive economy that relies on knowledge and that is capable of outstripping competing economies and therefore ensuring the availability of quality jobs. Innovative enterprises play a key role in this process. In a market economy such as that found in Québec, enterprises must innovate or disappear: it is through such firms that technological development and innovation revitalize the economy. In Québec, as elsewhere, innovative enterprises have always developed more rapidly than other enterprises. In recent years, as previously, they have created more jobs than other enterprises.

To create more jobs and ensure Quebecers' well-being also means ensuring the development of a caring economy focusing on shared values that allows as many people as possible to participate in the labour market and derive the maximum benefit from it. To this end, it is essential to offer young people quality training that satisfies their aspirations and allows them to quickly, successfully enter all sectors of the Québec economy.

It is the enterprises of tomorrow that will provide economic leadership in Québec. However, it is the young people of today who will create and develop them through their vitality and know-how. To rely on innovation is to help equip the future generations with a creative,

dynamic environment and the resources that will enable them to sustain their own development.

If innovation is, first and foremost, of concern to enterprises, the government also has responsibilities with respect to this key factor of competitiveness. It plays an essential role, especially in maintaining a dynamic research pool and in developing communications and partnership networks involving various stakeholders in the process of innovation.

Among the leading stakeholders, the universities assume a vital role in the development of the scientific research base by contributing actively to the training of the upcoming generation of scientists, the production of new knowledge and the adaptation of such knowledge to the needs of Québec society. In Québec, in particular, university research is an essential source of innovation.

On December 15, 1998, Prime Minister Lucien Bouchard assigned to the Minister responsible for Research, Science and Technology the mandate to define a research, science, technology and innovation policy to make Québec a world hub of innovation. This policy will be elaborated in the coming months in consultation with the universities and industry.

However, the government intends to take concrete steps immediately in priority sectors to ensure that the ability of the Québec economy to engage in research and innovation is constantly bolstered. ***Accelerating Research and Innovation*** presents these initiatives, based, among other things, on the deliberations of the Conseil de la science et de la technologie in recent years and on work carried out by various government departments and organizations.

1 Innovation: a key issue

1 INNOVATION: A KEY ISSUE

1.1 Innovation and job creation

In an economy that must satisfy constantly changing needs in respect of increasingly specific clienteles, innovation appears to be a decisive factor of competitiveness and the survival of an enterprise.

INNOVATION

Technological innovation covers new products and processes and significant technological modifications of products and processes. An innovation has been achieved as soon as it is introduced on the market (product innovation) or used in a production process (process innovation). Innovation relies on a wide array of scientific, technological, organizational, financial and commercial activities.

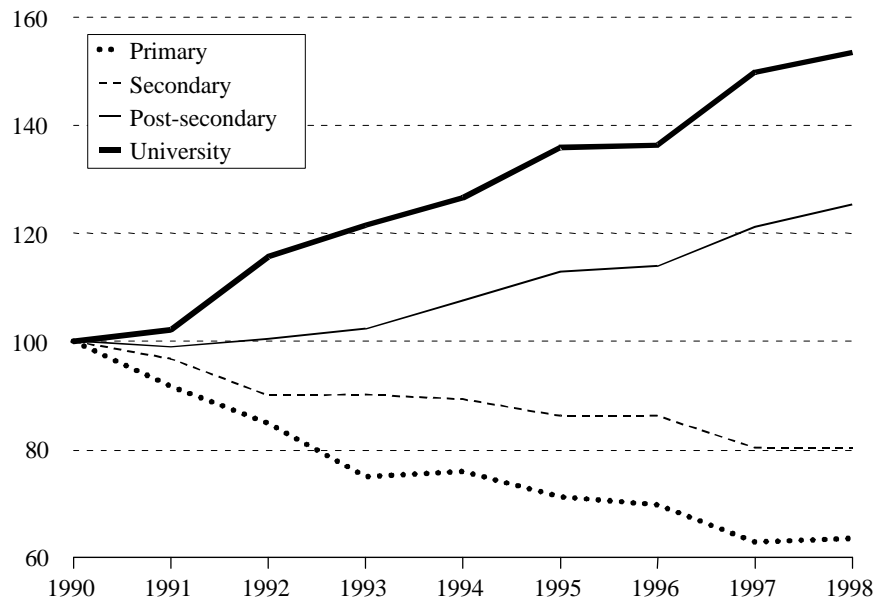
Source: OECD, Définitions et convention de base pour la mesure de la recherche et du développement expérimental (R-D), Coll. Documents de travail de l'OCDE, Vol. 11, n° 49, Paris 1994.

*Innovation, the key
to competitiveness*

An enterprise's success depends on its ability to quickly adapt its products and services to the needs of its customers and to integrate the methods and processes needed to produce them. The enterprise's ability to innovate is a basic condition for profitability and determines its ability to face competition and create jobs.

The role of innovation in the economy has grown in recent years, as witnessed by the rapid growth in public and private investment in R&D, worker training, and intangible assets such as patents. New products, production methods and ways of doing things are constantly changing the hiring requirements of enterprises in favour of more qualified, better-educated employees, to the detriment of those who are less qualified and educated.

CHART 1
EMPLOYMENT BY LEVEL OF EDUCATION
1990 TO 1998
(Index, 1990 = 100)



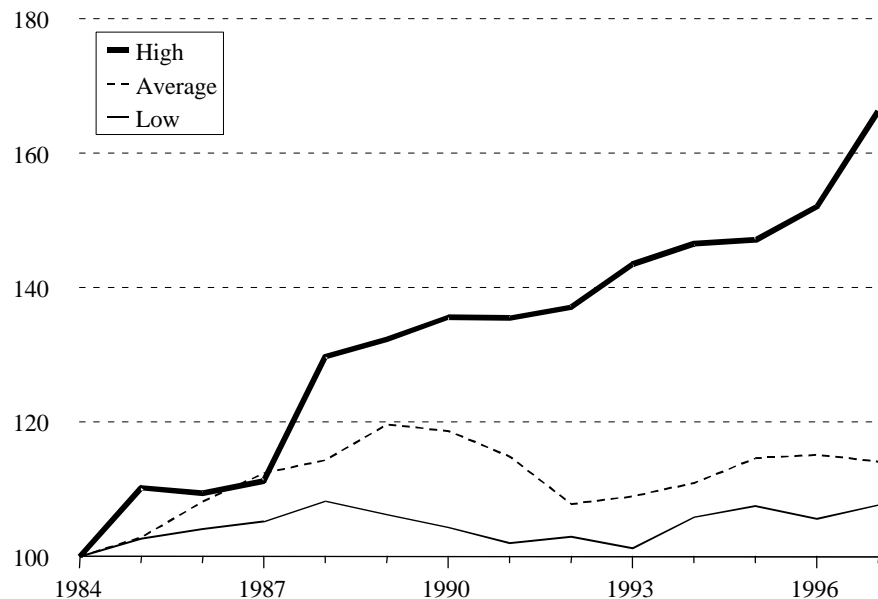
Source: Statistics Canada, *Labour Force Historical Review*, 1998.

The knowledge-based economy creates jobs

Industries that rely heavily on knowledge, i.e. that seek highly qualified workers, use advanced technological processes and invest heavily in their knowledge base, are also those that create the most jobs.

Between 1984 and 1997 in Québec, employment rose 66% in these industries, performance that was markedly higher than growth of 14% and 8% recorded by industries that make medium and limited use of knowledge.

CHART 2
**GROWTH IN EMPLOYMENT BY LEVEL OF
 KNOWLEDGE IN INDUSTRY – 1984 TO 1997**
 (Index, 1984 = 100)



Source: Ministère de l'Industrie, du Commerce, de la Science et de la Technologie, *L'économie du savoir 1984-1997*, November 1998.

*Most industrialized nations
 have adopted integrated
 innovation support strategies*

Québec is not alone in this respect, as the same situation has been noted in all industrialized countries.¹ For this reason, most of these countries have adopted integrated strategies designed to support the development of innovation in the economy in order to increase wealth and favour job creation.

1.2 Longstanding government support

The Québec government has been concerned with the development of science and technology since the early 1970s. It took its first initiatives in this realm in 1971 (departmental committee, Conseil de la politique scientifique, policy statements). These initiatives were intended to foster innovation through the financing of infrastructure and research. During the 1970s, the Québec government set up a number of research laboratories.

However, it was not until 1980 that the government formulated a genuinely comprehensive policy on scientific and technological

¹ OECD, *The OECD Jobs Study: Evidence and Explanation*, 1994.

development, presented in the white paper entitled *Un projet collectif*, the outcome of an extensive consultation initiated the preceding year with the green paper *Pour une politique québécoise de la recherche scientifique*. This policy was rounded out with the publication in 1982 of the policy statement entitled *The Technology Conversion*.

These policies respecting science and technology attached greater importance to the dissemination of technology in enterprises, support for scientific research, the circulation of information, and keeping up with technological innovations. The policies resulted in:

- the establishment of several funding agencies to support the development of a dynamic research base: the Fonds pour la formation de chercheurs et l'aide à la recherche (Fonds FCAR), the Fonds de la recherche en santé du Québec (FRSQ) and the Conseil québécois de la recherche sociale (CQRS);
- the development of an approach centred on cooperation between key players in the realm of innovation, especially enterprises and the universities, which led to the establishment, for example, of the Centres de liaison et de transfert (CLTs) and Centres collégiaux de transfert de technologie (CCTTs).

*The importance of
Québec enterprises in
the innovation process*

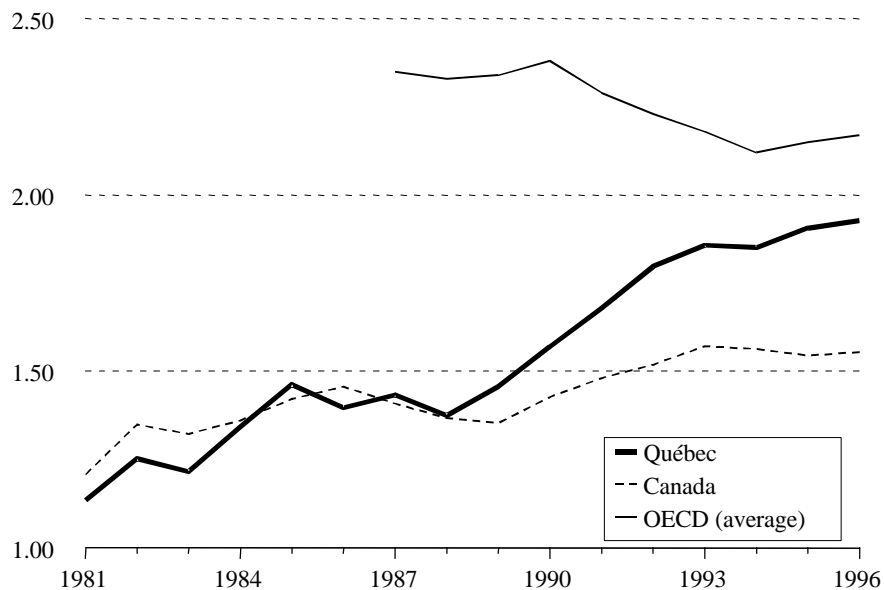
In 1988, the consultation paper *La maîtrise de notre avenir technologique* confirmed the importance of Québec enterprises in the innovation process.

More recently, the government has intervened to support innovation by:

- creating the Innovatech corporations, which are responsible for promoting and supporting technological innovation projects in their respective territories;
- adopting a series of measures to foster the development of new information technologies, especially the multimedia industry.

The acknowledgement of the importance of the role that innovation plays in enterprises, particularly in the wake of the policy statement *The Technology Conversion* published in 1982, led the Québec government to adopt a tax system favourable to enterprises conducting R&D. The system has been enhanced and adapted several times and has enabled Québec to surpass Canada from the standpoint of R&D as a percentage of GDP and to fill most of the gap separating it from the OECD countries.

CHART 3
R&D EXPENDITURE – QUÉBEC, CANADA AND THE OECD COUNTRIES
1981 TO 1996
 (as a percentage of GDP)



Sources: OECD, *Main Science and Technology Indicators*; Statistics Canada, *Estimates of Canadian Research and Development Expenditures (GERD)*, Service Bulletin Science Statistics; *National Income and Expenditure Accounts*; and Bureau de la statistique du Québec, *Comptes économiques du Québec*.

1.3 A key component of the *Focus on Jobs* strategy

For nearly 30 years, various means have been implemented to foster innovation and noteworthy progress has been made. Québec must now revise its overall strategy with respect to innovation against a backdrop of keen competition between most countries, whether industrialized or in the process of industrializing.

In the strategy *Focus on Jobs*, the government pinpointed as the main challenge facing Québec the need to accelerate the shift to the knowledge-based economy.

Five of the main policy directions in the strategy *Focus on Jobs* serve as guidelines with respect to innovation:

Five government policy directions serve as guidelines with respect to innovation

- encourage innovation, especially among SMEs;
- bolster support for research and development;
- broaden government involvement in favour of the new information and communications technologies;
- increase the education system's ability to adapt;
- steer young people toward promising careers.

The Prime Minister has assigned to the Minister responsible for Research, Science and Technology the mandate to define a new Québec policy respecting scientific research. The policy will enable Québec to adopt a comprehensive perspective on the policies to be emphasized and the measures to be adopted in order to accelerate innovation.

However, until the elaboration of this comprehensive policy has been completed, the government is presenting in this paper the first stages of the implementation of the policies to which it attaches high priority. The measures described herein are immediate responses to needs clearly identified by enterprises, interveners in the public sector and the post-secondary education sector.

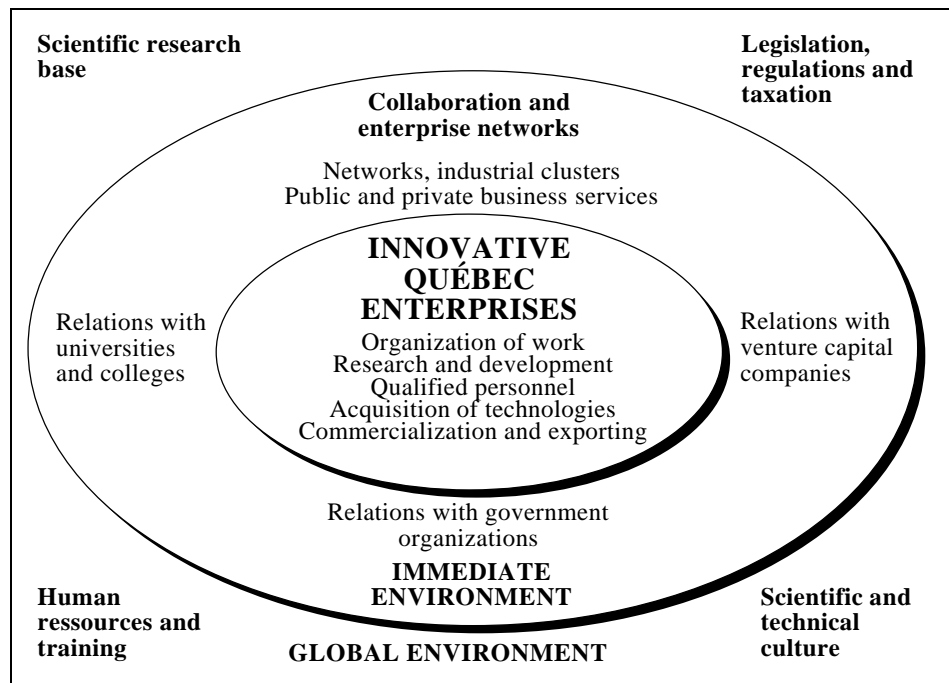
1.4 A multifaceted process

If innovation is in itself a complex process, it is no less complex to pinpoint the stakeholders and their interactions. The diagram representing the *national system of innovation* proposed by Christopher Freeman in the late 1980s² presents a coherent framework that makes it possible to visualize the different components and understand the role and interdependence of the different stakeholders. This diagram, applied to Québec by the Conseil de la science et de la technologie³, has been used as a framework for the presentation of the government measures described in this document.

² C. Freeman, *Technology and Economic Performance: Lessons from Japan*, Pinter, London, 1987.

³ Conseil de la science et de la technologie, *Pour une politique de l'innovation*, Rapport de conjoncture 1998, December 1997.

DIAGRAM 1
THE QUÉBEC INNOVATION SYSTEM



Source: Conseil de la science et de la technologie, *Pour une politique de l'innovation*, Rapport de conjoncture 1998, December 1997.

*The enterprise is
at the heart of the
innovation process*

The enterprise is at the heart of the Québec innovation system. It is subject to keen competition from domestic and foreign enterprises and must, in order to develop, make significant efforts to innovate from the standpoint of its way of doing things. Moreover, the enterprise must seek the best products and the cheapest processes, acquire new technologies and hire the most qualified staff.

For the enterprise, the key to innovation is the knowledge that it is able to develop by itself but also the knowledge that it can acquire through collaboration with stakeholders in the environment in which it operates. These stakeholders include government organizations, educational institutions, venture capital companies, and enterprise networks.

At the outset, an enterprise's ability to innovate depends on the presence in society, or the overall environment in which it operates, of factors over which it exercises much more limited control, i.e. the presence of a developed scientific research base, appropriate taxation and regulations, qualified workers, and a culture favourable to innovation.

The Québec innovation system is described briefly in the following sections.

1.4.1 The enterprise's overall environment: general conditions for success

The outstanding contribution by the universities to the Québec research base

The scientific research base usually refers to scientific research and specialized training carried out by high-calibre institutions such as universities, colleges and public research centres. The Québec research base is noteworthy in relation to that in other industrialized societies for the outstanding contribution that the universities make to scientific research.

The education system, a key component of the Québec innovation system

The Québec education system assumes primary responsibility for training young people to meet the needs of the knowledge-based economy. The availability of qualified, competent workers is a key factor in the location of enterprises and job creation. To this end, the education system assumes a twofold responsibility:

- provide top-notch training to ensure the preparation of the upcoming generation of scientists and to satisfy the increasingly stringent demands of enterprises with respect to worker qualification;
- train sufficient numbers of graduates to satisfy the needs of enterprises while ensuring employment opportunities for graduates.

The scientific and technical culture enables individuals to participate in society's development

To face the challenges posed by the knowledge-based economy, it is imperative to encourage everyone to acquire knowledge, skills and abilities and to adopt values likely to ensure everyone's participation in the development of a society that is now shaped by the omnipresence of science and technology.

The scientific and technical culture makes it possible to understand the socio-economic issues related to these fields and to foster a desire to contribute actively to ongoing progress. It also ensures the development of a critical view of the sciences and technology and an ability to assess their repercussions from an economic, social and cultural standpoint.

