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FRAMEWORK FOR TECHNOLOGY TRANSFER
FROM GOVERNMENT LABORATORIES FOR
COMMERCIAL APPLICATIONS

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MARCH 1991

For more information, contact:
*Industry, Science and
Technology Canada*
Manager, Science Development
Science Sector
235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 990-6262
Fax: (613) 991-0363

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Cat. No. C2-158/1991
ISBN 0-662-58276-4

PU 0160-90-03

INTERDEPARTMENTAL GROUP ON INTELLECTUAL PROPERTY MANAGEMENT

The Interdepartmental Group on Intellectual Property Management was formed in early 1989 to facilitate communication and cooperation among science-based departments and agencies (SBDAs) on science and technology policy and operational issues. The Group has emerged as a strong network, acting as an advocate for government laboratories and providing a link to scientists and engineers.

One objective of the Group is to identify technology transfer mechanisms needed to facilitate the fullest exploitation of government-sponsored research and development (R&D) for economic, social and cultural benefits. It is working closely with the Department of Justice Canada and government agencies responsible for setting policies and regulations on science and technology to examine the legal and administrative infrastructure needed to promote technology transfer. The Group's work plan has been approved by the Interdepartmental Steering Committee on the Management of Science and Technology, represented by Assistant Deputy Ministers. Recommendations are also channelled through this committee.

The Group has 42 members representing the following 22 departments and agencies:

- Agriculture Canada
- Atomic Energy of Canada Limited
- Canadian Space Agency
- Communications Canada
- Consumer and Corporate Affairs Canada
- Department of Justice Canada
- Energy, Mines and Resources Canada (Chair)
- Environment Canada
- External Affairs and International Trade Canada
- Fisheries and Oceans
- Forestry Canada
- Health and Welfare Canada
- Industry, Science and Technology Canada
- National Defence
- National Research Council
- Natural Sciences and Engineering Research Council
- Office of the Comptroller-General
- Privy Council Office
- Royal Canadian Mounted Police
- Supply and Services Canada
- Transport Canada
- Treasury Board Secretariat

EXECUTIVE SUMMARY

Science and technology activities are carried out by laboratories of federal science-based departments and agencies (SBDAs) primarily to support mandates and legislation. Various policies and programs of the federal government have encouraged increased performance of these science and technology activities in partnership with outside agents. While technology transfer has increased as a result of these policies, there is general agreement that further scope exists to realize the full potential of the products of these science and technology activities in creating benefits for Canada.

For the first time, SBDAs, through the Interdepartmental Group on Intellectual Property Management, have come together to explore ways to meet this challenge. This framework is one of the first products of this interaction. The objective of the framework is to help promote effective and efficient technology transfer to the private sector for commercial application. The framework provides principles and guidelines for use in: analyzing and evaluating existing policies relating to technology transfer; proposing new policies, programs, and legislation; and promoting and performing technology transfer activities.

The principles put forward state that:

- › Increased technology transfer will benefit the competitiveness of Canadian industry.
- › A consistent, cooperative effort is required from all players.
- › Mechanisms, powers and incentives must exist for each player.
- › Ownership of intellectual property must be defined clearly.
- › SBDAs must develop technology transfer skills and capacities.
- › Transfer opportunities must be identified and made known.
- › Technology transfer must be oriented to market needs.

Policies and programs developed under these principles should:

- › Place transfer powers close to the source of the know-how.
- › Provide incentives for strong technology transfer performance.
- › Support the development of a sound resource base for technology transfer.
- › Encourage industry users to commercialize technology by supporting the development of receptor capabilities and by promoting industry involvement in federal science and technology activities.

The framework also suggests roles and mechanisms for the various technology transfer players within government, including: SBDAs; laboratory managers; scientific and technical staff; technology transfer officers; Industry, Science and Technology Canada (ISTC); Treasury Board Secretariat (TBS); and common service agencies. However, the framework is only the beginning. It provides an initial "road map" for ongoing development of the government's technology transfer policies. A series of discussion papers or guidelines dealing with specific issues affecting technology transfer is envisaged as a central part of this development.

