INNOVACTION

The Federal Microelectronics Strategy

Canada

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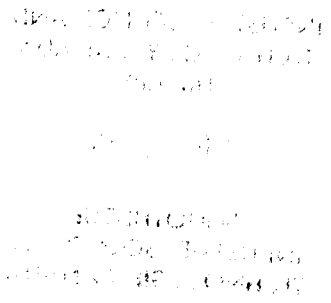
Ministry of State
Science and Technology
Canada

Ministère d'État
Sciences et Technologie
Canada

Department of Regional
Industrial Expansion

Ministère de l'Expansion
industrielle régionale



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Foreword

The Federal Microelectronics Strategy is a four-year, $90 million investment in Canada's future. Part of **InnovAction: The Canadian Strategy for Science and Technology**, it focuses on the key technologies at the heart of today's industrial and technological revolution.

In that revolution, nations are using technology to gain a competitive edge in world markets. The most far reaching is **information** technology which influences the competitiveness of national economies more than any previous technical development.

Information technology has been brought about by the convergence of technologies such as computing, communications and software engineering. Through things like Computer Integrated Manufacturing and Automated Process Control, it is transforming the way industry operates. The production, processing and distribution of information is joining labour and capital as a major driving force in industrial development.

Microelectronics is the underlying technology that makes this trend possible. Integrated circuits and software are the building blocks for new systems of production and management. Systems based on the application of microelectronics technology are the major tools for creating new wealth and employment in the industrialized world.

Canada must prepare now to take advantage of these opportunities, and respond to the challenge. We cannot afford to treat technological innovation as marginal to industrial renewal. At stake is the fundamental issue of how Canada will "earn a living" in the 1990s and beyond.

We need new policies to develop and apply key technologies more quickly. We need policies to encourage new forms of collaboration between governments, universities and industries, and new strategic alliances with other countries. We need policies with the flexibility to respond to rapid technological change.

The Federal Microelectronics Strategy outlined in the following pages is an important beginning — a first step in shifting resources into strategic technologies important to Canada. It is a set of complementary actions that will help build the technological foundation we need for competitive success in the 1990s and bring greater productivity and competitiveness throughout Canada's economy.

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Introduction

In recent months, the federal government has taken a number of important initiatives which set a new direction for science and technology in Canada. These include:

- improved funding arrangements to strengthen university research, and encourage corporate-university alliances;
- a major Space Plan, which will promote strategic technologies such as robotics and artificial intelligence;
- a National Advisory Board on Science and Technology, chaired by the Prime Minister; and
- Canada's first National Science and Technology Policy, developed in partnership with the provinces and territories.

InnovAction

Building on these initiatives, the government has also launched InnovAction — a practical, comprehensive strategy to promote research, development and technological innovation in Canada.

InnovAction will give focus and direction to federal science and technology activities in five critical areas:

1. Industrial Innovation and Technology Diffusion: InnovAction will improve the transfer and application of new technologies, enhance government-university-industry cooperation, and stimulate post-R&D innovation;

2. Strategic Technologies: InnovAction will help industries identify and secure economically exploitable niches in leading edge technologies;

3. Management of Federal Resources: InnovAction will ensure the effective management of the government's annual $4 billion investment in science and technology;

4. Human Resources: InnovAction will ensure a supply of highly qualified scientists, engineers and technologists, encourage retraining and facilitate adjustment to technological change in the work place;

5. Public Education: InnovAction will promote technological literacy and a more science-oriented culture, creating the social environment needed for a strong, national science and technology effort.

Strategic Technologies

Developing strategic technologies (#2 above) is a top priority for InnovAction. These technologies, such as microelectronics, robotics, biotechnology and advanced industrial materials, are:

- based on the interaction of different scientific disciplines that are changing rapidly;
- produced by the integration of previously separate technologies; and
- critical to the competitiveness of one or more industrial sectors, with a wide range of applications.

They are also the driving force behind the new industrial revolution which is transforming the world economy.

It is the microelectronics content that allows products to compete in terms of performance, features and cost. And it is microelectronics that allows significant productivity gains and greater competitiveness in industrial processing, for both the resource and manufacturing sectors. Today, the basic building blocks of a nation's economy are made up of tiny integrated circuits.

The Need for Action

Canada can not expect to be at the leading edge in all areas of microelectronics. But our industries have fallen behind international competitors, at a time when foreign governments are providing increased support for their own industries. Action must be taken to close the technological gap, to ensure that Canadian industry is positioned to take advantage of the growing world market for high value-added electronic products.