Support for the development of enterprises through taxation and regulation

The simplification and adaptation of the legislative and regulatory framework is a key issue in terms of the development of enterprises. Québec has made a considerable effort in recent years to revise its legislation and regulations in order to minimize their impact on enterprises and support their development.

The Québec tax system is one of the most advantageous in North America for enterprises

The importance of a tax system that fosters the ability to innovate is clearly illustrated by the results observed in Québec. The Québec tax system as it applies to corporations is one of the most advantageous in

North America, especially in the case of enterprises that invest in research and development⁴ and which, in doing so, benefit from generous refundable tax credits.

1.4.2 Interaction in the immediate operating environment of an enterprise

To innovate, an enterprise must maintain relations with educational institutions, various government organizations, venture capital companies, other financial institutions, and other enterprises.

In Québec, several organizations facilitate the adoption by enterprises of technologies, in particular the Centres de liaison et de transfert (CLTs), the Centres collégiaux de transfert de technologie (CCTTs), public research centres, and enterprise-university liaison organizations.

All of these stakeholders strive in their own way to develop and commercialize the results of public research, adapt public research and training institutions to the needs of the Québec economy, and disseminate and transfer technologies to innovative enterprises.

Government departments and organizations can establish a special network to disseminate and test new technologies developed by enterprises.

The financing of innovative enterprises by venture capital companies is an especially widespread practice in Québec. At the end of 1997:

- the funds managed by such private and public venture capital companies totalled \$4 billion, compared with \$3.2 billion at the end of 1996, a 26% increase;
- all told, Québec funds accounted for 48% of the venture capital managed in Canada.⁵

The vitality of the Fonds de solidarité des travailleurs du Québec (FTQ) and the Caisse de dépôt et de placement du Québec and the presence of four Innovatech corporations largely explains these outstanding results. This performance can only improve with the advent of the Fonds Fondation of the Confederation of National Trade Union (CNTU).

⁴ Price Waterhouse and ministère des Finances, *La fiscalité des entreprises au Québec, un régime compétitif et favorable à l'investissement*, 1997.

⁵ Macdonald & Associates Limited for Réseau Capital, *Statistiques annuelles 1997*, April 1998.

*Foster collaboration
between enterprises*

The networks that the Québec government is supporting in conjunction with the sectorial advisory committees are making it possible to foster cooperation between enterprises. The Centres de veille technologique, which offer enterprises research, analysis and summary services pertaining to strategic information, support such cooperation.

1.4.3 Innovative enterprises are at the heart of the innovation system

*The vitality of innovative
enterprises is the first key
to the success of the Québec
innovation system*

Innovation is, first and foremost, the responsibility of enterprises. When enterprises innovate, they become more productive and more profitable. They export more and cope better with international competition. They foster the creation of quality jobs and help boost collective wealth and enhance the quality of life. The enterprise's vitality, sustained by its links with other stakeholders in its environment, are the first key to the success of the Québec innovation system.

ROLE OF THE ENTERPRISE IN THE INNOVATION SYSTEM

- Make innovation an integral part of all of the enterprise's functions:
 - Organizational management;
 - acquisition of technologies;
 - research and development;
 - hiring of qualified workers;
 - ongoing training;
 - commercialization, and so on.
- Establish and develop relations with the immediate environment: universities, colleges, enterprise networks, financial institutions, and so on.
- Rely on the overall environment: research base, tax provisions, education system, and so on.

Innovative enterprises make up the heart of the Québec innovation system, whose development is the key to the development of the Québec economy and, in particular, the knowledge-based economy.

2 *Accelerating research and innovation: a priority for the government*

2. ACCELERATING RESEARCH AND INNOVATION: A PRIORITY FOR THE GOVERNMENT

If private enterprise is responsible, by and large, for creating jobs, the government has a duty to develop and maintain conditions that foster the development and competitiveness of enterprises by supporting, among other things, their efforts to innovate.

To this end, the government must:

- **provide the leadership** necessary to establish a **broad environment** favourable to the emergence and development of innovative enterprises;
- **facilitate relations** between the innovative enterprise and its **immediate environment**, i.e. educational and research institutions, government organizations, financial institutions and other enterprises;
- **assist the enterprise** in its efforts to acquire the expertise and skills that enable it to innovate.

2.1 Initiatives on several fronts

To make Québec a hub of the development of the knowledge-based economy, the government intends to act on several fronts. The scope of the measures announced in the 1999-2000 Budget Speech to accelerate research and innovation reflects this concern. In the next two years, these initiatives will represent a \$406.7 million contribution to innovation and the knowledge-based economy.

*Support for the development
of human resources
in strategic sectors*

The government recognizes the primordial role that the education system plays in the development of conditions favourable to innovation. For this reason, it announced in the 1999-2000 Budget Speech the granting of \$34.5 million (Appendix A) to the ministère de l'Éducation to:

- overcome worker shortages in the information technologies sector;
- encourage young people to enter careers in strategic sectors and foster their success;
- boost the development of short-term training.

Enhancement of the knowledge of the market for highly skilled workers

Moreover, to quickly satisfy the new manpower needs of an economy in which innovation is occupying a growing place, Québec must be able to rely on a thorough knowledge and dynamic monitoring of employment market trends in strategic sectors. To this end, the government will earmark \$4 million to establish the Centre Emploi-Technologie (CETECH). Under the responsibility of Emploi-Québec, CETECH will be supported by a steering committee made up of representatives of the science and technology sectors.

Support for innovation in enterprises

Fiscal and budgetary measures have also been announced to support innovative enterprises. The ministère de l'Industrie et du Commerce will have at its disposal \$13 million to support innovation and the advanced practices of SMEs. Moreover, the ministère de l'Industrie et du Commerce and the future ministère de la Recherche, de la Science et de la Technologie will receive \$7 million to support the establishment in the Québec City area of the Cité de l'optique. This project will make it possible to promote the Québec City area as a hub of excellence of international calibre in the field of photonics.

An integrated fiscal strategy to promote innovation

Taxation remains an ideal, effective way to help enterprises participate in the process of innovation. An integrated fiscal strategy, which will channel \$173 million into the knowledge-based economy over the next two years, was announced in the 1999-2000 Budget Speech. The measures presented in this strategy are summarized in this paper and also appear in Appendix B.

Innovation Québec and Valorisation-Recherche Québec

Moreover, as the government announced in the 1999-2000 Budget Speech, it will establish two new bodies with a budget of \$175.2 million, i.e. Innovation Québec and Valorisation-Recherche Québec, which will bolster Québec's ability to conduct research and engage in innovation.

TABLE 1
NEW INITIATIVES IN THE REALM OF RESEARCH AND INNOVATION
1999-2000 BUDGET
(in millions of dollars)

	1998-1999	1999-2000	2000-2001	TOTAL
Innovation Québec	–	32.3	42.9	75.2
Valorisation-Recherche Québec	100.0	–	–	100.0
Measures to develop human resources in strategic sectors	–	14.0	20.5	34.5
Other budgetary measures	–	10.0	14.0	24.0
Integrated fiscal strategy for the knowledge-based economy	–	45.0	128.0	173.0
TOTAL	100.0	101.3	205.4	406.7

2.2 New tools

An innovative, adaptable economy not only needs to invest sufficiently in innovation, it must also invest judiciously.

OECD, *The OECD Jobs Strategy, Technology, Productivity and Job Creation*, Vol. 2, Analytical Report, 1996.

2.2.1 Innovation Québec

Despite marked progress achieved in the realm of science, technology and innovation over the past 30 years and despite significant government intervention to bolster the ability to innovate of enterprises, Québec is facing major challenges. Specifically, it must seek to maintain a stimulating environment geared to basic and applied research, promote the international influence of innovative researchers and enterprises, and boost synergy between the public and private sectors.

To meet these challenges, the government has assigned to the Minister responsible for Research, Science and Technology the management of Innovation Québec, which will receive \$75.2 million in funding over the next two years.

Areas of intervention

Innovation Québec will focus primarily on:

- developing and maintaining in Québec a scientific research base of international calibre;
- contributing to the training of the scientific and technical workers required by enterprises, universities and research centres to maintain Québec's ability to conduct scientific research and innovate;
- promote and support partnerships between government departments and organizations, universities and enterprises;
- commercialize the results of R&D and innovation.

Innovation Québec will intervene at all level of the Québec innovation system

Innovation Québec will intervene at all levels of the Québec innovation system, more specifically in the enterprise's immediate and general environment. It will emphasize partnerships between the stakeholders, i.e. universities, colleges, government departments and private enterprises, in order to ensure the consistency and synergy of government initiatives. Through its association with other players in the realm of innovation, the government will create leverage that will enable it to maximize the impact of its intervention.

The measures that Innovation Québec will finance (Appendix C) are described in the sections that follow and presented with the other initiatives pertaining to innovation announced in the 1999-2000 Budget Speech.

2.2.2 Valorisation-Recherche Québec

In order to put to advantage Québec university research and knowledge, a \$100-million grant will be made to Valorisation-Recherche Québec, an independent body dedicated to this objective.

Objectives

With a view to accelerating the development of high-technology sectors, Valorisation-Recherche Québec will give priority to university initiatives aimed at:

- fostering the development of knowledge by contributing to the financing of the commercialization of the results of university research;

The development of knowledge and research partnerships are at the heart of Valorisation-Recherche Québec's objectives

- contributing to the funding of multidisciplinary or multisectorial university team research projects resulting from cooperation between university researchers or such researchers and researchers from government, public, parapublic or private research teams.

Half of the \$100 million in funding will be earmarked for the commercialization of the results of university research and the remainder for the financing of the projects of university research teams.

Structure

Valorisation-Recherche Québec is an organization that is independent of the government. It is a non-profit corporation run by a board of directors made up of nine representatives from the universities, research institutions and the business community:

- three members from the universities are chosen from a list submitted by the Conférence des recteurs et des principaux des universités du Québec;
- three members are chosen from a list of three persons submitted by the Minister responsible for Research, Science and Technology, including:
 - one member designated by the Fonds de la recherche en santé du Québec (FRSQ);
 - one member designated by the Conseil québécois de la recherche sociale (CQRS);
 - one member designated by the Fonds pour la formation de chercheurs et l'aide à la recherche (Fonds FCAR);
- three members, two of them from the business community selected from a list submitted by the Association de la recherche industrielle du Québec (ADRIQ) and one person, a member of the Comité des gouverneurs or an officer of the Montreal Exchange, selected from a list submitted by the Montreal Exchange.

The board of directors is responsible for adopting the organization's policies and programs, choosing the projects to be supported, and deciding on the allocation of funds.

Chapter 4 summarizes the government's expectations with respect to the activities of Valorisation-Recherche Québec.

3 *The government
assumes leadership
for the overall
environment*

3. THE GOVERNMENT ASSUMES LEADERSHIP FOR THE OVERALL ENVIRONMENT

It is incumbent on the State, first and foremost, to assume responsibility for establishing and maintaining an overall environment that fosters the development of enterprises capable of innovating. Its initiatives directly affect the quality of each of the four main components of the overall environment of the Québec innovation system, i.e. the Québec scientific research base, human resources and training, taxation, legislation and regulations, and the scientific and technical culture.

This chapter presents the government's policy directions and initiatives to enhance the overall environment of enterprises, by acting in particular with respect to the research base and the quality of human resources.

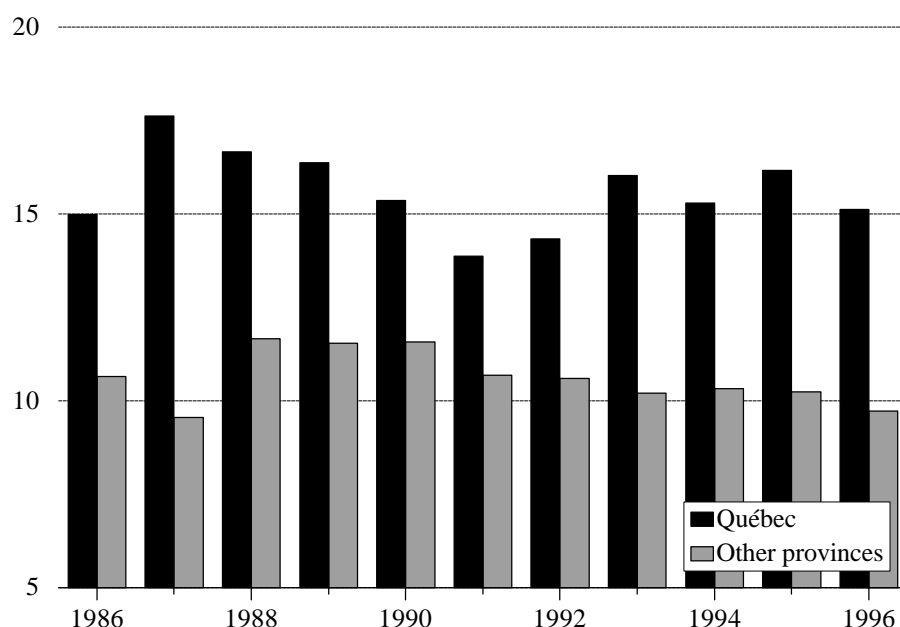
3.1 The Québec scientific research base

The scientific research base allows a society to contribute to the advancement of knowledge in various scientific disciplines, obtain access to cutting-edge scientific and technical information in strategic fields, and train highly qualified workers who are at the leading edge of knowledge.

The Québec government has, for a long time, made the scientific research base one of its priorities. It has contributed directly to funding the post-secondary education network made up of colleges and universities, and the network of public research centres. It supports researchers and the upcoming generation of scientists through funding agencies such as the Fonds FCAR, the FRSQ and the CQRS. It is also contributing indirectly to broadening the scientific base through an especially favourable tax system applicable to R&D. A significant portion of this contribution covers basic and applied research conducted by enterprises and private and public research centres, or in universities and colleges.

The Québec government is well placed with respect to the financing of research conducted in post-secondary educational institutions. In 1996, 15.1% of R&D spending incurred by post-secondary institutions was financed by Québec, while the provincial governments in the rest of Canada financed only 9.7% of such R&D spending.

CHART 4
**SHARE OF THE PROVINCIAL GOVERNMENTS IN THE FUNDING
 OF R&D CONDUCTED BY POST-SECONDARY
 EDUCATIONAL INSTITUTIONS**
1986 TO 1996
 (as a percentage)



Source: Statistics Canada, *Estimates of Canadian Research and Development Expenditures (GERD)*.

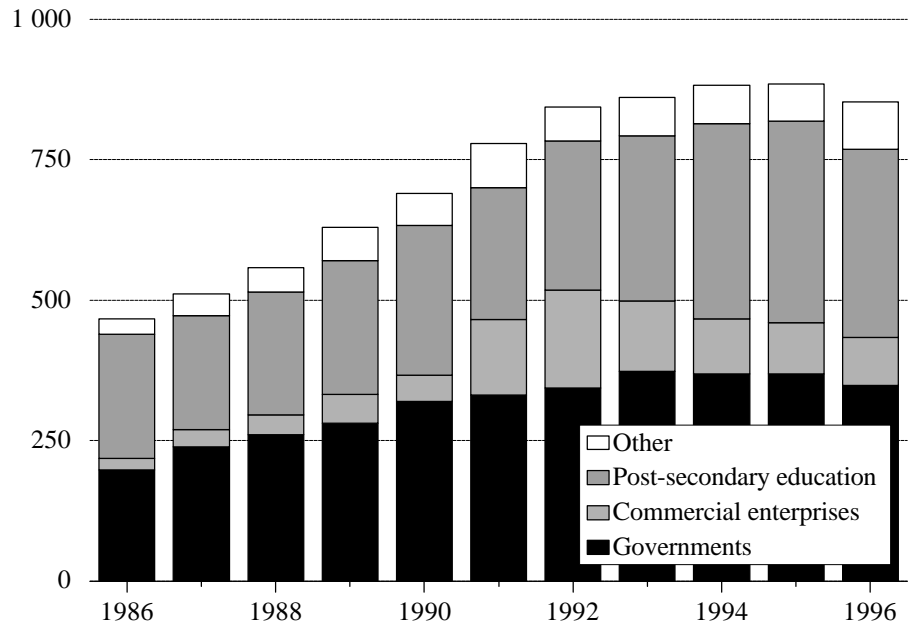
The already generous Québec tax system as it applies to R&D conducted by enterprises (see Chapter 5) is even more so when an enterprise entrusts research projects to the universities and public research centres. It is hardly surprising that the funding of research carried out by post-secondary educational institutions and generated by enterprises has increased over the years, from \$20 million in 1986 to \$85 million in 1996. The proportion of private funding of the total R&D spending of educational institutions, which stands at 10%, is still relatively modest.

3.1.1 Remarkable progress

For the past decade, remarkable progress has been made from the standpoint of university research in Québec. Between 1986 and 1996, university research spending nearly doubled in Québec, from \$467 million to \$853 million. This striking, constant increase in investment in university research illustrates the predominant role the universities play in the development of Québec's research base.

*"It is the universities that provide the largest portion of what is called the scientific and technological base."
 CST, Rapport de conjoncture 1998*

CHART 5
**R&D EXPENDITURES IN POST-SECONDARY EDUCATIONAL
 INSTITUTIONS, BY SOURCE OF FINANCING**
QUÉBEC – 1986 TO 1996
 (in millions of dollars)

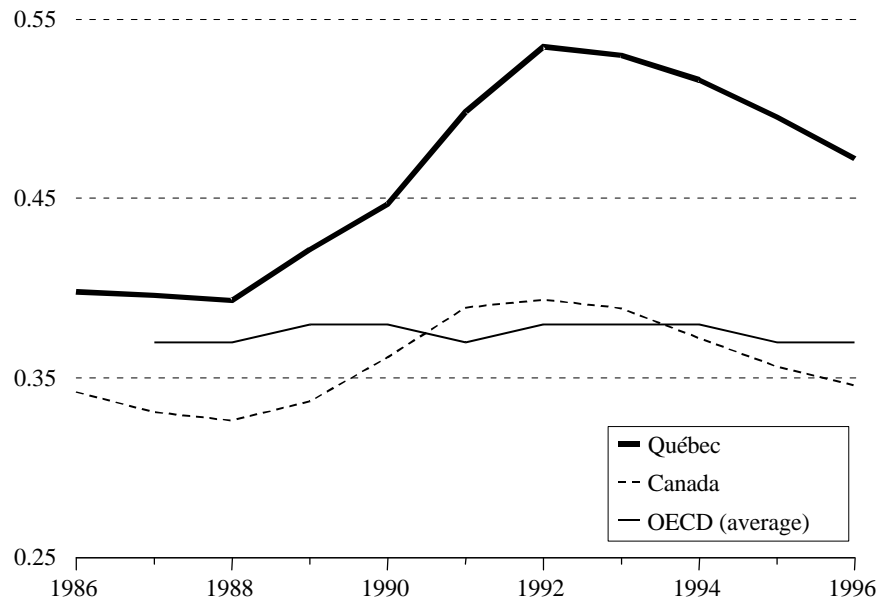


Source: Statistique Canada, *Estimates of Canadian Research and Development Expenditures (GERD)*.