PURPOSE

Interest is growing among federal laboratories, executives and policy makers in realizing the full potential of technology in building Canada's competitive industrial, economic and social capacity. Science-based departments and agencies (SBDAs) have traditionally treated technology transfer as an integral part of each phase of the R&D continuum.

For the first time, however, SBDAs, through the Interdepartmental Group for the Management of Intellectual Property, have come together to discuss problems that are commonly faced in technology transfer, to explore solutions to these problems, and to develop this framework for common policy and other related activities. The purpose of the framework, which focuses on technology transfer for commercial applications, is to provide an initial context for the consideration of a wide range of options and mechanisms for technology transfer and laboratory management.

INTRODUCTION

R&D is carried out by and for laboratories¹ of SBDAs primarily to support departmental and agency mandates and legislation. These include such areas as safeguarding the health and security of Canadians, establishing national standards, protecting the environment, managing the development and conservation of natural resources, developing the national infrastructure for communications and transportation, and undertaking regulatory activities, as well as directly helping industry to develop, find, adapt and adopt useful technology. In satisfying these requirements, R&D activities provide social and economic benefits for Canada, and contribute to Canadian competitiveness.

R&D activities range from basic research to short term applied research to technology development and transfer. Aside from the primary government applications mentioned above, the products of R&D are used both directly and indirectly by a variety of clients: the general Canadian public, other federal SBDAs, provincial research facilities, universities and other educational institutions, and Canadian industry.

In its broadest sense, technology transfer is a collaborative process whereby the products of R&D flow from the source to the user. Many of the products are developed intramurally, as a result of internal laboratory activities, while others are developed extramurally (under contract for example). The technology transfer process may differ dramatically between the two processes since in one, extramural, the technology already resides with, or may be a step closer to, the user.

To be effective from the perspective of federal science and technology activities, technology transfer must satisfy the needs of users at each phase of the R&D continuum and therefore is usually built into the R&D planning process. It can involve transfer into, out of, and within the department or agency. The identification and protection of intellectual property rights are integral to this process.

¹The reader should bear in mind that the term "laboratories" is used in its broadest sense, encompassing a variety of operational units engaged in a wide range of R&D activities and employing scientists, engineers, technologists and support staff.

Much of the success in technology transfer is dependent upon the value and relevance of the "technology" embodied in the knowledge, skill and experience of laboratory staff and upon their being able and motivated to act as agents of transfer. It is also dependent upon the ability of the users to adapt and adopt the technology, an ability gained frequently through participation as government's partner in technology development activities.

The SBDAs' role in technology transfer also includes the application of technology and the dissemination of technologies and know-how throughout the Canadian economy for social and economic benefit where direct commercial application is inappropriate or impossible. This derives from their status as public agencies.

This paper focuses on one specific aspect of technology transfer, i.e., the relationship between laboratories and the private sector users developed both directly and through universities and provincial organizations² for the purpose of promoting the exploitation of commercially attractive ideas and technology. The technology can be used to develop marketable products and services, to improve manufacturing processes, and generally to support the development of a competitive industrial capacity and continued economic growth. Other, non-commercial aspects of technology transfer are beyond the scope of this paper and will be addressed in future work. These may have applications that produce social, cultural, regional, national, and international benefits frequently of a longer term nature and essentially in advance of the current marketplace.

4 ²*Provincial organizations include Provincial Research Organizations (PROs), provincial extension services and federal-provincial agreements.*

BACKGROUND

Various policies and programs of the federal government — including the Contracting-Out Policy, the Extramural Performance Policy, the Technology Centres Policy, and the Decision Framework — have encouraged the increased performance of federal science and technology with and by outside agents. While the transfer of technology has increased as a result of these policies, there is general agreement that further, as yet untapped, potential exists for technology transfer activities.