Closing the technological gap is a difficult task for an individual company, large or small. The technology is advancing rapidly, and the necessary research is both risky and expensive.

Few companies have the resources to undertake such research on their own. A carefully focused strategy is needed to help build Canada's international competitiveness. Without such a strategy, existing and future jobs are at risk.

The Federal Microelectronics Strategy

Developed in consultation with the private sector, the Federal Microelectronics Strategy responds to needs identified by industry. It reflects the realities of the national and international microelectronics environment, and is designed to stimulate the development and application of microelectronics throughout Canada.

The Strategy consists of a set of related initiatives. They take into account the special needs of the small or medium sized firm. They will help strengthen capabilities in research, development and innovation in all regions. They will bring real and valuable benefits to many sectors of the Canadian economy.

Microelectronics and Systems Integration

A major component of the Strategy is a four-year, $60 million Microelectronics and Systems Integration Program. Through this Program, the Department of Regional Industrial Expansion, where there is a clear indication that the competitiveness of participating firms will be enhanced, will provide financial support to help Canadian companies:

- collaborate in the development of systems to improve the competitiveness in the manufacturing, service and resource processing industries;
- where necessary, develop the underlying microelectronics technology and software development tools needed to implement the systems integration approach.

A key feature of the Program is an emphasis on new forms of cooperation. The Program will encourage:

- significant private sector investment;
- collaboration among and between firms, universities and research institutes in developing technologies and systems;
- technology diffusion among Canadian firms; and
- exchange of strategic technologies with foreign firms.

Defence Systems Development

In order to meet strict performance standards and to keep maintenance costs down, future defence systems in Canada must incorporate highly sophisticated microelectronics technology. Anticipating future procurement requirements, the Department of

National Defence will use R&D contracts to develop advanced prototype electronic systems.

Within its existing research and development activities, the Department expects to spend $30 million on such contracts over a three year period. It will specify system requirements and invite companies to develop prototypes using state-of-the-art microelectronics. This will give the Department essential information needed to determine future procurement requirements. It will give Canadian firms valuable experience in applying advanced integrated circuits in complex electronic systems.

This experience will give Canadian firms a competitive edge when bidding on defence contracts not only in this country, but internationally. Because this kind of research produces substantial spin-off benefits for other sectors, these companies will gain an edge in non-defence markets as well.

Federal Research in Microelectronics

Both the National Research Council and the Department of Communications have research programs focused on compound semiconductor materials and devices. Such semiconductor devices are important for systems integration, because they are inherently fast and have opto-electronic properties which are vital in advanced communications and defence systems.

The National Research Council and the Department will work together more closely on complementary and collaborative projects in the future. They will consult more closely with private industry when setting long-term research objectives. With the help of the Natural Sciences and Engineering Research Council, they will encourage universities to participate more directly in federal research projects.

These initiatives will help support the training of highly qualified research personnel. They will also accelerate the development and implementation of key technologies needed by Canadian industry.

A Coordinating Office

The Department of Regional Industrial Expansion will establish a Microelectronics and Systems Integration Office. This Office will provide a central contact point for industry, provincial governments, and universities on microelectronics issues.

In the past, there has been no single source companies could turn to for information about federal microelectronics programs, or to discuss their own plans and proposals. The Microelectronics Office will help eliminate the delays and frustrations such companies have experienced.

The Office will help eliminate duplication, and identify new ways for departments and industry to work together. Also, through its liaison role with the provinces, it will encourage greater collaboration not only with the federal government, but between different provincial governments.

Benefits of the Strategy: a Summary

Each element within the Microelectronics Strategy is designed to support and reinforce the other elements. Taken together, these elements are expected to produce impressive results. For example:

- Canadian industry will develop and apply advanced electronics based systems more quickly, helping Canadian firms maintain and enhance their international competitive position.
- The Canadian electronics industry, which employs some 85,000 Canadians, will experience renewed vitality through the infusion of new technologies and capabilities in meeting advanced systems requirements.
- Canada's software and systems integration firms will benefit from new partnerships with technology suppliers and advanced systems users.
- The research capabilities of universities and government laboratories will be more closely coupled, and through association with industry will more rapidly develop relevant advanced microelectronics technologies.
- Canadian firms will have better access to technologies developed in other countries through technology transfer, joint ventures and strategic partnerships.
- Duplication and waste will be avoided both in the internal activities of the federal government and in the funding of projects outside government.