***Québec outstrips Canada
and the average in the OECD
countries in terms of university
R&D spending***

This increase has enabled Québec to take the lead in relation to Canada and the OECD countries with respect to the extent of the resources devoted to R&D conducted by post-secondary educational institutions. In 1988, such funding was equivalent to 0.39% of Québec GDP, as against 0.33% in Canada and 0.37% in the OECD countries. This proportion reached 0.47% in Québec in 1996, 0.35% in Canada, and remained stable in the OECD countries. While a slight downturn has been noted in very recent years, Québec's effort still remains appreciably higher than that observed in the industrialized economies.

CHART 6
R&D EXPENDITURES IN POST-SECONDARY EDUCATIONAL INSTITUTIONS
QUÉBEC, CANADA AND THE OECD COUNTRIES – 1986 TO 1996
 (as a percentage of GDP)



Sources: OECD, *Main Science and Technology Indicators*; Statistics Canada, *Estimates of Canadian Research and Development Expenditures (GERD), National Income and Expenditure Accounts*; and Bureau de la statistique du Québec, *Comptes économiques du Québec*.

**Researchers working
in the main currents of
international research**

The quality and development of the Québec scientific base are also readily apparent in the vitality of Québec researchers and their ability to integrate into the main currents of international research. For example, mention should be made of the striking increase in the number of scientific publications produced by Québec researchers. Since 1990, the increase has stood at 31% on average, with even higher increases in certain disciplines such as physics (43%), earth sciences (36%) and clinical medicine (33%).

Not only has Québec done well, but it has done better than others to such an extent that, from 21.5% of the Canadian total in 1990, the percentage of publications produced by Québec researchers stood at 24.9% in 1996. According to preliminary data, the proportion appears to have risen further in 1997, to 25.8%.

TABLE 2
QUÉBEC SCIENTIFIC PUBLICATIONS BY SCIENTIFIC FIELD
1990 TO 1996
(number)

	1990	1991	1992	1993	1994	1995	1996	Growth 1990-1996
Clinical medicine	1 596	1 735	1 787	1 894	1 964	2 038	2 124	33 %
Biomedical research	981	1 064	1 101	1 098	1 176	1 284	1 277	30 %
Physics	490	486	559	638	742	691	699	43 %
Applied sciences and engineering	486	494	548	572	601	636	571	17 %
Biology	545	582	544	525	544	587	555	2 %
Chemistry	424	412	474	509	541	520	550	30 %
Earth sciences	262	292	311	328	336	425	357	36 %
Mathematics	92	90	81	94	101	116	102	11 %
Not classified	25	19	46	88	98	130	191	
Total	4 901	5 174	5 451	5 746	6 103	6 427	6 426	31 %
% of Canadian total	21.5	22.1	22.1	22.9	23.6	25.0	24.9	

Source: Compilation by the Observatoire des sciences et des technologies (CIRST).

The Québec government already provides significant financial support for the scientific base. The results discussed in this section clearly show that it is on the right track. However, it is possible to do even more. The government now intends to consolidate the achievements of the Québec research base and support it in light of the new challenges posed by the acceleration of the shift to the knowledge-based economy.

3.1.2 Rely on Québec funding agencies

The funding of university research relies extensively on the Fonds de la recherche en santé du Québec (FRSQ), the Fonds pour la formation de chercheurs et l'aide à la recherche (Fonds FCAR) and the Conseil québécois de la recherche sociale (CQRS).

These three organizations, whose grant and bursary budgets total over \$100 million, are decisive assets for the development of the Québec innovation system. Their programs make it possible to support advanced research and to directly finance researchers by means of grants. Their intervention also contributes to enabling Québec university research to adapt quickly to new demands arising from the rapid change taking place in the knowledge-based economy.

To bolster the initiatives of the funding organizations from the standpoint of the research base, over the next two years, the government will invest \$21.4 million in:

- the basic financing of research centres (FRSQ);
- the financing of thematic research (FRSQ);
- the concerted action program (Fonds FCAR);
- scientific equipment for university research (Fonds FCAR);
- support for social research (CQRS).

3.1.2.1 The Fonds de la recherche en santé du Québec (FRSQ)

Established in 1983, the Fonds de la recherche en santé du Québec (FRSQ) is responsible for promoting and developing health research in Québec. It gives priority to granting training bursaries to researchers and the implementation in all Québec health care establishments of a veritable network of research centres.

*Networks centred
on Québec's priorities
in health and well-being*

The FRSQ is now funding 17 hospital research centres and institutes. In addition, mention should be made of nearly 20 priority teams and 14 thematic research networks focusing on government priorities in health and well-being.

To enable the FRSQ to respond effectively to the needs engendered by rapid changes in the environment in which health research is being conducted, the government will increase the budgets devoted to the basic funding of research centres and thematic research.

Basic funding of research centres

*For every dollar invested,
four dollars in bursaries
and grants are awarded*

The FRSQ supports health research by means of a strategy based on leverage. By supporting the infrastructure of research centres, i.e. equipment and technical support, it enables Québec researchers to successfully compete for funds in Canada and at the international level. For each dollar invested, the FRSQ strategy enables Québec researchers to obtain four dollars in bursaries and grants from Canadian and international funding organizations.

The FRSQ allocates nearly \$26 million a year to support 17 research centres, of which \$18 million is earmarked for infrastructure and operating expenses. These centres account for nearly 80% of health research in the public sector.

However, the basic funding of these centres has remained unchanged over the past 15 years. Consequently, it is becoming harder and harder for researchers to compete fully with other research teams in Canada and abroad.

With a view to bolstering the competitiveness of research centres associated with the FRSQ, the government will allocate an additional \$5.8 million to their basic funding.

INNOVATION QUÉBEC
FRSQ –BASIC FUNDING OF RESEARCH CENTRES
OBJECTIVE <ul style="list-style-type: none">▪ Help researchers remain competitive in Canada and at the international level.
FEATURE OF THE MEASURE <ul style="list-style-type: none">▪ Increase in the financing of the centres based on performance indicators.
FINANCIAL IMPLICATIONS <p>Innovation Québec will earmark \$5.8 million for the financing of this measure over the next two years, i.e. \$2.5 million in 1999-2000 and \$3.3 million in 2000-2001.</p>

Funding of thematic research

Through the FRSQ, Québec began over six years ago to organize its researchers in networks to facilitate synergy between the universities, university hospitals and various disciplines. Since then, 14 networks focusing on as many priority themes pertaining to Québec health policy have been established.

The networks can be broken down as follows:

- major networks: cancer, cardiovascular health, respiratory health, AIDS, mental health, genetics and rehabilitation;
- growing networks: geriatrics, major burn victims/tissular engineering, vision, environmental health, bucco-dental health, the optimum use of drugs, and clinical ethics.

FRSQ financing of the networks varies from \$150 000 to \$500 000 and supports three types of activities:

- communications and synergy;
- the development of common infrastructure;
- the start-up of pilot projects and the dissemination of scientific information.

To a large extent, the networks have proven their importance¹ and their funding must be reviewed bearing in mind their achievements and potential. For this reason, the government will increase by \$5 million over two years its support for thematic research.

INNOVATION QUÉBEC
FRSQ – THEMATIC RESEARCH
OBJECTIVES <ul style="list-style-type: none"> ▪ Bolster the development of thematic health research networks in Québec. ▪ Enable Québec networks to position themselves favourably to exercise leadership in the Canadian Health Research Institutes.
FEATURES OF THE MEASURE <ul style="list-style-type: none"> ▪ Increase in the funding allocated to the seven major networks. ▪ Specific support to promote growth in the seven emerging networks. ▪ Allocation of additional grants according to FRSQ criteria and priorities.
FINANCIAL IMPLICATIONS <p>Innovation Québec will pay \$2.5 million per year to the FRSQ to support thematic research over the next two years.</p>

¹ For example, networking has led to the pooling of resources in neurosciences for the acquisition of the biggest brain bank in North America, thus enabling Québec teams to display leadership in the neurosciences in Canada and obtain major grants. Similarly, the computer networking developed by the cardiovascular health research network is drawing substantial investments by the pharmaceutical industry in clinical research in Québec.

3.1.2.2 The Fonds pour la formation de chercheurs et l'aide à la recherche (FCAR)

Established in 1984, the Fonds pour la formation de chercheurs et l'aide à la recherche (FCAR) is a multisectorial organization responsible for promoting and contributing to the funding of:

- research conducted in post-secondary educational institutions;
- the work of researchers who are not attached to a post-secondary educational institution;
- the dissemination of knowledge in all fields of research;
- the training of researchers through the granting of bursaries to students at the master's and doctoral levels and to researchers engaged in postdoctoral research.

The Fonds FCAR is a very important partner in the development and consolidation of the Québec research system. Over the years, it has developed unique expertise with respect to scientific evaluation, fostered groupings of researchers, and contributed both to the upcoming generation of scientific researchers and the training of highly qualified workers. It is also involved in coordinating the efforts of various stakeholders in the realm of research.

The concerted action program

In a society in which knowledge plays a predominant role, collaboration between partners, such as government laboratories, universities and enterprises, is becoming increasingly important. Such alliances facilitate the search for solutions. The concerted action program of the Fonds FCAR encourages this type of partnerships.

The program seeks to encourage collaboration and the coordination of the initiatives of various partners in research sectors that are of strategic importance to Québec, from a technological, economic, social and cultural standpoint.

*Partnerships centred
not on projects
but on research fields*

What is noteworthy about this program is that it is contributing to developing partnerships, not by project but by strategic research field. A concerted action must encompass at least three research projects related to different facets of the partners' field of interest.

For example, the Fonds FCAR-NOVALAIT concerted action focused on opportunities for growth and improvement in the profitability of the dairy industry. The research fields selected centred on three components: production (genetics, disease prevention, animal productivity), processing (processes, packaging materials and

techniques, search for new products), and economics and management sciences (elaboration of measures to evaluate the efficiency of technology transfers).

This concerted action has made it possible to carry out 13 projects and train 61 undergraduate and graduate university students and four postdoctoral trainees. This experience has proven sufficiently noteworthy for the same partners, along with the ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), to recently undertake a second concerted action.

The concerted action program is contributing to the training of highly qualified researchers, sometimes in fields in which they are scarce. For example, a concerted action now under way, which assembles in partnership with the FCAR four major pharmaceutical groups and focuses on combinatorial chemistry, is devoted to the development of a new technology essential to the growth of the drug industry. The expertise required to carry out this program is so specialized that only a small number of researchers in Québec can offer it. The program will make possible the training of new specialists in this field.

The protocols now being negotiated and those recently signed in conjunction with this program reveal that the current budget of \$2 million will clearly be insufficient to satisfy demand in the coming months.

In order to support more extensive research in partnership, the government will increase by \$1 million a year, over two years, support for the concerted action program of the Fonds FCAR.

INNOVATION QUÉBEC
FONDS FCAR – CONCERTED ACTION PROGRAM
<p>OBJECTIVES</p> <ul style="list-style-type: none"> ▪ Broaden collaboration between government laboratories, universities, colleges and enterprises. ▪ Respond to growing demand from enterprises and government departments for the establishment of partnerships. <p>FEATURE OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ Increase in the Fonds FCAR concerted action program budget for: <ul style="list-style-type: none"> – grants to university or college researchers who satisfy the specific needs of partners in the private and public sectors; – bursaries for graduate students enrolled in leading-edge sectors. <p>FINANCIAL IMPLICATIONS</p> <p>Innovation Québec will contribute an additional \$1 million per year, over two years, to the Fonds FCAR concerted action program.</p>

Technical support for university research

The realization of research demands adequate infrastructure, both from the standpoint of personnel and equipment. In recent years, the increase in the cost of research and the reduction in funding in the universities have curtailed the capacity to acquire new equipment or to replace outmoded equipment.

Bolster the capacity to acquire or replace equipment

To overcome this problem, the government will increase the annual budget of the Fonds FCAR program for scientific equipment used for university research from \$2.2 million to \$4.7 million.

INNOVATION QUÉBEC
FONDS FCAR – SCIENTIFIC EQUIPMENT USED FOR UNIVERSITY RESEARCH
<p>OBJECTIVES</p> <ul style="list-style-type: none"> ▪ Maintain the number of grants for equipment costing under \$50 000. ▪ Increase the number of partial grants for the purchase of more expensive equipment. <p>FEATURES OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ Increase in the budget of the program for scientific equipment used for university research. ▪ Target clientele: <ul style="list-style-type: none"> – new researchers; – members of teams and centres financed following various Fonds FCAR competitions. ▪ Equipment covered: <ul style="list-style-type: none"> – ancillary equipment costing under \$50 000; – more expensive equipment (maximum contribution of \$50 000). <p>FINANCIAL IMPLICATIONS</p> <p>Innovation Québec will increase by \$2.5 million per year over the next two years the budget of the Fonds FCAR program for scientific equipment used for university research.</p>

3.1.2.3 The Conseil québécois de la recherche sociale (CQRS)

The Conseil québécois de la recherche sociale, a funding body set up in 1979, is responsible for contributing to the enhancement of the health and well-being of Quebecers. It fulfils this mandate by supporting:

- research in the realm of the social and human sciences;
- advanced training for researchers and interveners in these fields;
- the transfer of knowledge.

The CQRS supports social research, in particular through grants covering basic infrastructure in university institutes, which are organizations designated by the Minister of Health and Social Services pursuant to the *Act respecting health services and social services*.

At present, there are four university institutes dealing with social gerontology, young people in difficulty, social rehabilitation, and violence among young people. Other themes will eventually be broached in the coming years, which will necessitate the development of new institutes.

The structure of social research also encompasses affiliated university centres. To date, two local community service centres have been designated affiliated university centres, one in the field of geriatrics and social gerontology and the other in the realm of primary services and services for the cultural communities. Other candidates for the designation of affiliated university centres are under study. However, the CQRS does not have the funds to support these centres.

In 1992-1993, the CQRS implemented the teams in partnership grant program, which is intended to underpin a stable social research base in Québec and encourage researchers to work in close collaboration with practitioners, interveners and policymakers. At present, 22 teams are working in partnership on the priority social problems pinpointed by the ministère de la Santé et des Services sociaux.

In order to bolster the CQRS's ability to provide support to institutes, affiliated university centres and research teams working in partnership, the government will increase the funding agency's budget by \$1.8 million a year over the next two years.

INNOVATION QUÉBEC**CQRS – SUPPORT FOR SOCIAL RESEARCH****OBJECTIVES**

- Broaden the understanding of social problems and foster the development of effective solutions.
- Consolidate and develop the network of research institutes and affiliated university centres dealing with social issues.
- Step up government support for the realization of research on priority social problems conducted by teams working in partnership.

FEATURE OF THE MEASURE

- Increase in the CQRS budget devoted to:
 - university institutes and affiliated university centres dealing with social issues;
 - the teams in partnership program.

FINANCIAL IMPLICATIONS

Innovation Québec will grant the CQRS \$1.8 million a year over the next two years, i.e. \$3.6 million, to support social research.

3.1.3 Prepare the upcoming generation of scientists***Young university researchers***

As we noted earlier, over the past 20 years, Québec has achieved remarkable results in the realm of public and private R&D.

The quality of the research base is a major comparative advantage in a knowledge-based economy. The universities are unquestionably the cornerstone of the research base.

However, various indicators suggest stagnation or even a deterioration in research potential and problems in ensuring the preparation of the upcoming generation of university scientists, especially in sectors of strategic interest to Québec. Specifically, mention should be made of:

- a reduction in the recruiting of young lecturers;

*The universities
are the cornerstone
of the research base*

- a drop in demand for the FCAR program to help new researchers get started, particularly in the sciences and engineering;
- the departure from Québec of brilliant researchers to areas offering a more favourable research environment.

Accelerate the hiring of teachers to counteract the brain drain

To help counteract these trends, Innovation Québec, through the Fonds FCAR, will intervene to accelerate the hiring of university lecturers in sectors where the upcoming generation of scientists is a priority.

INNOVATION QUÉBEC

FONDS FCAR – FCAR STRATEGIC RESEARCHERS PROGRAM

OBJECTIVES

- Accelerate the recruiting of university lecturers in sectors in which the upcoming generation of scientists is a priority from the standpoint of research and the training of researchers and qualified specialized staff.
- Help keep young researchers in Québec.
- Attenuate the problem of intergenerational replacement in the universities.

FEATURES OF THE MEASURE

- Establishment of a temporary salary subsidy program in the universities for the hiring of 125 lecturers in five years in strategic sectors, i.e. 25 per year.
- A subsidy of \$205 000 per position over five years, i.e. \$50 000 for each of the first three years, \$35 000 for the fourth year, and \$20 000 for the fifth year.
- Automatic grant from the program to establish new researchers of the Fonds FCAR to the candidates selected.
- Eligibility criteria: the usual hiring criteria for university lecturers in respect of tenure-track positions, in keeping with the collective agreements.

- Selection process: Fonds FCAR competition in two stages:
 - an initial assessment focusing on the candidate's scientific merit (academic file, research program) and the research environment into which the potential candidate will be integrated;
 - second, a selection will be made from among the candidates chosen during the first stage, according to strategic criteria (priority of positions in sectors of strategic interest to Québec, strategic nature of the position for the institution).

FINANCIAL IMPLICATIONS

Innovation Québec will pay the Fonds FCAR \$3.8 million over the next two years, i.e. \$1.3 million in 1999-2000 and \$2.5 million in 2000-2001.

Support for researchers in the health sector

In conjunction with the research fellowship program, the Fonds de la recherche en santé du Québec (FRSQ) subsidizes the salaries of a limited number of researchers who, after four years of postdoctoral study, pursue their careers in research and, after a competition, are deemed praiseworthy by the FRSQ.

Under the program, at the conclusion of the period during which researchers may receive fellowships (up to a maximum of 12 years), the researchers are offered a university position.

***Top-notch researchers
are a factor in attracting
investment***

This program has largely contributed to creating in Québec a critical mass of researchers of very high calibre in several biomedical research disciplines. It is one of the factors most often mentioned by the pharmaceutical and biotechnology industry as a factor in attracting investment to Québec.

However, the universities can only offer partial support to research fellows at the conclusion of the period in which they may receive grants. In the short term, the Québec health industry does not appear to be in a position to take over and to hire and keep in Québec these researchers, who are among the best in the health field in Québec.