SBDAs have always shown interest and been active in technology transfer. Offices that promote industrial alliances, technology transfer and technology marketing have been established at Energy, Mines and Resources Canada, Agriculture Canada, Fisheries and Oceans, Communications Canada, National Defence, the National Research Council, and Atomic Energy of Canada Limited.

SBDAs also have evidence of their growing successes in cooperative ventures with industry. Recently, however, inter-departmental discussions of common problems in technology transfer have resulted in a consensus that new policies and mechanisms are needed for more effective technology transfer to take place.

Broad guidelines may help SBDAs to develop new policies, procedures and practices to promote technology transfer efforts. In formulating these guidelines, due account needs to be taken of the fact that not all technology has the potential for commercial application. On the other hand, most laboratories have some degree of potential to promote the exploitation of commercially attractive ideas and technology with the private sector.

This paper provides a framework within which the transfer of technology for commercial application can be encouraged, suggesting roles for each of the parties involved and mechanisms that could be used to fulfill these roles.

The principles and guidelines of the framework may provide a common basis to:

- › Analyze and evaluate existing policies and their effects.
- › Propose changes to existing policies, propose new policies and programs, and influence the direction of overall policy development.
- › Guide laboratories in their technology transfer activities.

OBJECTIVE

Taking into account the need for R&D programs to contribute to long term national economic and social interests, the objective of this framework is to help promote the transfer of technology to the private sector, both directly and through universities and provincial organizations, for its commercial exploitation and its contribution to Canadian competitiveness, and to do this in the most effective and efficient manner.

PRINCIPLES

1. Increased technology transfer from SBDA laboratories will help Canadian industry be more competitive.
2. A consistent, cooperative effort is required from all players in government and the private sector to transfer technology successfully.
3. This effort will be forthcoming only if mechanisms, powers and incentives exist to provide each player — laboratory managers and staff, and industry receptors — with the instruments for collaboration and the full benefits of participation.
4. The expectations, rights and responsibilities of industry, universities and government with respect to the ownership and management of intellectual property must be defined clearly.
5. Laboratories and technology transfer offices must be empowered to develop technology transfer skills and capacity and to work with the private sector, as well as with universities and provincial organizations, individually and in consortia or groups, to facilitate the commercial application of technology.
6. Mechanisms must exist to identify internal and external opportunities for technology transfer and commercial application, including international opportunities, and to disseminate this information to the private sector and within laboratories.
7. Technology transfer for commercial application must be oriented to market needs.

POLICY STATEMENT

It is one of the policies of the government to encourage SBDAs to seek and exploit opportunities to transfer technology developed and/or acquired by their laboratories to the private sector for commercial application. This policy provides principles to facilitate development and interpretation of technology transfer and intellectual property policies. These policies should:

- ▶ Place technology transfer powers and mechanisms as close as possible to the source of the know-how and provide maximum opportunities for immediacy of transfer.
- ▶ Provide rewards and incentives to inventors and laboratories to reinforce strong performance related to technology transfer.
- ▶ Provide flexible administrative procedures and mechanisms to develop a sound human and financial resource base for departments to pursue their technology transfer activities.
- ▶ Encourage the industry users of the technology to absorb and further commercialize the technology.
- ▶ Encourage the development of receptors.
- ▶ Encourage early and ongoing private sector involvement in federal science and technology activities with potential for the transfer of technology and its commercial application.

ROLES AND MECHANISMS IN TRANSFERRING GOVERNMENT TECHNOLOGY

This framework can be extended to look at its impact on the various technology transfer players within government by suggesting roles and mechanisms available to fill these roles, for each of them:

The Treasury Board Secretariat should:

- Support departments in developing strategies and policies to optimize technology transfer:
 - by identifying and developing, in concert with SBDAs, proposals to remove unnecessary constraints and provide incentives for the technology transfer process.