Moreover, these top-notch researchers are working in a highly competitive environment. Their publications and achievements are making them known in all leading-edge research centres in North America and Europe. American research centres, in particular, have considerable financial means to attract them.

Maintain a critical mass of researchers in the health field

The challenge in the coming years is to maintain in Québec a critical mass of researchers in the health sector and facilitate their hiring by universities and research centres. To contribute to the attainment of this objective, the government will allocate \$4 million to the new salary support program for Québec researchers, which the FRSQ will introduce in 1999-2000.

INNOVATION QUÉBEC

FRSQ – SALARY SUPPORT FOR QUÉBEC RESEARCHERS

OBJECTIVES

- Maintain in Québec a critical mass of researchers in the biomedical field.
- Prepare the upcoming generation of Québec researchers and teachers in this field.

FEATURES OF THE MEASURE

- Creation of a new program.
- Financing of 67% of the salary of the researcher for five years after his regular bursaries, with the remainder to be covered by universities and hospitals.
- Eligible researchers: praiseworthy researchers, according to the criteria of the FRSQ, at the conclusion of the research fellowship program.

FINANCIAL IMPLICATIONS

Over the next two years, Innovation Québec will earmark \$4 million for this new program of the FRSQ, i.e. \$1.2 million in 1999-2000 and \$2.8 million in 2000-2001.

Support by the CQRS for researchers

In the wake of the teams in partnership program, the CQRS has sought to consolidate strong expertise in social research within health and social services institutions. To this end, it has set up the research fellowship program, which covers up to \$40 000 per year of the salary of a researcher for a period of 12 years. The CQRS now has funds to finance 13 research fellows.

In order to further develop this program, the government will pay the CQRS \$200 000 a year over the next two years.

INNOVATION QUÉBEC
CQRS –RESEARCH FELLOWSHIP PROGRAM
OBJECTIVES <ul style="list-style-type: none"> ▪ Develop social research expertise in institutions in the health and social services network. ▪ Strengthen collaboration between institutions in the health and social services network and the universities.
FEATURE OF THE MEASURE <ul style="list-style-type: none"> ▪ Increase in the budget of the research fellowship program that will make it possible to grant five additional fellowships, worth \$40 000 a year.
FINANCIAL IMPLICATIONS <p>Innovation Québec will devote \$0.4 million to this measure over two years, i.e. \$0.2 million in 1999-2000 and \$0.2 million in 2000-2001.</p>

3.1.4 Adapt government intervention to the needs of the promoters of innovation

Flexible measures to meet challenges and take advantage of opportunities

Against a backdrop of constant change, the government must have at its disposal flexible measures that allow it to respond rapidly and effectively to the challenges and opportunities arising in the field of research and innovation in respect of which no regular funding program applies. Innovation Québec will set aside \$19.5 million for this purpose.

INNOVATION QUÉBEC
CHALLENGES AND OPPORTUNITIES IN RESEARCH AND INNOVATION
<p>OBJECTIVE</p> <ul style="list-style-type: none"> Facilitate the realization of projects to which the government and its partners give priority. <p>FEATURES OF THE MEASURE</p> <ul style="list-style-type: none"> Eligible projects must: <ul style="list-style-type: none"> have a developmental impact on the economy; provide leverage with respect to research and Québec's industrial, scientific and technological potential; not be covered by existing programs. Selection by a committee made up of representatives of the government department(s) concerned by the project examined. <p>FINANCIAL IMPLICATIONS</p> <p>Innovation Québec will devote \$8 million to this measure in 1999-2000 and \$11.5 million in 2000-2001.</p>

3.2 Human resources and training

3.2.1 A strategic asset for Québec

It is individuals who create, transpose and make use of knowledge and who generate innovation.

Source: Conseil de la science et de la technologie, *Pour une politique québécoise de l'innovation*, Rapport de conjoncture 1998.

The government plays a fundamental role with regard to human resources and training. This role encompasses two equally important facets. First, the individuals trained by the education system must possess the basic qualifications demanded by the labour market that will enable them to find a job in the fields for which they are qualified.

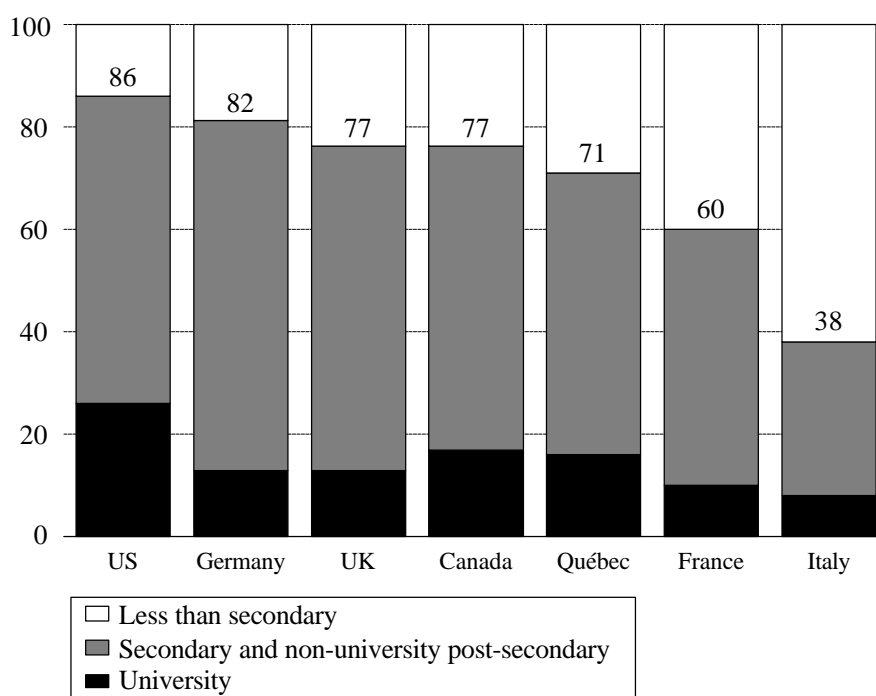
Second, it is incumbent upon the education system to train a sufficient number of people to satisfy the needs of the economy.

*The quality of Québec workers,
an important comparative
advantage*

The most recent analyses indicate that the quality of Québec workers is recognized and represents an important comparative advantage for Québec.² Efforts over the past 30 years to broaden access to education and enhance the quality of training have undoubtedly contributed to this result.

In 1996, 71% of Quebecers between the ages of 25 and 64 had completed the equivalent of secondary level of education or better. In relation to the G7 nations (excluding Japan), this general level of education ranks Québec fifth, well ahead of France and Italy. Québec ranks third and surpasses Germany, the United Kingdom, France and Italy for the percentage of university graduates.

CHART 7
POPULATION BETWEEN 25 AND 64 YEARS OF AGE
ACCORDING TO LEVEL OF EDUCATION
QUÉBEC AND THE G7 NATIONS* – 1996
(as a percentage)



Sources: OECD, *Education at a Glance – OECD Indicators*, 1998, Statistics Canada and Bureau de la statistique du Québec.

* Excluding Japan, for which data are not available.

² Ministère de l'Éducation, *La formation professionnelle au secondaire: les employeurs s'expriment*, survey of employers, 1997 and *La formation technique au collégial: les employeurs se prononcent*, survey, 1997.

Young Quebecers are among the highest achievers in the world in mathematics and science

From the standpoint of the quality of basic learning, young Quebecers in elementary and secondary school have regularly ranked at the top in Canadian and international tests in mathematics and science and have obtained average results in reading and writing.

TABLE 3
**INTERNATIONAL COMPARISON OF THE RESULTS
OF QUÉBEC STUDENTS IN MATHEMATICS AND SCIENCE
1994-1995**
(as a percentage)

	Elementary		Secondary	
	3rd year	4th year	1st year	2nd year
Mathematics test				
Average, Québec students	55.7	69.3	60.5	67.5
Average, Canadian students (including Québec)	47.0	60.5	51.6	58.7
International average	46.9	59.2	49.3	55.1
Science test				
Average, Québec students	53.2	64.5	53.8	59.0
Average, Canadian students (including Québec)	53.3	63.6	54.0	58.7
International average	50.4	59.4	49.8	55.5

Source: Ministère de l'Éducation, *Bulletin statistique de l'éducation*, August 1998.

When the economy undergoes important structural changes, such as those Québec has been facing for several years, the education sector must be able to adapt rapidly in order to satisfy the demands of the labour market. However, to make the necessary changes to the education system, the government must have at its disposal the necessary information on the changing labour market trends and needs.

3.2.2 Guide and ensure the success of young people

Immediately take the necessary steps to train greater numbers of individuals in strategic sectors

The development of technologies, processes and technological applications leads to often striking changes in the qualifications demanded of college or university graduates. The challenge that arises is to train sufficient numbers of young people in emerging or rapidly growing occupations.

To this end, the government must seek to:

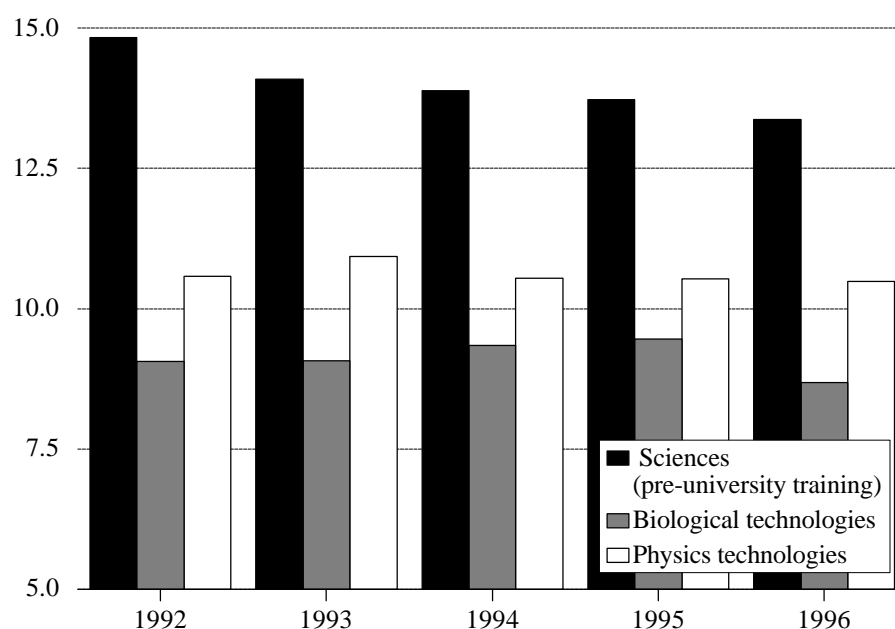
- increase enrolments in programs that are of strategic importance to the development of the knowledge-based economy;
- enhance the graduation rate in these disciplines.

Enrolment rate

Despite the growing importance of the sciences and technology in Québec's economic development, enrolments in disciplines leading to careers in these fields are levelling off or dropping slightly.

For example, while labour market needs with respect to these disciplines have risen sharply, the number of students enrolled in undergraduate degree programs in the pure and applied sciences fell from 28 594 to 28 176 between 1992 and 1996. Moreover, enrolment rates in these programs at the university level are not improving, considering that enrolment in these disciplines has declined at the Cégep level. The proportion of students registered in programs leading to a Diploma of Collegial Studies in sciences, biological technologies and physics technologies, relative to total Cégep enrolment, has been falling since 1992.

CHART 8
**CEGEP ENROLMENT IN SCIENCE, BIOLOGICAL TECHNOLOGIES
AND PHYSICS TECHNOLOGIES – 1992 TO 1996**
(as a percentage of total enrolment)



Source: Ministère de l'Éducation, *Statistiques de l'Éducation*, 1998.

An effort must be made to reassert the value of scientific and technical studies, interest students in engaging in careers in these fields, and ensuring that students who take an interest in them maintain their motivation until graduation.

*Scientific and technical studies
should be promoted starting in
secondary school*

The choice of options is decisive with respect to the orientation of young people in Secondary IV. The sciences must be promoted very early on in secondary school if we are to bolster the level of enrolment in Cegep and university scientific and technical studies programs.

For this reason, in the 1997-1998 Budget, the government established a section devoted to the upcoming generation of students in conjunction with the program to enhance skills in science and technology (PACST). This section is intended to spark interest among young people for science and technology and encourage them to engage in careers in these fields.

This measure, with a budget of \$1 million a year, is making possible the realization of projects proposed by educational and private organizations with a view to increase interest among young people for studies in science and technology. In particular, the measure has led to the production of facilitator's handbooks, reference tools and visits to enterprises in order to draw the schools and enterprises closer together.

After two years of existence, this program is enjoying ever more widespread dissemination and application: 15 projects were submitted in 1997-1998 and 27 projects in 1998-1999.

The section devoted to the upcoming generation of students in conjunction with the program to enhance skills in science and technology (PACST) has now been incorporated into Innovation Québec. In order to take into account the experience of the first two years of operation, technical adjustments will be made to the program in order to broaden the categories of projects and the pool of eligible organizations.

INNOVATION QUÉBEC

PROMOTION AMONG SECONDARY SCHOOL STUDENTS OF CAREERS IN SCIENCE AND TECHNOLOGY – ENHANCEMENT OF ASSISTANCE TO THE UPCOMING GENERATION –

OBJECTIVE

- Broaden the scope of the existing program.

FEATURES OF THE MEASURE

- Addition of new categories of eligible projects:
 - initiatives such as major colloquia that do not necessarily give rise to a product;
 - projects already supported by the program in which the quality of content and relevance warrant more widespread circulation or dissemination.
- Addition of eligible organizations:
 - Québec research funding organizations.
- Enhancement of the assistance:
 - funding of up to a maximum of \$210 000 for a 36-month project (a maximum of \$70 000 per year);
 - a \$2 000 grant for the conception and elaboration of a project, subject to the submission of a preliminary estimate that describes the objectives.

FINANCIAL IMPLICATIONS

Assistance for the upcoming generation will be extended until March 31, 2001 and the annual budget will be increased to \$1.3 million in 1999-2000 and in 2000-2001.

Graduation

Too many young people leave Cegep and university without completing their studies. In 1996-1997, over one third of students abandoned their programs without obtaining a diploma at all levels of the education system. The situation is especially worrisome in the Cegep technical sector, where nearly half of the students leave without a diploma.

TABLE 4
ACADEMIC SUCCESS IN CEGEPS AND UNIVERSITIES
PROPORTION OF STUDENTS WHO OBTAIN A DIPLOMA
(as a percentage)

	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997 ^E
Cegep							
Pre-university training	71.4	71.6	69.4	67.6	65.4	64.3	66.2
Technical training	58.6	58.2	56.7	54.0	53.1	53.1	51.4
University							
Bachelor's degree	61.5	61.5	61.2	61.1	63.4	65.9	65.7
Master's degree	64.5	65.7	65.1	65.7	64.6	65.6	65.4
Doctorate	52.4	54.6	53.9	54.9	54.5	56.5	58.3

E: Estimate.

Note: Proportion of students who complete their studies and obtain a diploma, according to the most recent year of registration.

Source: Ministère de l'Éducation, Direction des statistiques et des études quantitatives, March 1999.

Moreover, an almost constant decline in academic success has been noted in Cegeps since the beginning of the 1990s. From 1990-1991 to 1996-1997, the success rate fell from 71.4% to 66.2% in pre-university training, and from 58.6% to 51.4% in technical training.

In the realm of scientific and technical studies, the figures are more alarming. For example, over 70% of young people who enrol in computer technology in Cegep abandon the program before completing it.³ Between 40% and 60% of students who register in scientific or technical disciplines at Cegep and university do not obtain a diploma.⁴

³ Commission de l'évaluation de l'enseignement collégial, *Évaluation des programmes d'informatique*, June 1996.

⁴ Conseil de la science et de la technologie, *Des formations pour une société de l'innovation*, Avis, June 1998.

Data on dropping out in disciplines related to the sciences and technology are all the more disturbing since, in these fields, employment is growing more rapidly than in other fields. The government must take the necessary steps to boost the motivation and perseverance of young people enrolled in these disciplines.

Two measures were announced in the 1999-2000 Budget Speech. One measure is intended to sustain interest in the sciences and technology by emphasizing careers in these fields. The other measure focuses on broader academic success by fostering tutorials by peers in Cégeps.

1999-2000 BUDGET
<p align="center">GUIDANCE FOR CEGEP STUDENTS IN SCIENTIFIC AND TECHNICAL CAREERS</p> <hr/> <p>OBJECTIVE</p> <ul style="list-style-type: none"> ▪ Increase the graduation rate of students registered in the natural sciences and in certain applied techniques. <p>FEATURE OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ Funding by the ministère de l'Éducation of projects submitted by the Cégeps proposing activities that establish contact between new students in these disciplines and individuals engaged in scientific and technological careers. <p>FINANCIAL IMPLICATIONS</p> <p>The ministère de l'Éducation will allocate a budget of \$1 million a year over the next two years to the Cégeps.</p>

1999-2000 BUDGET**FUNDING OF PEER TUTORIAL PROJECTS IN CEGEPS****OBJECTIVE**

- Foster the success of greater numbers of Cegep students, especially in programs directly related to the sciences and technology, by pairing students in difficulty with students who have succeeded in these subjects (peer tutorial).

FEATURES OF THE MEASURE

- Funding of peer tutorial projects submitted by the Cegeps.
- Creation of roughly 900 part-time jobs for Cegep students.

FINANCIAL IMPLICATIONS

The ministère de l'Éducation will have at its disposal an annual budget of \$1.5 million over the next two years to cover this measure.

3.2.3 Ensure proper matching between labour supply and labour market needs

Match labour supply and demand at a time when needs are changing rapidly

Rapidly changing needs for qualified workers are a key characteristic of an innovative society. Under the circumstances, a crucial factor in the coming years will be to ensure the best possible matching between labour supply and labour market needs.

The education system has a primordial role to play in the process of adjusting the supply of highly educated workers to the needs of the economy. The prompt adaptation of educational programs is a decisive factor with respect to the proper functioning of the job market.

Enterprises in certain economic sectors that are subject to very rapid technological change, especially those related to the information and communications technologies, are facing problems concerning the availability of sufficient numbers of workers and the adaptation of training to their needs.

The education system must closely monitor the labour market's needs, particularly in these fields, in order to broaden its efforts to:

- better direct individuals to occupations and professions in high demand;
- better gear university and Cegep programs to the needs of the job market.

At the same time, to ensure that the education system is aware of the needs of the labour market, it is essential to maintain an effective information system on changes in needs for qualified workers. Such a system does not exist at present in Québec. The information available is often inadequate and dispersed.

Target strategic fields

To respond to these concerns, the government announced several measures in the 1999-2000 Budget:

- initiatives to overcome manpower shortages in the information technologies sector;
- further development of short-term training;
- the establishment of the Centre Emploi–Technologie (CETECH) in order to better understand and anticipate changes in demand for highly qualified workers.

Overcome manpower shortages in the information technologies sector

Demand in the information technologies sector outstrips the number of new graduates

Demand for qualified workers in the information technologies sector in Québec is very brisk. However, the number of Cegep and university graduates in electronics and data processing is largely insufficient.

To remedy the situation, the government will earmark \$24 million over the next two years to increase enrolment and the graduation rate in Cegeps and universities in the realm of the new information technologies.⁵

⁵ In Cegeps, the diplomas covered are the DCS in electronics, industrial electronic technology, technology of computer systems, technology of electronic design, physics technology and data processing. At the university level, the diplomas covered are bachelor's degrees in computer science, computer engineering and the construction of computers, and in electrical, electronics and communications engineering. DCSs and bachelor's degrees in multimedia and software engineering are also covered.

BUDGET 1999-2000**INITIATIVES TO OVERCOME MANPOWER SHORTAGES
IN THE INFORMATION TECHNOLOGIES SECTOR****OBJECTIVE**

- Double the number of graduates (DCSs and bachelor's degrees) in the information technologies sector within six years.

FEATURES OF THE MEASURE

- Grant bursaries of up to \$3 000 per graduate.
- Financial support for the universities to offset higher costs related to the increase in the number of students registered.
- Contribution to the financing of the purchase of computer equipment.

FINANCIAL IMPLICATIONS

The ministère de l'Éducation will allocate \$24 million over two years to these new initiatives, i.e. \$10 million in 1999-2000 and \$14 million in 2000-2001.

***Increase the education
system's ability to adapt******Broader development of short-term training***

In the 1998-1999 Budget, the government announced a measure to support educational institutions in the development of short-term training. This measure is intended to increase the education system's ability to adapt to the labour needs of rapidly growing sectors. It has two sections:

- the development of bridges between existing programs to facilitate career shifts;
- the development of short-term training programs to satisfy the urgent training needs pinpointed by businesses.

This measure has produced excellent results, particularly in the Cegeps (92 projects submitted and 57 accepted until now). However, it has had less impact in those fields of study that require the purchase of costly computer equipment. The government has, therefore, decided to enhance the program in the 1999-2000 Budget.

1999-2000 BUDGET**FUNDING OF SHORT-TERM TRAINING PROGRAMS****OBJECTIVE**

- Increase the education system's ability to adapt.

FEATURES OF THE MEASURE

- Enhancement of the existing measure through funding for computer equipment needed to launch new programs (\$30 000 maximum per new program).
- Extension of the measure for 2000-2001.

FINANCIAL IMPLICATIONS

The ministère de l'Éducation will have an additional \$1.5 million at its disposal for this program in 1999-2000 and \$4 million in 2000-2001.

Enhancement of knowledge of trends on the job market for highly qualified workers

Better ascertain changes on the job market for highly qualified workers to avoid shortages

The government announced in the 1999-2000 Budget Speech the establishment of the Centre Emploi-Technologie (CETECH), in order to better ascertain changes on the job market for highly qualified workers.

The Centre will be concerned primarily with developing a thorough knowledge of and constantly monitoring labour market trends. The number of workers and needs for scientific and technical workers in sectors that are of strategic importance for the development of an innovative economy will be specifically covered, along with emerging trades and occupations and those related to data processing.

1999-2000 BUDGET

**ESTABLISHMENT OF THE
CENTRE EMPLOI-TECHNOLOGIE
(CETECH)**

OBJECTIVES

- Enhance knowledge of changes on the job market for highly qualified workers in order to better guide students, more rapidly and effectively adapt the education system to the needs of the labour market, and help balance supply and demand for workers in sectors of strategic importance to the economy.
- Widely disseminate the findings.

FEATURES OF THE MEASURE

- Establishment of the Centre Emploi-Technologie at Emploi-Québec.
- Mandates of the research team established by the steering committee.
- Steering committee:
 - chaired by Emploi-Québec;
 - made up, in particular, of representatives of industry, educational institutions, the future ministère de la Recherche, de la Science et de la Technologie and the government departments concerned.

FINANCIAL IMPLICATIONS

The government will devote \$2 million a year over the next two years to the realization of CETECH's activities.

Measures for the overall environment

Innovation Québec

**Financial impact
over two years
(millions of dollars)**

▪ FRSQ – BASIC FUNDING OF RESEARCH CENTRES	5.8
▪ FRSQ – THEMATIC RESEARCH	5.0
▪ FONDS FCAR – CONCERTED ACTION PROGRAM	2.0
▪ FONDS FCAR – SCIENTIFIC EQUIPMENT USED FOR UNIVERSITY RESEARCH	5.0
▪ CQRS – SUPPORT FOR SOCIAL RESEARCH	3.6
▪ FONDS FCAR – STRATEGIC PROGRAM FOR FCAR RESEARCHERS	3.8
▪ FRSQ – SALARY SUPPORT FOR QUÉBEC RESEARCHERS	4.0
▪ CQRS – RESEARCH FELLOWSHIP PROGRAM	0.4
▪ CHALLENGES AND OPPORTUNITIES IN RESEARCH AND INNOVATION	19.5
▪ PROMOTION OF CAREERS IN SCIENCE AND TECHNOLOGY	1.6

Subtotal

50.7

Measures for the overall environment

<i>1999-2000 Budget</i>	
	Financial impact over two years (millions of dollars)
▪ GUIDANCE FOR CEGEP STUDENTS IN SCIENTIFIC AND TECHNICAL CAREERS	2.0
▪ FUNDING OF PEER TUTORIAL PROJECTS IN CEGEPS	3.0
▪ INITIATIVES TO OVERCOME LABOUR SHORTAGES IN THE INFORMATION TECHNOLOGIES SECTOR	24.0
▪ FUNDING OF SHORT-TERM TRAINING PROGRAMS	5.5
▪ ESTABLISHMENT OF THE CENTRE EMPLOI- TECHNOLOGIE (CETECH)	4.0
Subtotal	38.5
TOTAL – OVERALL ENVIRONMENT	89.2

4 *The government facilitates relations in the immediate environment*

4. THE GOVERNMENT FACILITATES RELATIONS IN THE IMMEDIATE ENVIRONMENT

Enterprises cannot innovate alone

Innovation is, first and foremost, the responsibility of the enterprise. However, in order to carry out their projects, enterprises must usually act in collaboration with numerous interveners in their immediate environment. The State can facilitate and encourage such interactions by supporting networking initiatives and the pooling of resources.

The immediate environment with which the enterprise interacts encompasses primarily:

- universities and colleges;
- government organizations;
- venture capital companies and other financial institutions;
- enterprise networks and collaboration.

4.1 Innovative enterprises, educational institutions and liaison organizations: partnerships to be bolstered

Broader collaboration between universities and innovative enterprises

Enterprises rely on the skills and resources of universities, particularly through the realization of research projects in partnership or through the awarding of contracts. In certain cutting-edge sectors, collaboration between universities and enterprises has become systematic and sustained. A similar synergy is also developing between enterprises and certain colleges. We must continue to bolster this process.

4.1.1 Encourage relations between public researchers and private enterprise

At present, the Centres de liaison et de transfert (CLTs), the Centres collégiaux de transfert de technologie (CCTTs) and enterprise-university liaison organizations are the main interveners devoted to the development of relations between enterprises and researchers in post-secondary educational institutions, in conjunction with the innovation process.

*The CLTs, an original
initiative in Québec*

The Centres de liaison et de transfert (CLTs)

The liaison and transfer centre formula was developed in Québec starting in 1985. There are now six centres partly financed by the Québec government. They are among the key liaison agents between universities and enterprises. The centres are also responsible for transferring the results of university research to enterprises, each one in a specific sector.

The CLTs assemble researchers from several universities or research centres who associate with industrial partners to engage in research projects, facilitate the realization of strategic alliances, ensure technology transfers, and contribute to the training of highly qualified workers.

The CLTs offer diversified services. They can provide leading-edge expertise, foster linkages and the organization of research projects, help finance R&D projects, and ensure the dissemination of the results of research through the organization of seminars, conferences and specialized courses. Most CLTs participate in the training of top-notch researchers by accepting post-master's degree and post-doctoral trainees.

CENTRES DE LIAISON ET DE TRANSFERT

- **Centre de recherche en calcul appliqué (CERCA)**, specializing in the application of digital computation in the basic and applied sciences.
- **Centre de recherche informatique de Montréal (CRIM)**, specializing in the information technologies and data processing applications.
- **Centre francophone en informatisation des organisations (CEFRIO)**, specializing in the study of the organizational impact of the new information and communications technologies.
- **Centre interuniversitaire de recherche en analyse des organisations (CIRANO)**, specializing in the scientific analysis of organizations and strategic behaviour.
- **Centre québécois de valorisation des biomasses et des biotechnologies (CQVB)**, specializing in expertise and financing for the start-up of projects and technological enterprises in the bio-industries.

- **Centre québécois de recherche et de développement de l'aluminium (CQRDA)**, specializing in the development of collaboration between researchers and industrialists in the realms of the production of aluminum and the search for new uses for this metal.

The CLT funding program was established in 1985-1986. The annual budget granted to the CLTs decreased from \$12.8 million in 1993-1994 to \$8.8 million in 1998-1999. The consolidation of the existing centres and the recognition of new centres to satisfy strategic needs for liaison and transfer have become more difficult in recent years.

In light of the importance of the CLTs in the Québec innovation system, the government will allocate an additional \$9 million over two years to the CLT funding program.

INNOVATION QUÉBEC	
<p style="text-align: center;">SUPPORT FOR THE FUNDING OF THE CENTRES DE LIAISON ET DE TRANSFERT</p> <hr/> <p>OBJECTIVE</p> <ul style="list-style-type: none"> ▪ Allow the Centres de liaison et de transfert to properly fulfil their mandate. <p>FEATURE OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ Increase the budget allocation of the CLT funding program to: <ul style="list-style-type: none"> – adjust the budgets of the existing centres, if need be; – possibly recognize new centres. <p>FINANCIAL IMPLICATIONS</p> <p>Innovation Québec will receive an additional \$4 million in 1999-2000 and \$5 million in 2000-2001 for this program.</p>	

The Centres collégiaux de transfert de technologie (CCTT)

The Centres collégiaux de transfert de technologie have been set up with two objectives in the Cegep network:

- contribute to the economic development of their region and Québec by ensuring technology transfers through research and development carried out in collaboration with enterprises;
- satisfy the technical training needs of enterprises.

There are 23 CCTTs (see Appendix D), which focus mainly on three types of activities. Specifically, the centres:

- conduct research often centred on the application of new products and processes;
- provide technical assistance services (supervision of the implementation of equipment and technologies, advice, coordination);
- offer technical training adapted to the needs of enterprises.

The centres cover several industrial sectors, ranging, in particular, from aquaculture to geomatics, not to mention the textile industry and home automation, and are located throughout Québec.

The Conseil de la science et de la technologie deems the CCTT formula to be an especially effective partnership and transfer mechanism in the Québec innovation system, since it has succeeded in drawing the education system and industry closer together.

However, the CCTTs' current budgets make it difficult to cover the cost of renewing their machinery and equipment. Consequently, their equipment is becoming less and less suitable to satisfy the needs of enterprises. This situation is considerably curtailing their ability to obtain contracts and to fulfil their technology transfer mandate.

In order to support the CCTTs in the realization of their mission, the government will allocate \$4 million over two years for the renewal of equipment.

INNOVATION QUÉBEC**SUPPORT FOR EQUIPMENT PURCHASES
IN THE CCTT NETWORK****OBJECTIVES**

- Help the CCTTs obtain modern equipment.
- Enable the centres to effectively fulfil their responsibility for dissemination and technology transfers among SMEs.

FEATURES OF THE MEASURE

- Eligible expenses: 80% of the cost of purchasing equipment or development programs aimed at dissemination and technology transfers, up to a maximum of \$300 000 per project.
- The organization must assume 20% of the cost of the project.
- Projects selected by competition.

FINANCIAL IMPLICATIONS

Innovation Québec will grant \$2 million a year over the next two years for this program.

*A new tax credit to facilitate
access to the services
of CLTs and CCTTs*

The government also intends to encourage enterprises to avail themselves of the services offered by CLTs and CCTTs. To this end, a tax measure was announced in the 1999-2000 Budget Speech. The measure allows enterprises to obtain a tax credit in respect of searches for information and liaison, transfer and training activities that they entrust to these centres.

1999-2000 BUDGET**REFUNDABLE TAX CREDIT
FOR TECHNOLOGICAL ADAPTATION SERVICES
– LIAISON AND TRANSFER SECTION –****OBJECTIVES**

- Broaden collaboration between enterprises and CLTs and CCTTs.
- Consolidate the availability of liaison and transfer services adapted to the needs of enterprises.

FEATURES OF THE MEASURE

- A 40% refundable tax credit on the cost of acquiring the liaison and transfer services offered by accredited organizations.
- Eligible enterprises: SMEs.
- Eligible expenses: 80% of fees on liaison and transfer services, the cost of participating in information and training activities, and the cost of subscribing to liaison and transfer products and services.

FINANCIAL IMPLICATIONS

This measure will cost \$3 million in 1999-2000 and \$4 million in 2000-2001.

4.1.2 Develop and commercialize the results of research

The universities are at the heart of scientific development in Québec. In addition to contributing to the advancement of knowledge, they make it possible to develop knowledge and sustain research. The universities offer entrepreneurs the raw material necessary to launch new enterprises and create jobs.

To enable the economy to develop rapidly in leading-edge sectors, the universities must be able to fully assume these functions. Moreover, they should be able to directly benefit from their research by commercializing such research. At present, these conditions are not always present.

Québec universities do not always have at their disposal the resources necessary to fund research teams engaged in multidisciplinary or

multisectorial projects in partnership. This situation reduces the universities' ability to retain their best researchers and attract the most qualified human resources.

***Research results that lead
all too rarely to products***

The results of scientific research lead all too rarely in Québec and Canada to patents, processes and marketable products. While Québec and Canadian scientists produce, all things being equal, as many scientific publications as their American counterparts, the development and commercialization of the results of research are relatively recent concerns in the universities and remain largely underdeveloped. Between 1991 and 1995, the royalties collected by American universities reached 1.7% of R&D spending, double the royalties received by Québec and Canadian universities (0.9% of R&D spending).¹

***\$100 million to develop the
research and knowledge of
Québec universities***

The government intends to support the universities to enable them to more actively play their role. In order to develop the knowledge of Québec universities, the government will pay, in 1998-1999, \$100 million to Valorisation-Recherche Québec, a non-profit organization.

Projects covered

The grant will be paid to Valorisation-Recherche Québec for the purpose of financially supporting:

- the projects of university research teams;
- the commercialization of the results of university research.

In all instances, the projects must contribute to the establishment of critical masses and engender significant spin-off.

The projects of university research teams must complement other assistance programs available for this type of project, particularly those aimed at the recruiting of researchers, the consolidation of the university careers of young researchers, and the development and maintenance of the infrastructure of research teams.

¹ Association of University Technology Managers, *1995 Survey Results*, drawn from *L'entreprise innovante au Québec: les clés du succès*, Conseil de la science et de la technologie, Avis, June 1998.

The commercialization of the results of university research must focus on the establishment and development of marketing firms whose mission it is to develop and commercialize research for the benefit of the institution and its researchers, in particular by means of:

- the proactive search for promising technologies and the assessment of their positioning in relation to competing technologies;
- the management of intellectual property (patenting of promising ideas);
- the establishment of a development plan for the technologies chosen and the supervision of researchers during the development program;
- the management of royalties and the profits from the commercialization of technologies resulting from the licences granted by the institution or the sale of shares following the listing on the stock exchange of the operating companies.

Proposals to commercialize the results of university research must be accompanied by specific expectations pertaining to self-financing, the number of enterprises and jobs created in Québec, income from licences generated, or any other appropriate indicator.

Financing of projects

Applications for project financing will be accepted until March 31, 2002. The duration of the projects submitted must not exceed four years. Valorisation-Recherche Québec will establish the matching rules governing project financing.

In the case of funding for the projects of research teams, Valorisation-Recherche Québec will establish the matching rules bearing in mind existing programs and while avoiding any recovery of expenses already assumed by the institutions concerned. The matching funds could be provided, if need be, by research funds and public, parapublic and private partners.

The financing granted to Valorisation-Recherche Québec projects intended to commercialize the results of university research will take the form of a matching grant in respect of eligible expenses, in all cases. The matching funds must be provided by the university, or private and public partners, other than the Québec government.

VALORISATION-RECHERCHE QUÉBEC**OBJECTIVES**

- Contribute to the financing of the projects of university research teams.
- Contribute to the financing of the commercialization of the results of university research.

STRUCTURE

- A non-profit corporation independent of the government.
- A board of directors made up of nine representatives of the universities, research institutions and private enterprise.

FINANCIAL IMPLICATIONS

- Valorisation-Recherche Québec will earmark \$100 million over the next three years for the financing of projects, i.e. \$50 million for the projects of university research teams and \$50 million for the commercialization of the results of university research.

4.1.3 Develop and commercialize inventions

Too many projects related to an invention do not reach the business project stage

If the results of university research are insufficiently developed from a commercial standpoint, the same is true of inventions. Few projects see the light of day or succeed in interesting venture capital companies.

The absence of appropriate measures to assist inventors and the financial risk inherent in this type of project are two difficulties that are often invoked to explain the low rate of commercial development of inventions.

Few measures have been specially developed to help inventors, in particular during the emergence phase, i.e. during the transition from the idea to the project concept.

Financing problems are especially acute during the emergence phase. Financing organizations deem the financial risk to be too high at this

stage and believe that the intangibility of assets makes it hard to assess risk and that a return on investment is too remote.

In order to overcome this shortcoming, Innovation Québec will introduce a new measure to support the development of inventions.

INNOVATION QUÉBEC
SUPPORT FOR THE DEVELOPMENT OF INVENTIONS
<p>OBJECTIVES</p> <ul style="list-style-type: none"> ▪ Provide the tools that allow a greater number of inventions to progress from the idea stage to a business project. ▪ Increase the technical and financial assistance available during the business project phase. <p>FEATURES OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ Section 1: Support tools <ul style="list-style-type: none"> – Assistance covering up to 50% of costs, to a maximum of \$50 000 per project, for the realization and dissemination of support tools for inventors. – Assistance granted to private or public organizations that are especially suited to develop tools for inventors. ▪ Section 2: Financial assistance for inventors <ul style="list-style-type: none"> – Financial assistance during the business project phase covering up to 50% of costs, up to a maximum of \$10 000 per activity. – Eligible expenses: assistance and realization of technical and economic studies, validation tests, prototype development, and steps to protect intellectual property. – Possibility of submitting up to three activities in conjunction with the same project. <p>FINANCIAL IMPLICATIONS</p> <p>Innovation Québec will allocate \$2 million a year over the next two years to the funding of this measure.</p>

4.2 Relations with government organizations

4.2.1 Importance of government procurement

Government procurement offers business potential to innovative enterprises

Several studies have shown how useful it is for enterprises to be able to rely on an initial user as regards innovation, for the commercial demonstration of an innovation or as a technological showcase for the development of new markets.