The Office of the Comptroller-General should:

- Support departments in developing strategies and policies to optimize technology transfer:
 - by developing an interdepartmental consensus on technology transfer evaluation guidelines and mechanisms (e.g. ad hoc working groups).

Industry, Science and Technology Canada, in consultation with other departments and agencies³, should:

- Encourage the development within the government, and each SBDA, of policy frameworks, programs and practices that contribute to the transfer of technology to the private sector, both directly and through universities and provincial organizations:
 - by working with departments and agencies to develop consistent new policies and programs to maximize opportunities for technology transfer for commercial application while ensuring a strong research base.
- Encourage the climate for the private sector to realize the potential for successful transfer of technology developed for and by government laboratories:
 - by encouraging the private sector — in part through the provision of coordinated technology and marketing services — to develop the capacity to search out, identify and assess new technologies for adoption, adaptation and commercial application;
 - by assisting SBDAs to market technologies to the private sector, particularly through ISTC regional offices and programs;
 - by working cooperatively with regional development agencies in providing assistance and encouragement to users; and
 - by encouraging firms to hire technical, scientific, and engineering personnel needed to recognize, develop, and use new technologies.

³Clearly, other departments and agencies — such as Supply and Services Canada, External Affairs and International Trade Canada, Finance Canada, Revenue Canada and Consumer and Corporate Affairs Canada — also have a role to play. This will be addressed through further interdepartmental discussions.

The science-based departments and agencies, directly or through their technology transfer offices, should:

▶ **Actively pursue technology transfer:**

- by working in collaboration with each other, TBS, and ISTC, where appropriate, to develop, seek support for and apply fully policies and programs that promote technology transfer activities, and proposals that remove unnecessary constraints and provide incentives for the technology transfer process;⁴
- by developing individually and seeking support for similar proposals, for example in negotiating Memoranda of Understanding under the Increased Ministerial Authority and Accountability initiative with TBS, where these are specific to the department or agency;
- by seeking legislative changes, where appropriate, to facilitate technology transfer;
- by developing and implementing a technology transfer strategy consistent with their mandate and legislation, their ongoing R&D requirements, and this framework;
- by encouraging early and ongoing user participation in the planning and priority-setting process of federal laboratories through advisory mechanisms; and
- by evaluating programs and analyzing available and future technologies with a view to optimizing potential economic and social benefits through the most appropriate choice of user, including consortia or alliances, where applicable.

▶ **Foster a culture within themselves that realizes the full potential for technology transfer:**

- by providing laboratory managers and staff with a clear statement of the department's technology transfer objectives and criteria within the context of ongoing R&D activities;
- by providing laboratory managers and staff access to training programs that will develop specific technology transfer skills (for example, marketing and intellectual property management) and an appreciation of the factors affecting private sector participation in the commercial application of technology;
- by providing managers with the administrative and financial support to develop internal technology transfer capabilities, to reward employee participation, and/or to acquire such capabilities through external agents; and
- by regularly evaluating their technology transfer efforts and results.

The managers of laboratories should:

- ▶ **Work closely with their technology transfer offices and with users in the private sector — both directly and through universities and provincial organizations — to maximize opportunities for effective and efficient transfer of appropriate technologies for commercial development:**
- by identifying and promoting, where not restricted by confidentiality considerations, the uses of new technologies that are being developed;

⁴*This also includes departments such as Supply and Services Canada, External Affairs and International Trade Canada, Finance Canada, Revenue Canada, and Consumer and Corporate Affairs Canada, where appropriate.*