Considering their size, government and parapublic procurement can play a major role as a base for testing the technological innovations of enterprises. In Québec, the market is worth roughly \$15 billion.

4.2.2 Promote innovation through government procurement

In the wake of the numerous agreements on trade concluded in recent years,² the Québec government's leeway with respect to government procurement has become more limited.

However, certain provisions in these agreements leave some latitude to support innovative enterprises, especially as regards the purchase of the first prototype. The Agreement on Internal Trade allows a government department or organization or a parapublic organization not to proceed by call for tender to purchase a prototype, a new product or service that is to be developed in conjunction with a specific market.

While these non-application provisions exist, public buyers are not inclined to make use of them to purchase innovative Québec products. Such products are usually more expensive or imply a greater financial or technological risk than known, proven products.

Encourage government departments and networks to adopt innovative products

To encourage the managers of government departments and networks to use the leeway allowed under trade agreements, the government is allocating \$4 million over two years to promote the testing and adoption of the prototypes of innovative products.

² The Agreement on Internal Trade in Canada and Agreements with New Brunswick and Ontario.

INNOVATION QUÉBEC**TECHNICAL AND FINANCIAL ASSISTANCE FOR THE
DEVELOPMENT OF TECHNOLOGICAL APPLICATIONS****OBJECTIVES**

- Financially encourage interveners in the public and parapublic sectors to become partners in projects intended to develop and demonstrate technological innovations that include certain financial or technological risks.
- Rely on government procurement in order to test and promote innovation.

FEATURES OF THE MEASURE

- Financial support for the purchaser or user in the public and parapublic sectors not exceeding 50% of the total cost of the project, up to a maximum of \$150 000.
- Eligible projects: purchase of a prototype, new product or service that is to be developed in conjunction with a specific market.
- Evaluation of the project and establishment of the amount of and conditions governing the assistance by an interdepartmental committee.

FINANCIAL IMPLICATIONS

Innovation Québec will earmark \$4 million over the next two years for the financing of this measure, i.e. \$1.5 million in 1999-2000 and \$2.5 million in 2000-2001.

4.3 Innovation and the networking of enterprises

Enterprise networks and collaboration play an important role for innovative enterprises. Often, such networks and collaboration enable enterprises to make technological choices, elaborate commercial strategies, establish alliances, or participate in research consortia in Canada and abroad.

*Business watch networks
are a means of ensuring the
technological development
of SMEs*

4.3.1 Business watch networks

In recent years, large enterprises, which are aware of the importance of strategic information, have established their own business watch services. However, the situation is much different for SMEs, which do not have at their disposal the same human and financial resources to set up such systems. Business watch services are important for the development of SMEs, whether to select a more productive technology, establish alliances, reduce the cost of raw materials, or find out about the most efficient management policies.

In 1993, Québec set up the partnership fund, one section of which is devoted to the establishment of business watch networks. Some 13 networks have been created and financed with government assistance, by contributions from the partners, and through the sale of customer products and services.

These business watch networks bring together nearly 100 partners, which offer to industry access to research, analytical and strategic information summary services.

LIST OF QUÉBEC BUSINESS WATCH CENTRES

- Centre de veille sur les médias
- Centre de veille sur les communications graphiques (Vigicom)
- Centre de veille de la construction (CeVeC)
- Centre de veille des équipements de transport terrestre (CVETT)
- Centre de veille sur les métaux légers (CVML)
- CEVEIL (Cellule de veille et d'expertise sur les inforoutes et langues)
- ÉCO RADAR (Réseau de veille concurrentielle en environnement)
- OBTIQ (Observatoire des technologies de l'information du Québec)
- Réseau CHIMIE (Réseau d'information stratégique de l'industrie chimique)
- RVSB (Réseau de veille stratégique bioalimentaire)
- RISP (Réseau d'information stratégique de plasturgie)
- Réseau INFO-BOIS (Réseau d'information sur les produits du bois inc.)
- Réseau d'information stratégique de la mode et des textiles

Examples of groups of partners:

- **OBTIQ** encompasses CRIM CEFRIO, the Centre de promotion du logiciel québécois (CPLQ) and the Université du Québec à Montréal (UQAM);
- similarly, the **Réseau d'information stratégique de la mode et des textiles** encompasses the Centre des technologies textiles du cégep de Saint-Hyacinthe, the Centre spécialisé de la mode du collège Lasalle and the Groupe Impac, a grouping of industrialists in the Lac-Mégantic region.

A new tax credit to facilitate access to the services of business watch networks

To broaden the dissemination of the services offered by business watch organizations, the government announced in the 1999-2000 Budget that the eligible expenses incurred in accredited business watch centres would give rise to a refundable tax credit for technological adaptation services.

1999-2000 BUDGET
<p align="center">REFUNDABLE TAX CREDIT FOR TECHNOLOGICAL ADAPTATION SERVICES – COMPETITIVE INFORMATION SECTION –</p>
<p>OBJECTIVE</p> <ul style="list-style-type: none"> ▪ Encourage enterprises to broaden their technological, competitive and business watch operations.
<p>FEATURES OF THE MEASURE</p> <ul style="list-style-type: none"> ▪ A 40% refundable tax credit on the cost of purchasing information services offered by accredited business watch centres. ▪ Eligible enterprises: SMEs. ▪ Eligible expenses: 80% of the fees payable for information services, the cost of participating in information and training activities, and the cost of subscribing to information products and services.
<p>FINANCIAL IMPLICATIONS</p> <p>This measure will cost \$1 million in 2000-2001.</p>

In the coming months, the government intends to evaluate, in collaboration with industry, the results obtained by these centres. This evaluation should make it possible to propose, for the year 2000-2001, funding methods that allow the business watch centres to effectively fulfil their role with respect to enterprises.

4.3.2 Business combinations

The Carrefours de la nouvelle économie

The Centres de développement des technologies de l'information (CDTI) and the Cité du multimédia are two business combination formulas that have accelerated the creation and growth of enterprises in the information and communications technologies sector.

In light of the results of this experience, the government announced in the 1999-2000 Budget Speech its intention to introduce this development formula into the regions of Québec by establishing 12 Carrefours de la nouvelle économie (CNE).

The Carrefours de la nouvelle économie: acknowledgement of the specific character of the regions and opportunities for young people

In order to acknowledge the specific character of the regions from the standpoint of technological development and offer as many young people as possible an opportunity to obtain quality jobs in their region, the field of application of the CNEs will cover not only the information and communications technologies sector but also an array of technologies that have a developmental effect on the economy, e.g. biotechnologies, materials technologies, production technologies, and scientific and technological services.

1999-2000 BUDGET

ESTABLISHMENT OF THE CARREFOURS DE LA NOUVELLE ÉCONOMIE

OBJECTIVES

- Encourage the emergence and growth of enterprises in the new economy.
- Maximize synergy and collaboration between enterprises.
- Revitalize the economic strengths inherent in Québec's regions.

FEATURES OF THE MEASURE

- A refundable tax credit equivalent to 40% of the salaries paid to employees involved in the realization of certain activities related to the knowledge-based economy.
- Financial assistance not exceeding \$15 000 per job per year.
- Target clientele: enterprises in the information and communications technologies, biotechnologies, materials technologies and production technologies sectors, and scientific and technological services.

FINANCIAL IMPLICATIONS

The measure will cost \$1 million in 1999-2000 and \$9 million in 2000-2001.

Centre national des nouvelles technologies de Québec (CNNTQ)

For several years, the government has provided special support to develop and broaden the influence of the Québec information and communications technologies industry. It is also keenly concerned with the dissemination of Québec culture and the arts.

With a view, in particular, to combining these two development priorities by supporting and fostering the development of the arts in relation to the new information and communications technologies and the multimedia, the government announced in the 1999-2000 Budget Speech the establishment, for the benefit of Québec's national capital, of the Centre national des nouvelles technologies de Québec (CNNTQ).

Bolster the cultural vocation of Québec's national capital while revitalizing downtown Québec City

This government initiative underpins a burgeoning sector while enabling artists to experiment with new means of expression. The project is directly in keeping with the extension of the development policy pertaining to Québec's national capital, which the government made public in June 1998. It will make it possible to bolster the cultural vocation of Québec's national capital while contributing to the revitalization of downtown Québec City.

The CNNTQ will assemble, on a site in downtown Québec City, enterprises that rely on the new information and communications technologies such as multimedia, animation, digitization of images and content, and special effects, applied, in particular, to the arts and culture.

1999-2000 BUDGET**ESTABLISHMENT OF THE CENTRE NATIONAL
DES NOUVELLES TECHNOLOGIES DE QUÉBEC (CNNTQ)****OBJECTIVES**

- Promote in downtown Québec City activities related to the information technologies and multimedia.
- Foster the development of applications of the information technologies and multimedia, especially in the arts and culture sector.

FEATURES OF THE MEASURE

- A refundable tax credit equivalent to 40% of the salaries paid to employees directly involved in production operations.
- Annual financial assistance of up to \$15 000 per job.
- Target clientele: enterprises grouped together in downtown Québec City in designated buildings of the CNNTQ.

FINANCIAL IMPLICATIONS

The measure will cost \$1 million in 1999-2000 and \$5 million in 2000-2001.

The Cité de l'optique

Economic activities related to the development of photonics are today a rapidly growing niche in the cutting-edge technologies industry. They include fibre optics, quantum optics, lasers, optoelectronics, imaging, and optical data processing.

*The Québec City area has
recognized expertise in
photonics and optics*

The Québec City area enjoys recognized expertise in this field with world-renowned establishments and dynamic, efficient enterprises. All told, the Québec City area has roughly 1 500 jobs in the optics-photonics sector.

The government will provide special support to promote the development of the Québec City area as a world-class hub of excellence in the realm of optics-photonics.

1999-2000 BUDGET**CITÉ DE L'OPTIQUE****OBJECTIVES**

- Consolidate the partnership between universities, research centres and enterprises.
- Support the realization of pre-commercialization and commercialization developmental projects.
- Encourage the deployment of enterprises in the Québec City area.

FEATURES OF THE MEASURE

- **Section 1: *Research and development*:** Financial support for the realization through partnerships between universities, enterprises and research centres of research projects geared to practical, marketable applications in optics-photonics.
- **Section 2: *Commercialization*:** Financial support for the development by enterprises of new, marketable processes and products on markets in the optics-photonics sector.
- **Section 3: *Deployment*:** Financial support for enterprises and research centres wishing to set up operations or expand in the Québec City area.

FINANCIAL IMPLICATIONS

The future ministère de la Recherche, de la Science et de la Technologie will allocate \$1 million per year to Section 1 over the next two years.

The ministère de l'Industrie et du Commerce will earmark \$2 million in 1999-2000 and \$3 million in 2000-2001 for Sections 2 and 3.

Tax holiday for foreign trainers

Foreign trainers now employed by an enterprise in a Centre de développement des technologies de l'information (CDTI) enjoy a two-year exemption on tax on their salaries.

Facilitate the recruiting of specialized trainers for enterprises in CDTIs

To bolster its initiatives with respect to training for these business combinations, the government announced in the 1999-2000 Budget Speech the extension from two to five years of the tax holiday granted to foreign trainers. This measure will enable the enterprises in a CDTI to more easily recruit specialized trainers.

1999-2000 BUDGET
TAX HOLIDAY FOR FOREIGN TRAINERS (CDTI)
OBJECTIVE <ul style="list-style-type: none"> Facilitate the recruiting of foreign trainers by enterprises operating in a CDTI.
FEATURES OF THE MEASURE <ul style="list-style-type: none"> Extension from two to five years of the tax holiday for foreign trainers. Target clientele: foreign trainers employed by a corporation operating an enterprise in a CDTI.
FINANCIAL IMPLICATIONS <p>The measure will cost \$1 million a year over the next two years.</p>

4.3.3 International cooperation

Encourage broader openness to the world in the Québec scientific community

The Québec government has sought to establish links of a scientific nature on the international scene in recent years, to enable Quebecers to participate more fully in international research efforts and to benefit from the resulting spin-off.

Several bilateral scientific and technological cooperation agreements have been signed with European governments, e.g. France, Flanders, the Walloon region of Belgium, and Bavaria, and with other countries such as Israel and China. In 1997, the French and Québec Prime Ministers agreed to encourage more extensive technological meetings and thus assemble the key stakeholders in industry and research in Québec and France. Three technological meetings were held in 1998, which led to

the establishment of 11 research projects. This experience will be repeated shortly with other countries.

The European Union (EU) is one of the world's leading scientific and technological powers. From the standpoint of scientific publications, it accounts for 33%³ of scientific output and nearly 43%⁴ of scientific cooperation in the world. Under the Fifth Framework Programme, the EU is planning to invest several billion in R&D. Enterprises and researchers employed by enterprises in Québec can take part in this research effort, in particular through international research consortia and the bilateral cooperation agreements signed by the Québec government.

In fact, it is hard for Québec researchers, especially those working for enterprises, to find funding for scientific and technological cooperation projects with foreign partners.

It should be noted, in this respect, that the R&D tax credits granted by the federal and Québec governments usually only apply to activities carried out in Canada, which can foster cooperation when research is conducted here. However, this is not the case when researchers must engage in research outside Canada.

In order to facilitate participation by Québec enterprises and researchers in international research cooperation programs, research consortia and research projects arising from bilateral cooperation between Québec and various countries, the government is setting up the financial assistance program for international scientific cooperation, with a budget of \$3.5 million over two years.

³ Observatoire des sciences et des techniques, *Science et Technologie: Indicateurs*, Édition 1998, Economica.

⁴ M. Leclerc, *Mesurer la science: Dynamiques et mesures de la coopération scientifique internationale du Québec et du monde, 1980-1990*, ministère de l'Industrie, du Commerce, de la Science et de la Technologie, 1995.

INNOVATION QUÉBEC**FINANCIAL ASSISTANCE PROGRAM
FOR INTERNATIONAL SCIENTIFIC
AND TECHNOLOGICAL COOPERATION****OBJECTIVES**

- Support R&D projects carried out with international partners.
- Enable Québec enterprises and researchers to benefit from spin-off from international research projects.

FEATURES OF THE MEASURE

- Financial support covering 50% of eligible expenses, up to a maximum of \$200 000.
- Government assistance must not exceed 66% of the cost of the Québec portion of the project.
- Eligible expenses: expenses not covered by R&D tax credits or government assistance programs, such as:
 - the organization of the project;
 - the realization of R&D and the project for activities outside Québec;
 - management of the project outside Québec;
 - the cost of intellectual property and patents, membership fee in the consortium;
 - travel abroad.
- Eligible projects: cooperation projects that are part of international and bilateral agreements, European research partnership programs, or an international research consortium.
- Target clientele:
 - SMEs;
 - Researchers from universities or research centres in partnership with enterprises.

FINANCIAL IMPLICATIONS

Innovation Québec will allocate \$1.5 million to this program in 1999-2000 and \$2 million in 2000-2001.

Measures for the immediate environment

Innovation Québec

**Financial impact
over two years**
(millions of dollars)

▪ SUPPORT FOR THE FUNDING OF THE CENTRES DE LIAISON ET DE TRANSFERT	9.0
▪ SUPPORT FOR THE PURCHASE OF EQUIPMENT IN THE NETWORK OF CCTTs	4.0
▪ SUPPORT FOR THE DEVELOPMENT OF INVENTIONS	4.0
▪ TECHNICAL AND FINANCIAL ASSISTANCE FOR THE DEVELOPMENT OF TECHNOLOGICAL APPLICATIONS	4.0
▪ FINANCIAL ASSISTANCE PROGRAM FOR INTERNATIONAL SCIENTIFIC AND TECHNOLOGICAL COOPERATION	3.5

Subtotal

24.5

Measures for the immediate environment

<i>1999-2000 Budget</i>	
	Financial impact over two years (millions of dollars)
▪ REFUNDABLE TAX CREDIT FOR TECHNOLOGICAL ADAPTATION SERVICES – LIAISON AND TRANSFER SECTION	7.0
▪ VALORISATION-RECHERCHE QUÉBEC ¹	–
▪ REFUNDABLE TAX CREDIT FOR TECHNOLOGICAL ADAPTATION SERVICES – BUSINESS WATCH SECTION	1.0
▪ CITÉ DE L'OPTIQUE	7.0
▪ ESTABLISHMENT OF THE CARREFOURS DE LA NOUVELLE ÉCONOMIE	10.0
▪ ESTABLISHMENT OF THE CENTRE NATIONAL DES NOUVELLES TECHNOLOGIES DE QUÉBEC (CNNTQ)	6.0
▪ TAX HOLIDAY FOR FOREIGN TRAINERS (CDTI)	2.0
Subtotal	33.0
TOTAL – IMMEDIATE ENVIRONMENT	57.5

¹ The government allocated \$100 million to Valorisation-Recherche Québec in 1998-1999.

5 *The government supports innovative enterprises*

5. THE GOVERNMENT SUPPORTS INNOVATIVE ENTERPRISES

Innovation is a demanding process for enterprises

Innovation is a demanding process for enterprises. Whether an enterprise is investing in R&D or acquiring new technologies, implementing new processes, methods or ways of doing things, all of its functions come into play. This chapter examines three decisive aspects of an enterprise's ability to innovate:

- advanced practices;
- in-house R&D;
- the acquisition of new technologies.

5.1 Advanced practices

5.1.1 The organization of work, a factor in competitiveness

Innovation in the enterprise encompasses both the development of new products and the development of new processes, or the acquisition of new technologies. However, in order to bolster productivity, these changes in production processes must be accompanied by changes in the organization of work. Indeed, a twofold shift takes place: technological changes spur organizational changes and, inversely, organizational changes lead to the adoption of new technologies.

The organization of work, a decisive factor in an enterprise's competitiveness

The organization of work, i.e. the entire array of processes that the enterprise develops and implements to fulfil its mission, has always been a decisive factor in its productivity and competitiveness.

At the beginning of the century, the division of work that resulted from the standardization of products made it possible to organize production according to a set sequence of simple tasks and to substantially reduce production costs. Today, in many sectors, mass production has given way to forms of production that satisfy more specialized needs. Enterprises must adapt quickly to their customers' demands and to changing conditions in their environment.

An enterprise's ability to adapt determines its success

This ability to adapt has to some extent supplanted the ability to generate economies of scale as a determining factor in the enterprise's success and its ability to develop.

5.1.2 Significant progress to be consolidated

In Europe and North America, the adoption of advanced practices in enterprises is occurring at different paces depending on the type of changes in the organization of work that such practices engender. The pace is slow when profound changes occur, such as the implementation of autonomous work teams, but much more rapid with respect to production techniques and quality control.

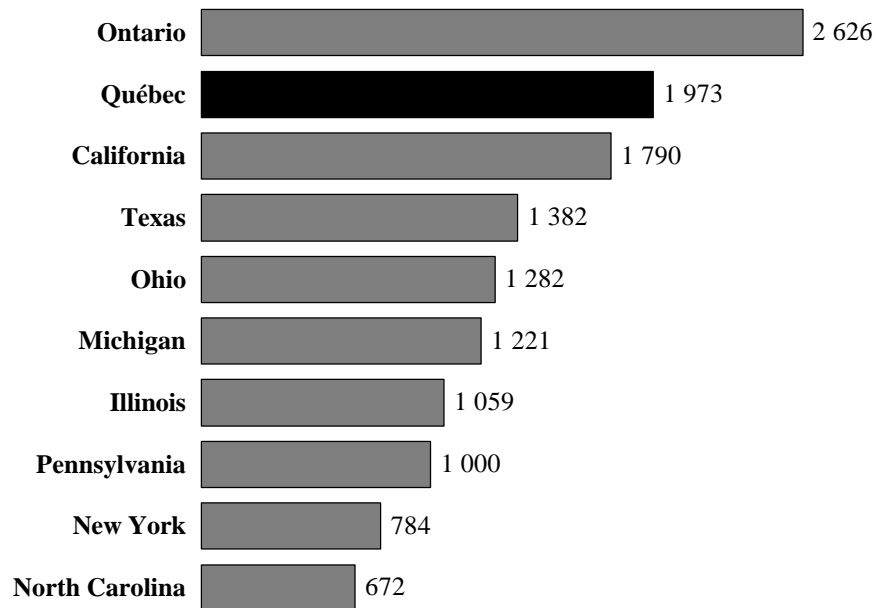
Québec is no exception. Surveys confirm that enterprises have moved quickly to implement quality control and management systems, mainly in the manufacturing sector.¹ In 1995, such systems had been implemented or were planned in over 70% of goods exporting enterprises and in 34% of all enterprises.

Québec ranks second in North America for the adoption of ISO quality standard

In April 1998, Québec ranked second in North America for the adoption of ISO quality standards. With 1 973 ISO 9000 certified sites, Québec is second only to Ontario, with 2 656 sites, and is ahead of California, with 1 790 sites.

¹ Société québécoise de développement de la main-d'œuvre, *Enquête sur les caractéristiques de la demande de main-d'œuvre*, Résultats globaux, 1996 and Conseil de la science et de la technologie, *L'entreprise innovante au Québec: les clés du succès*, June 1998.

CHART 9
NUMBER OF ISO 9000 REGISTRATIONS
APRIL 1998

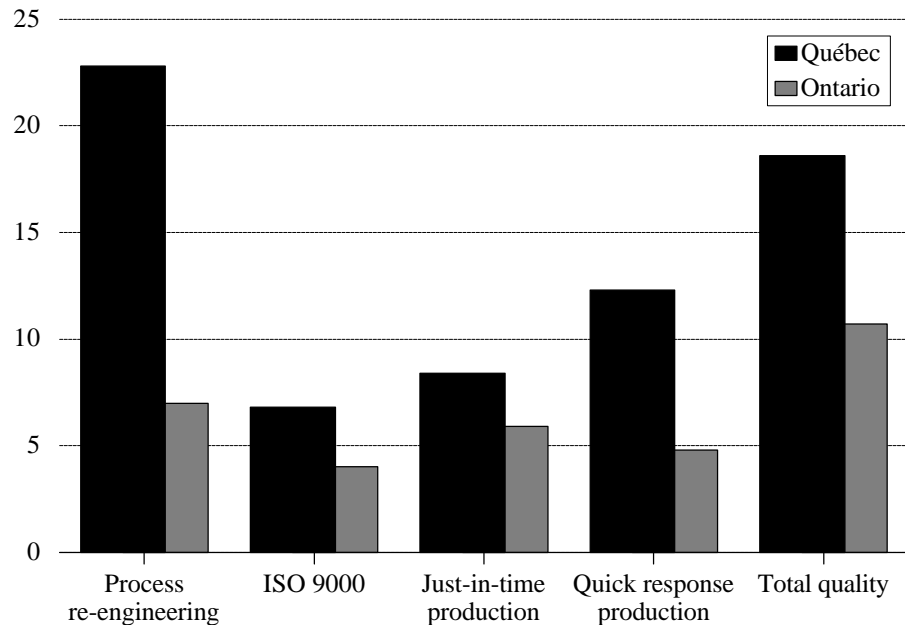


Source: The McGraw-Hill Companies, April 1998.

In the service sector, another survey conducted in 1996 reveals that Québec enterprises are ahead of those in the other regions of Canada, including Ontario, as regards recourse to new management and production practices, such as process re-engineering, the adoption of ISO standards, just-in-time or quick response production, and total quality.²

² Industry Canada, *Survey of Technology Diffusion in Services Industries*, May 1997.

CHART 10
**ENTREPRISES IN THE SERVICES SECTOR
 THAT HAVE ADOPTED AN ADVANCED PRACTICE
 QUÉBEC-ONTARIO – 1996**
 (as a percentage)



Source: Industry Canada, *Survey of Technology Diffusion in Service Industries*, May 1997.

However, much remains to be done. While the adoption of quality control techniques and process improvement is fairly advanced in Québec, recourse to more demanding practices in terms of the reorganization of work is still only the prerogative of big enterprises that are focusing on international markets.

New ways of organizing production, employee accountability, the reduction in the number of hierarchical levels, and the creation of autonomous work teams are all changes that are occurring very gradually. Studies show that it is the implementation of the entire array of these practices in an enterprise that ensures a significant increase in its productivity.

5.1.3 Encourage SMEs to adopt advanced practices

Current market conditions differ significantly from those in preceding decades. Competition has intensified, markets have become segmented, the life cycle of products is shorter and knowledge is replacing raw materials as the main source of value.

Resort to strategies that ensure greater flexibility

Today's efficient enterprise is noteworthy for its different organization and ways of doing things. To remain competitive, enterprises must resort to strategies that ensure greater flexibility, enable them to listen more attentively to their customers, and rely more extensively on economies of scope than on economies of scale. In this way, they can reduce their costs and, at the same time, enhance the value of their goods and services in the eyes of their customers.

The government financially supports SMEs

For this reason, the government announced in the 1999-2000 Budget Speech a new measure intended to encourage SMEs to plan and initiate activities related to innovation and the implementation of advanced practices. This measure will make it possible to financially support the realization of strategic initiatives in the realm of the management and improvement of production processes.

1999-2000 BUDGET**SUPPORT FOR INNOVATION
AND ADVANCED PRACTICES IN SMEs****OBJECTIVES**

- Accelerate the adoption by SMEs of the most advanced strategies and practices.
- Bolster the competitiveness of SMEs.

FEATURES OF THE MEASURE

- Eligible initiatives:
 - establishment of a corporate appraisal;
 - elaboration of a comprehensive innovation strategy;
 - planning and implementation of advanced practices (design, quality, technology transfer, business watch, process re-engineering, reorganization of work, E-commerce);
 - integration of know-how;
 - planning of an R&D project.
- Financial assistance covering 40% of expenses pertaining to eligible initiatives.
- Maximum assistance:
 - \$10 000 for a corporate appraisal or a comprehensive innovation strategy;
 - \$15 000 for other eligible initiatives.
- Eligible clientele: SMEs with 250 or fewer employees, excluding, in particular, retail trade enterprises and those in the personal services sector.

FINANCIAL IMPLICATIONS

The ministère de l'Industrie et du Commerce will earmark \$13 million for this measure over the next two years, i.e. \$5 million in 1999-2000 and \$8 million in 2000-2001.

5.2 In-house R&D

In-house R&D is an essential undertaking to create new products and processes. It is one of the most effective ways for any enterprise to develop and strengthen its competitive position. It also allows the enterprise to develop its ability to adopt new technologies.

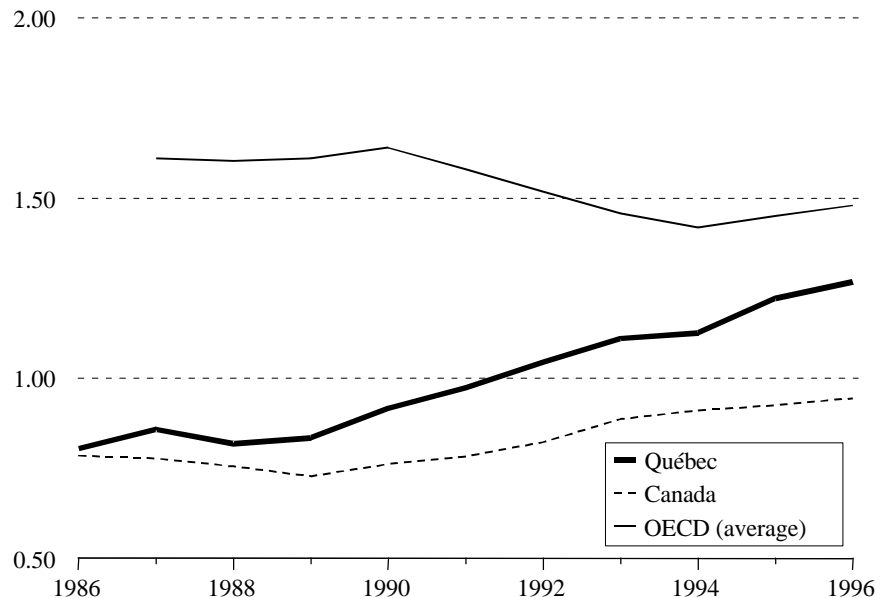
*Enterprises that invest in R&D
succeed better than those
that do not*

Enterprises that invest in R&D succeed better than those that do not. During periods of growth, such enterprises contribute more to job creation and during sluggish periods, they shed fewer jobs.

Québec enterprises have significantly increased their R&D spending over the past 10 years. Québec is catching up to the OECD countries. The ratio of spending by enterprises to GDP in Québec, which was 0.8 of a percentage point below that of the OECD in 1987, was only 0.2 of a percentage point below in 1996.

Québec is also taking a growing lead in relation to the rest of Canada. In 1986, the ratio of the R&D spending of enterprises to GDP in Québec and Canada stood at 0.8%. In 1996, this ratio reached 1.3% in Québec, as against less than 1% in Canada (0.95%).

CHART 11
R&D EXPENDITURE OF ENTERPRISES
QUÉBEC, CANADA AND THE OECD COUNTRIES – 1986 TO 1996
 (as a percentage of GDP)



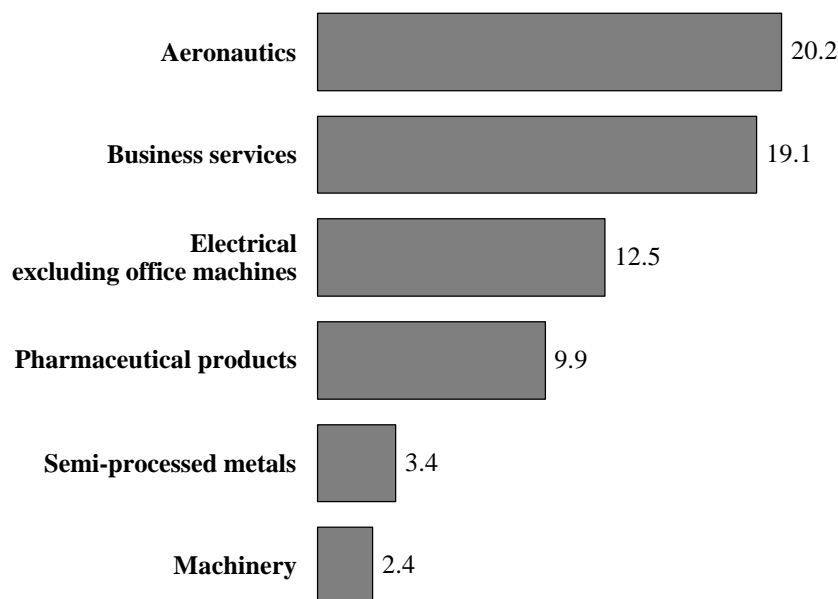
Source: OECD, *Main Science and Technology Indicators*; Statistics Canada, *Estimates of Canadian Research and Development Expenditures (GERD)*; *National Income and Expenditure Accounts*; and Bureau de la statistique du Québec, *Comptes économiques du Québec*.

While these results are encouraging, they nonetheless overshadow certain shortcomings in the realm of industrial R&D that reduce the potential effectiveness of the Québec innovation system.

***Industrial R&D is carried on
by a few big enterprises
in a handful of sectors***

First, the increase in the R&D spending of enterprises centres on an overly limited number of industrial sectors. Six sectors account for nearly 70% of all industrial research in Québec. These sectors are noteworthy in that they rely heavily on advanced technologies and extensive knowledge. However, investment in R&D is fairly limited in industries that have average or limited technology intensity.

CHART 12
CONCENTRATION OF INDUSTRIAL RESEARCH IN QUÉBEC
1995
 (percentage of R&D spending effected by sector)



Source: Conseil de la science et de la technologie, *Pour une politique québécoise de l'innovation*, Rapport de conjoncture, 1998, December 1997.

Second, industrial R&D is still excessively concentrated in big enterprises. While large firms accounted for scarcely 16% of the number of enterprises conducting industrial R&D in 1995, they are responsible for over 80% of total spending in this field.

Furthermore, the 10 biggest enterprises in Québec conduct 43% of industrial R&D, while the top 50 enterprises account for nearly 70%.³

³ Bureau de la statistique du Québec and ministère de l'Industrie, du Commerce, de la Science et de la Technologie, *Indicateurs de l'activité scientifique et technologique au Québec*, 1997.

TABLE 5
**R&D INITIATIVES OF ENTERPRISES
 BY SIZE**
 (as a percentage)

	1988	1995
Number of enterprises		
SMEs (99 or fewer employees)	72	84
Large (100 or more employees)	28	16
R&D spending		
SMEs	14	19
Large	86	81

Sources: Bureau de la Statistique du Québec, ministère de l'Industrie, du Commerce, de la Science et de la Technologie, *Indicateurs de l'activité scientifique et technologique au Québec*, 1997.

5.2.1 Enhance tax assistance for enterprises active in R&D

A generous tax system with respect to R&D

In Québec, government support for the R&D initiatives of enterprises is achieved primarily through the tax system. The significant catching up in industrial R&D noted in Québec during the 1990s is largely attributable to the generosity of the Québec tax system as regards such expenditures.

TABLE 6
**NUMBER OF ENTERPRISES AND AMOUNTS GRANTED IN R&D TAX CREDITS
 1988 TO 1998**

Component	1988	1990	1992	1994	1995	1998 ^E
<i>Number of enterprises</i>	1 232	1 534	2 133	3 448	3 586	3 900
<i>R&D tax credits (\$000)</i>						
Salaries	—	—	190 790	251 078	264 052	302 256
University research ¹	—	—	76 479	20 027	18 560	19 414
Consortium	—	—	64	2 675	2 801	2 930
Other ²	—	—	15 656	29 253	24 910	—
TOTAL³	98 122	149 896	282 989	303 033	310 323	324 600

E: Estimate of the ministère des Finances.

1 The reduction in tax credits in respect of university research contracts between 1992 and 1994 can be explained primarily by the elimination by the government of the external financing mechanism in 1993-1994.

2 These measures were abrogated. They covered catalyst projects and environmental technological innovation projects.

3 For the years 1988 to 1990, a breakdown of data on tax credits is not available.

Source: Ministère des Finances, *An Integrated Fiscal Strategy for the Knowledge-Based Economy*, March 1999.

To further encourage enterprises to broaden their R&D activities, the 1999-2000 Budget Speech announced various measures designed to enhance tax assistance for research, foster growth in the volume of research conducted by SMEs, and facilitate the recruiting of top-notch foreign experts.

Enhancement of tax assistance for research

The Québec government has always emphasized the refundable tax credit to promote R&D since it allows all enterprises to take advantage of a fully refundable form of assistance.

In light of the specific rules governing the federal tax system, the net cost for an enterprise to incur an R&D expense is usually higher if it is entitled to a tax credit than if it is entitled to a super-deduction of equivalent value.

TABLE 7
NET COST OF A \$100 R&D EXPENSE (SALARIES)
SME

	Tax credit	Super-deduction
Cost to Québec	\$47	\$47
Cost to the federal government	\$26	\$44
Net cost to the enterprise	\$27	\$9
Total	\$100	\$100

¹ Illustration based on the 40% tax credit and the equivalent super-deduction calculated at the rate of 460%.

Source: Ministère des Finances, *An Integrated Fiscal Strategy for the Knowledge - Based Economy*, March 1999.

To enable enterprises to benefit from a more advantageous federal tax treatment of R&D expenses incurred in Québec, the government announced in the 1999-2000 Budget Speech the introduction of a super-deduction.

***An enterprise can choose
the most advantageous
tax provision***

However, the enterprise always has the choice of using the most advantageous tax provision, i.e. the refundable tax credit or the super-deduction. It is in the interests of an enterprise operating at a loss to take advantage of the tax credit since it is refundable, while a profit-making enterprise will usually take advantage of the super-deduction in order to reduce its taxable income.

1999-2000 BUDGET**INTRODUCTION OF A SUPER-DEDUCTION FOR R&D****OBJECTIVES**

- Allow enterprises to lower the net cost of R&D conducted in Québec.
- Encourage enterprises to use in Québec the results of R&D conducted in Québec.

FEATURES OF THE MEASURE

- Increase in the deductions allowed in the calculation of income with respect to labour costs associated with R&D.
- Increase in the deductions allowed in the calculation of income with respect to expenses incurred pursuant to research contracts concluded with third parties.
- Deduction rates of 230% and 460% that ensure a tax benefit equivalent to that of the refundable 20% and 40% tax credit.
- The choice for the enterprise between the super-deduction and the refundable tax credit.

FINANCIAL IMPLICATIONS

This measure will not engender any cost for the Québec government. For enterprises, it will reduce the net cost of R&D conducted in Québec by \$3 million in 1999-2000 and by \$54 million in 2000-2001.