- by evaluating new technologies to identify and protect intellectual property, where appropriate;
 - by pursuing opportunities for the involvement of the private sector at all stages of development, for example, through joint research and alliances, and by having the authority to enter into technology transfer agreements;
 - by promoting, under appropriate circumstances and conditions, the use of unique government facilities by the private sector to strengthen their research capabilities through access to expertise and advanced equipment;
 - by assisting users in identifying and assessing the commercial potential of new technologies both domestically and abroad; and
 - by ensuring that technology transfer activities are targeted to realistic economic objectives.
- › Manage their resources to realize the full potential for the transfer of technology developed and/or acquired by or for their laboratories:
- by understanding the departmental objectives and government policies that guide their technology transfer activities; and
 - by developing the skills and capabilities within their laboratory and/or accessing the external expertise required to pro-actively identify, evaluate, and market commercially exploitable technology.
- › Provide incentives and recognition to staff for participation in technology transfer activities:
- by implementing, where appropriate, classification standards for laboratory staff that incorporate technology transfer responsibilities;
 - by ensuring that technology transfer activities are given due recognition during performance appraisal;
 - by providing access to training programs in relevant skills; and
 - by providing financial rewards within approved guidelines.
- › Ensure the ongoing rejuvenation of laboratory staff by:
- introducing new science and technology personnel initiatives, such as hiring recent graduates, assigning fellowships (post-doctoral, industrial research, and others), and introducing early retirement; and
 - providing non-financial rewards such as opportunities for professional development in related areas.

The laboratory staff should:

- › Participate in technology transfer where appropriate to their responsibilities and activities:
- by understanding the objectives and guidelines for the laboratory's activities and their role in these activities;
 - by understanding and being prepared to take full advantage of the policies in place to encourage technology transfer;
 - by becoming familiar with the technology needs of their industrial clients and working cooperatively with these clients; and
 - by identifying, where appropriate, opportunities for commercial application of the results of their work for management and clients.

CONCLUSIONS

This framework is the result of a broad consultation and consensus-building process carried out under the auspices of the Interdepartmental Group on Intellectual Property Management. Its development has promoted discussions among departments on technology transfer activities for commercial purposes and the identification of common themes. The framework outlines guidelines to help SBDAs and their laboratories develop policies, procedures and practices to promote and execute technology transfer. It suggests roles and mechanisms for transferring government technologies and has helped identify consensus positions on important issues and problems of interest to government laboratories.

Yet the framework is only the beginning. It will provide the foundation for ongoing consultative and participatory work to review, formulate and influence the government's technology transfer policies. It is envisaged that a series of discussion papers or guidelines on specific issues will emerge since the issues affecting technology transfer go far beyond the realm of a single paper. For instance, policies addressing the broader public-good aspects of technology transfer need to be actively pursued, and more effective programs and mechanisms facilitating technology transfer have to be promoted and implemented. Perhaps most importantly, technology transfer must be integrated in the very fabric of federal culture as a service to the public. A nation's ability to be competitive in the world economy depends on its capacity to innovate, adopt and upgrade. There is therefore now, more than ever, the need to promote and effect technology transfer for commercial applications, a vital component in obtaining a competitive advantage.

Considerable work remains to be done by departments, agencies and others to promote technology transfer for commercial applications. Most importantly, the views, opinions, ideas and committed participation of those who create and disseminate technology, the staff of the laboratories, are a critical element in the process.

DEPARTMENTAL AND AGENCY TECHNOLOGY TRANSFER CONTACTS

Agriculture Canada
Director, Industry Relations Office
930 Carling Avenue
OTTAWA, Ont.
K1A 0C5
Tel.: (613) 995-7084
Fax: (613) 943-0440

Atomic Energy of Canada Limited
Director, Intellectual Property
344 Slater Street
OTTAWA, Ont.
K1A 0S4
Tel.: (613) 237-3270
Fax: (613) 782-2007

Canadian Space Agency
Technology Development Manager
Space Station Program
Building R-88
Montreal Road
OTTAWA, Ont.
K1A 0R6
Tel.: (613) 990-6671
Fax: (613) 952-1319

Communications Canada
Chief, Technology Transfer Programs
Technology Transfer Office
3701 Carling Avenue
OTTAWA, Ont.
K2H 8S2
Tel.: (613) 998-2325
Fax: (613) 998-3185

Energy, Mines and Resources Canada
Director, Technology Marketing
Division/CANMET
555 Booth Street
OTTAWA, Ont.
K1A 0G1
Tel.: (613) 995-4267
Fax: (613) 995-3192

Environment Canada
Manager, Technology Transfer and
Commercialization
Unit 100, Asticou Centre
241 Cité des Jeunes Boulevard
HULL, Que.
K1A 0H3
Tel.: (819) 953-9364
Fax: (819) 953-9029

Fisheries and Oceans
Manager, Oceans Technology
Promotion Office
200 Kent Street
OTTAWA, Ont.
K1A 0E6
Tel.: (613) 990-4373
Fax: (613) 990-7391

Forestry Canada
Scientific Advisor
Industry, Trade and
Technology Directorate
351 St. Joseph Blvd.
HULL, Que.
K1A 1G5
Tel.: (819) 997-1107, ext. 9105
Fax: (819) 997-8697

Health and Welfare Canada
Director
Management Processes Division
Room 1-12
Health Protection Building
Tunney's Pasture
OTTAWA, Ont.
K1A 0L2
Tel.: (613) 957-8266
Fax: (613) 952-7767

National Defence
Directorate of Industry and
University Programs
Research and Development Branch
305 Rideau Street
OTTAWA, Ont.
K1A 0K2
Tel.: (613) 992-5829
Fax: (613) 996-0038

National Research Council
Director
Intellectual Property Services Office
Building M-58
Montreal Road
OTTAWA, Ont.
K1A 0R6
Tel.: (613) 990-9547
Fax: (613) 952-6082

Royal Canadian Mounted Police
Officer-in-Charge
Science and Technology Branch
Forensic Laboratory Services
Directorate
1200 Vanier Parkway
OTTAWA, Ont.
K1A 0R2
Tel.: (613) 998-6340
Fax: (613) 952-0156

Transport Canada
Chief, Research Coordination
Research and Development
Directorate
Tower C, Place de Ville
OTTAWA, Ont.
K1A 0N5
Tel.: (613) 991-6036
Fax: (613) 993-5146

**DEPARTMENTS
AND AGENCIES WITH
RESPONSIBILITIES
RELATED TO
TECHNOLOGY
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*Consumers and Corporate
Affairs Canada*
Director, Information and
Technology
Exploitation Branch
Phase I, Place du Portage
50 Victora Street
HULL, Que.
K1A 0C9
Tel.: (819) 994-4775
Fax: (819) 997-2721
(Administration of intellectual
property statutes.)

*External Affairs and
International Trade Canada*
Deputy Director (TDS)
Tower C
Lester B. Pearson Building
125 Sussex Drive
OTTAWA, Ont.
K1A 0G2
Tel.: (613) 996-4160
Fax: (613) 943-1102
(International technology transfer.)

*Industry, Science and
Technology Canada*
Manager, Science Development
Science Sector
235 Queen Street
OTTAWA, Ont.
K1A 0H5
Tel.: (613) 990-6262
Fax: (613) 991-0363
(Science and technology
policy and program development.)

*Natural Sciences and
Engineering Research Council*
Director
Research Partnerships Program
200 Kent Street
OTTAWA, Ont.
K1A 1H5
Tel.: (613) 996-1898
Fax: (613) 992-5337
(Support for high quality university
research and increased collaboration
among university, industry and
government researchers.)

Supply and Services Canada
Director, Science Branch
Phase III, Place du Portage
11 Laurier Street
HULL, Que.
K1A 0S5
Tel.: (819) 956-1788
Fax: (819) 956-5165
(Technology transfer and intellectual
property protection arrangement
facilitators.)

*Treasury Board — Office of the
Comptroller General*
Chief, Science, Economic and
Regional Development
Program Evaluation Branch
9th Floor, West Tower
300 Laurier Street
OTTAWA, Ont.
K1A 1E4
Tel.: (613) 957-7182
Fax: (613) 957-7240
(Information and guidelines on
evaluation and assessment of science
and technology activities.)

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Technology Canada

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