Increasing R&D***Foster the initiation of R&D***

However, Québec's tax system, which is advantageous from the standpoint of R&D, has few specific provisions to encourage enterprises that engage in little or no R&D to undertake research.

Several countries and jurisdictions, in particular the United States, Japan and Ontario, grant tax benefits to enterprises that increase their R&D activities. These tax benefits apply to the additional R&D that an enterprise effects in a given year in relation to the R&D conducted during a specific reference period.

In order to boost R&D in SMEs, the government is implementing, for a period of five years, enhance tax assistance applying to the additional R&D expenses that SMEs incur.

1999-2000 BUDGET**ENHANCED TAX ASSISTANCE FOR ADDITIONAL R&D****OBJECTIVES**

- Step up R&D conducted by SMEs.
- Accelerate the closing of the gap in relation to industrialized nations in the realm of industrial R&D.

FEATURES OF THE MEASURE

- Enhancement of tax assistance for SMEs that incur R&D expenses in excess of the baseline established.
- Baseline: average R&D spending over the previous three years.
- An additional 15% tax credit on excess R&D spending in relation to the baseline or, in the case of the super-deduction, a deduction rate increased by 190%, from 460% to 650%.
- Temporary measure lasting five years.

FINANCIAL IMPLICATIONS

This measure will cost \$1 million in 1999-2000 and \$24 million in 2000-2001.

The tax holiday is intended to attract and encourage specialists of international calibre to settle in Québec

Recruiting of foreign experts

Enterprises that engage actively in R&D must, in some instances, resort to international expertise to carry out research. The tax holiday for foreign researchers, introduced in 1987-1988, was designed to encourage specialists of international calibre to join Québec enterprises and settle in Québec.

In order to further broaden the ability to attract foreign researchers to Québec and keep them in Québec enterprises, the government announced in the 1999-2000 Budget Speech the enhancement of the tax holiday for foreign researchers.

The modifications take into account two key facets of the functioning of research teams in industry:

- in many instances, research projects last longer than two years;
- the need to include in research teams specialists in the management and financing of innovation, international marketing and the transfer of leading-edge technologies.

1999-2000 BUDGET

TAX HOLIDAY FOR FOREIGN R&D EXPERTS
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OBJECTIVES

- Increase the number of foreign researchers and experts in R&D.
- Increase the proportion of researchers who lengthen their stay or settle permanently in Québec.

FEATURES OF THE MEASURE

- Extension from two to five years of the tax holiday for foreign researchers in R&D.
- Broadening of the tax holiday to include foreign experts (in the management and financing of innovation, marketing abroad, and the transfer of leading-edge technologies) involved in research projects.

FINANCIAL IMPLICATIONS

This measure will cost the government \$1 million in 1999-2000 and \$2 million in 2000-2001.

5.3 Acquisition of new technologies

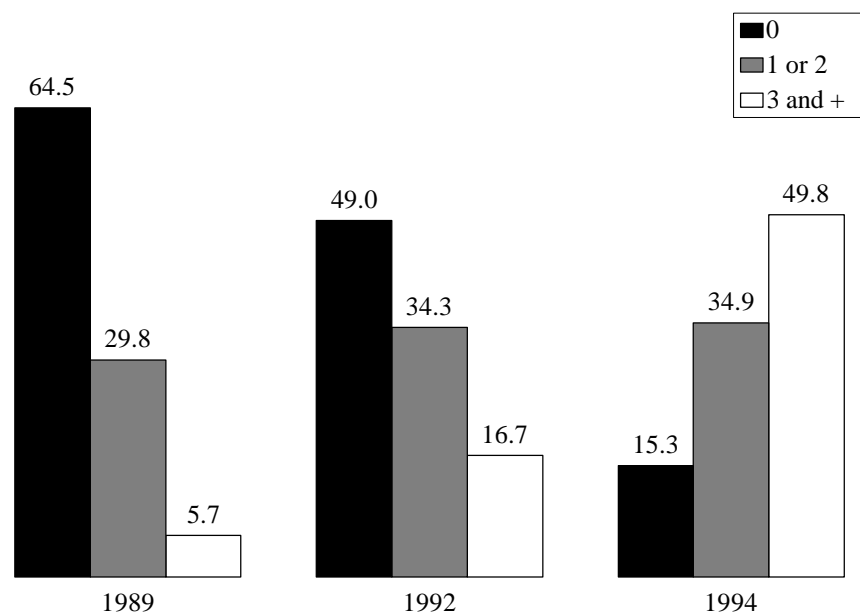
5.3.1 The diffusion of technologies, a key factor in the innovation process

The acquisition of new technologies and the adaptation of existing technologies are, in the same way as the adoption of advanced management practices and R&D, a decisive factor in the innovation process. They encompass such functions as monitoring to locate new technologies, the purchase of equipment and technology transfers.

The diffusion of leading-edge technologies is becoming more widespread in Québec enterprises

The coming century will be dominated by organizations that succeed in integrating technological changes into their strategies, products, services and communications and distribution systems. Several indicators and surveys reveal that the diffusion of leading-edge technologies has progressed considerably in Québec enterprises in recent years.

CHART 13
ADOPTION RATE IN QUÉBEC OF NEW GENERIC TECHNOLOGIES
BY ALL INDUSTRIES
1989 – 1992 – 1994
(as a percentage of enterprises)



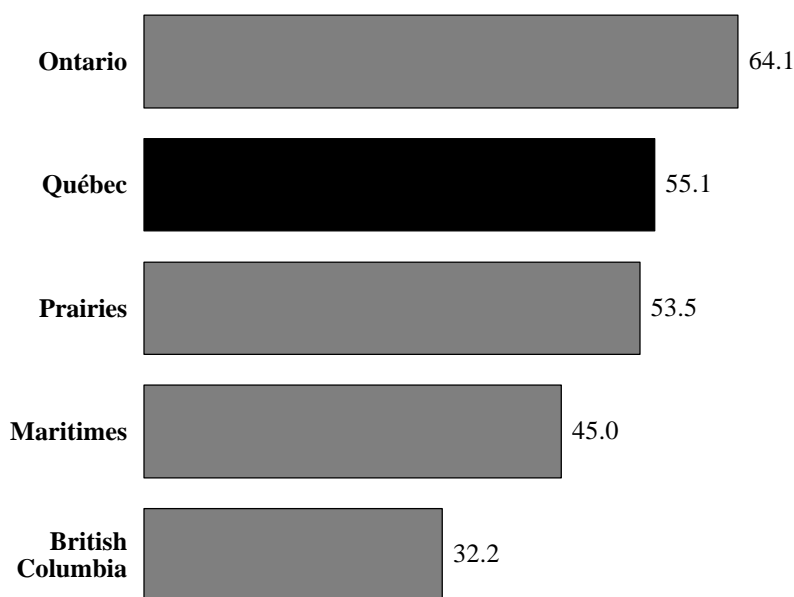
Source: J.B. Carrière, *Profil technologique de la PME manufacturière québécoise*, final report, project coordinated by CEFRIQ, March 1995.

A recent study on the management of computer projects and organizational performance indicates, however, the presence of two

distinct computerization profiles in Québec establishments.⁴ SMEs concentrate on the acquisition of equipment and the updating of software while big enterprises engage in more complex modifications such as networking and the development and integration of data processing systems.

Moreover, the proportion of manufacturers' shipments effected by enterprises that use five or more technologies varies from one province to another. Québec ranked second in Canada in 1993, after Ontario. The industrial structure and the size of the enterprises could explain why, in Ontario, a higher proportion of shipments is made by such enterprises.

CHART 14
**MANUFACTURERS' SHIPMENTS BY ENTERPRISES
USING FIVE OR MORE TECHNOLOGIES
INTERPROVINCIAL COMPARISON – 1993**
(as a percentage of all manufacturers' shipments)



Source: J. Baldwin and D. Sabourin, *Technology Adoption in Canadian Manufacturing*, S.C. 88-512, Statistics Canada, 1995.

⁴ J.-B. Carrière, *Gestion des projets informatiques et performance organisationnelle*, under the direction of Lucie Noël, CEFRIO, February 1997.

The assistance provided by governments for the adoption of new technologies by means of measures to encourage enterprises to invest in machinery and equipment is not of the same scope as that accorded to support industrial R&D. However, in this instance as well, taxation is a favoured means of intervention, in particular through the treatment of the amortization of investments.

5.3.2 Accelerate the acquisition by SMEs of new technologies

Investment allows enterprises to update their technology

Investment, especially to acquire the assets needed for manufacturing and processing, computer equipment and intangible assets such as patents, permits and licences, favours the introduction of new technologies in production processes and has a positive impact on the productivity of enterprises.

In the 1997-1998 Budget, the 100% accelerated depreciation measure was enhanced with an additional 25% deduction for investments effected until December 31, 1998. This measure was intended, among other things, to facilitate technology transfers, i.e. the acquisition of knowledge, know-how and techniques through equipment purchases. The 1999-2000 Budget announced the extension of the 25% enhancement for accelerated depreciation until March 31, 2000 and its retroactive application to January 1, 1999.

1999-2000 BUDGET**EXTENSION OF THE ENHANCEMENT
FOR ACCELERATED DEPRECIATION****OBJECTIVES**

- Encourage and attract new investments.
- Encourage SMEs to acquire new technologies.

FEATURES OF THE MEASURE

- Extension until March 31, 2000 of the enhancement at the 25% rate of the additional deduction applicable, in particular, to investments related to the acquisition of assets required for manufacturing and processing, certain computer equipment, and intangible assets such as patents, permits and licences.
- Retroactive application to January 1, 1999.

FINANCIAL IMPLICATIONS

This measure will cost \$34 million in 1999-2000 and \$28 million in 2000-2001.

Measures for innovative enterprises

<i>1999-2000 Budget</i>	
	Financial impact over two years (millions of dollars)
▪ SUPPORT FOR INNOVATION AND ADVANCED PRACTICES IN SMES	13.0
▪ INTRODUCTION OF A SUPER-DEDUCTION FOR R&D	57.0 ¹
▪ ENHANCED TAX ASSISTANCE FOR ADDITIONAL R&D	25.0
▪ TAX HOLIDAY FOR FOREIGN EXPERTS IN R&D	3.0
▪ EXTENSION OF THE ENHANCEMENT FOR ACCELERATED DEPRECIATION	62.0
TOTAL – INNOVATIVE ENTERPRISES	160.0

¹ Gain for Québec enterprises resulting from the application of the federal tax system (does not engender any cost for the government).

Conclusion

CONCLUSION

The universal shift to the knowledge-based economy places Québec and its partners before the pressing need to accelerate the pace of scientific and technological progress and innovation. The entire array of measures announced, while they reflect the striking progress Québec has achieved in more than 20 years, are contributing to economic and social development and job creation by emphasizing, in particular, the development of skills, more extensive R&D, the commercialization of the results of research, and the promotion of innovation.

In this perspective, the impending creation of the ministère de la Recherche, de la Science et de la Technologie places research, technology and innovation at the forefront of Québec society's concerns and government's initiatives. The department will make it possible to better guide and coordinate the government's interventions aimed at promoting and supporting science, technology and innovation. Moreover, it will facilitate the proper monitoring of initiatives and programs in this field.

The elaboration and implementation of a policy respecting research, science, technology and innovation demands the mobilization of stakeholders in the universities, industry and government. The new department intends to emphasize intersectorial, interdepartmental and horizontal initiatives and partnerships with a view to ensuring the consistency, effectiveness and synergy of government initiatives and optimizing their effects.

Research, science, technology and innovation are of the utmost importance for Québec's future and the government intends to use all of the means at its disposal to make research and innovation a driving force in Québec's social, economic and cultural development.

Appendices

APPENDIX A

BUDGETARY MEASURES ANNOUNCED IN THE 1999-2000 BUDGET

	Financial impact over two years (in millions of dollars)
BUDGETARY MEASURES TO DEVELOP HUMAN RESOURCES IN STRATEGIC SECTORS	
1. Guidance for Cegep students with respect to scientific and technical careers	2.0
2. Funding of peer tutorial projects in Cegeps	3.0
3. Initiatives to overcome labour shortages in the information technologies sector	24.0
4. Funding of short-term training programs	5.5
TOTAL	34.5
OTHER BUDGETARY MEASURES	
1. Establishment of the Centre Emploi-Technologie (CETECH)	4.0
2. Cité de l'optique	7.0
3. Support for innovation and advanced practices in SMEs	13.0
TOTAL	24.0

APPENDIX B

MEASURES UNDER THE INTEGRATED FISCAL STRATEGY FOR THE KNOWLEDGE-BASED ECONOMY

	Financial impact over two years (in millions of dollars)
1. Refundable tax credit for technological adaptation services — Liaison and transfer section	7.0
2. Refundable tax credit for technological adaptation services — Business watch section	1.0
3. Establishment of the Carrefours de la nouvelle économie	10.0
4. Establishment of the Centre national des nouvelles technologies de Québec	6.0
5. Tax holiday for foreign trainers (CDTI)	2.0
6. Introduction of a super-deduction for R&D	57.0 ¹
7. Enhanced tax assistance for additional R&D	25.0
8. Tax holiday for foreign R&D experts	3.0
9. Extension of the enhancement for accelerated depreciation	62.0
TOTAL	173.0

¹ Gain for Québec enterprises resulting from the application of the federal tax system (does not engender any cost for the government).

APPENDIX C

INNOVATION QUÉBEC MEASURES

	Financial impact over two years (in millions of dollars)
1. FRSQ – Basic funding of research centres	5.8
2. FRSQ – Thematic research	5.0
3. Fonds FCAR – Concerted actions program	2.0
4. Fonds FCAR – Scientific equipment used for university research	5.0
5. CQRS – Support for social research	3.6
6. Fonds FCAR – FCAR strategic researchers program	3.8
7. FRSQ – Salary support for Québec researchers	4.0
8. CQRS – Research fellowship program	0.4
9. Challenges and opportunities in research and innovation	19.5
10. Promotion among secondary school students of careers in science and technology	1.6
11. Support for the funding of the Centres de liaison et de transfert	9.0
12. Support for the acquisition of equipment in the network of CCTTs	4.0
13. Support for the development of inventions	4.0
14. Technical and financial assistance to develop technological applications	4.0
15. International scientific and technological cooperation financial assistance program	3.5
TOTAL	75.2

APPENDIX D

CENTRES COLLÉGIAUX DE TRANSFERT DE TECHNOLOGIE (CCTT)

CCTT	College (year of creation)	Discipline
Centre collégial de transfert de technologie en biotechnologies (TRANSBIOTECH)	Lévis-Lauzon (1998)	Biotechnology
Institut des communications graphiques du Québec	Ahunatic (1995)	Graphic communications
Centre collégial de transfert technologique en musique et son (MUSILAB)	Drummondville (1997)	Music and sound
Institut de chimie et pétrochimie	Maisonnette (1996)	Chemistry and petrochemistry
Centre d'innovation technologique agroalimentaire (Cintech AA inc.)	Saint-Hyacinthe (1992)	Agri-food
Centre de géomatique du Québec inc.	Chicoutimi (1997)	Geomatics
Centre de métallurgie du Québec	Trois-Rivières (1985)	Metallurgy
Centre de production automatisée	Jonquière (1984)	Computer-aided production
Centre de recherche et de développement en agriculture du Saguenay–Lac-Saint-Jean	Alma (1996)	Agriculture
Centre de robotique industrielle inc.	Lévis–Lauzon (1984)	Robotics
Centre de technologie minérale et de plasturgie inc.	Région de l'Amiante (1984)	Mineralogy and plastic processing
Centre de technologie des systèmes ordonnés inc. (CETSO)	Lionel-Groulx (1983)	Data processing – Home automation
Centre des technologies textiles	Saint-Hyacinthe (1983)	Textiles
Centre d'enseignement et de recherche en foresterie inc. (Ste-Foy)	Sainte-Foy (1985)	Forestry
Centre Microtech inc. (Sherbrooke)	Sherbrooke (1989)	Computer-aided production
Centre national en électrochimie environnementale inc.	Shawinigan (1992)	Electrochemistry and environment

CCTT	College (year of creation)	Discipline
Centre spécialisé de la mode du Québec	LaSalle (1983)	Fashion
Centre spécialisé de technologie physique du Québec inc.	La Pocatière (1983)	Physics
Centre spécialisé des pêches	Gaspésie et des Îles (1983)	Fisheries
Centre spécialisé en pâtes et papiers	Trois-Rivières (1989)	Pulp and paper
Centre technologique en aérospatiale (CTA)	Édouard-Montpetit (1992)	Aerospace
EQMBO ENTREPRISES INC., Centre d'aide technique et technologique	Victoriaville (1983)	Furniture and furnishings
Centre des matériaux composites	Saint-Jérôme (1989)	Composite materials

APPENDIX E

INITIALISMS AND ACRONYMS

CCTT	Centre collégial de transfert de technologie
CDTI	Centre de développement des technologies de l'information
CEFRIO	Centre francophone en informatisation des organisations
CERCA	Centre de recherche en calcul appliqué
CETECH	Centre Emploi-Technologie
CeVeC	Centre de veille de la construction
CEVEIL	Cellule de veille et d'expertise sur les inforoutes et langue
CIRANO	Centre interuniversitaire de recherche en analyse des organisations
CIRST	Centre interuniversitaire de recherche en science et technologie
CLT	Centres de liaison et de transfert
CNE	Carrefours de la nouvelle économie
CNNTQ	Centre national des nouvelles technologies de Québec
CPLQ	Centre de promotion du logiciel québécois
CQRDA	Centre québécois de recherche et de développement de l'aluminium
CQRS	Conseil québécois de la recherche sociale
CQVB	Centre québécois de valorisation des biomasses et des biotechnologies
CREPUQ	Conférence des recteurs et des principaux des universités du Québec
CRIM	Centre de recherche informatique de Montréal
CVETT	Centre de veille des équipements de transport terrestre
CVML	Centre de veille sur les métaux légers
ÉCO RADAR	Réseau de veille concurrentielle en environnement
EU	European Union
FCAR	Formation de chercheurs et d'aide à la recherche
FRSQ	Fonds de la recherche en santé du Québec
GDP	Gross domestic product
GERD	Gross domestic expenditures on R&D
INFO-BOIS	Réseau d'information sur les produits du bois inc.

NAFTA	North American Free Trade Agreement
OBTIQ	Observatoire des technologies de l'information du Québec
OECD	Organisation for Economic Cooperation and Development
RISP	Réseau d'information stratégique de plasturgie
RUSB	Réseau de veille stratégique bioalimentaire
UQAM	Université du Québec à Montréal
VIGICOM	Centre de veille sur les communications graphiques
WTO	World Trade Organization
