Catalogue no. 88F0006XIE — No. 018
ISSN: 1706-8967
ISBN: 0-662-41952-9

Working Paper

Science, Innovation and Electronic Information Division working papers

Survey of Intellectual Property Commercialization in the Higher Education Sector, 2003

by Cathy Read

Science, Innovation and Electronic Information Division (SIEID)
7-A, R.H. Coats Building, Ottawa, K1A 0T6

Telephone: 1 800 263-1136

Statistics Canada Statistique Canada

Canada

How to obtain more information

For information on the wide range of data available from Statistics Canada, you can contact us by calling one of our toll-free numbers. You can also contact us by e-mail or by visiting our website.

National inquiries line	1 800 263-1136
National telecommunications device for the hearing impaired	1 800 363-7629
Depository Services Program inquiries	1 800 700-1033
Fax line for Depository Services Program	1 800 889-9734
E-mail inquiries	infostats@statcan.ca
Website	www.statcan.ca

Information to access the product

This product, catalogue no. 88F0006XIE, is available for free. To obtain a single issue, visit our website at www.statcan.ca and select Our Products and Services.

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner and in the official language of their choice. To this end, the Agency has developed standards of service that its employees observe in serving its clients. To obtain a copy of these service standards, please contact Statistics Canada toll free at 1 800 263-1136. The service standards are also published on www.statcan.ca under About Statistics Canada > Providing services to Canadians.

Symbols

The following standard symbols are used in Statistics Canada publications:

. not available for any reference period

.. not available for a specific reference period

… not applicable

0 true zero or a value rounded to zero

0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded

^{p} preliminary

^{r} revised

x suppressed to meet the confidentiality requirements of the *Statistics Act*

^{E} use with caution

F too unreliable to be published

Note
Due to rounding, components may not add to the totals.

Statistics Canada
Science, Innovation and Electronic Information Division (SIEID)
Human Resources and Intellectual Property Section

Survey of Intellectual Property Commercialization in the Higher Education Sector, 2003

Published by authority of the Minister responsible for Statistics Canada

November 2005

Catalogue no. 88F0006XIE, no. 018

ISSN: 1706-8967
ISBN: 0-662-41952-9
Frequency: occasional

Ottawa

La version française de cette publication est disponible sur demande (n^{o} 88F0006XIF au catalogue)

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

Contacts for more information

Science, Innovation and Electronic Information Division

Director	Dr. F. D. Gault	(613-951-2198)
Assistant Director	Craig Kuntz	(613-951-7092)

The Science and Innovation Information Program

Special Advisor, Science and Technology
Dr. Frances Anderson (613-951-6307)
Chief, Human Resources and Intellectual Property
Michael Bordt (613-951-8585)
Special Advisor, Life Sciences
Antoine Rose (613-951-9919)
Chief, Science and Technology Surveys
Antoine Rose (613-951-9919)

Fax: (613-951-9920)
E-Mail: Sieidinfo@statcan.ca

Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review.

The science and innovation information program

The purpose of this program is to develop **useful indicators of science and technology activity** in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed in five key entities:

- **Actors**: are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- **Activities**: include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages**: are the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, the source of ideas for innovation in industry.
- **Outcomes**: are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts**: are the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report **Federal Scientific Activities, 1998 (Cat. No. 88-204)** first published socio-economic objectives indicators to show *what* the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 (**Science and Technology Activities and Impacts: A Framework for a Statistical**

Information System, Cat. No. 88-522). The framework has given rise to **A Five-Year Strategic Plan for the Development of an Information System for Science and Technology** (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

Our working papers and research papers are available at no cost on the Statistics Canada Internet site at http://www.statcan.ca/cgi-bin/downpub/research.cgi?subject=193.

2003 Survey of Intellectual Property Commercialization in the Higher Education Sector

Table of Contents

List of Tables

Introduction

Canadian universities and hospitals have made great strides in commercializing inventions. Statistics Canada conducted the Survey of Intellectual Property Commercialization in the Higher Education Sector in 1998, 1999, 2001 and 2003 to track progress in this area. This report highlights some of the changes between 2001 and 2003, as well as presenting the 2003 regional results.

Highlights

- Between 2001 and 2003, the number of inventions reported or disclosed by researchers to universities and hospitals increased from 1,105 to 1,133 (3%).
- Between 2001 and 2003, income from IP increased from $52.5 million to $55.5 million (6%).
- In 2003, universities and hospitals had $36.4 million in total operational expenditures for IP management, up 28% from $28.5 million in 2001.
- In 2002 and 2003, Canadian universities and hospitals created 64 spin-off companies to commercialize their technologies, for a total of 876 created to date.

Results

More institutions doing IP management

Intellectual property (IP) management is defined as the identification, protection, promotion and/or commercialization of IP. In 2003, 72% of institutions reported actively managing their IP, compared to 66% in 2001. The change was due to increased activity among the smaller universities. (Table 1)

Institutions spending more on IP management

In 2003, universities and hospitals had $36.4 million in total operational expenditures for IP management, up 28% from $28.5 million in 2001. The number of employees engaged in IP management also rose from 221 in 2001 to 255 in 2003. The average salary (including benefits) was $66,500.

In 2003, 12 institutions reported a total of $1.4 million in litigation expenditures. Litigation expenditures were defined as those related to disputes over patents/other intellectual property and include settlements. (Table 2)

Sources of funds for IP management

Concerning the $36.4 million spent on IP management in 2003, the funding sources and the proportions were as follows:

- institutional base funding (29%)
- institutional one-time allocations (10%)

- IP commercialization revenues (e.g., licensing, cashed-in equity) (36%)
- external sources (25%).

The external sources included the following:

- Atlantic Canada Opportunities Agency (ACOA)
- Canadian Institutes of Health Research (CIHR)
- Social Sciences and Humanities Research Council of Canada (SSHRC)
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Indirect costs of research program
- Provincial governments
- Private business.

Qualifications of technology transfer personnel

Technology transfer personnel reported a large assortment of university degrees. The fields of study included arts, business, law, sciences, applied sciences and engineering.

Twenty-five percent had a bachelor's degree as the highest degree, 40% had a master's degree and 21% had a Ph.D. Seven percent had no degree (e.g., support staff), 4% listed other qualifications (e.g., community college, P.Eng, CA) and the remaining 3% were unspecified. (Table 3)

The years of experience of technology transfer personnel in that field ranged from zero to over 30, with an average of 6.5 years. Fifty percent of technology transfer personnel had fewer than five years of experience in that field. This is partly due to the relative newness of the field and to the significant increases in government funding of technology transfer offices in recent years. (Table 4)

Legal services used

Of those institutions with central office(s) for IP management, 36% used an outside legal counsel exclusively, 13% used an in-house legal counsel exclusively, 20% used both and the remaining 31% were unspecified. Concerning patent agent services, 55% of institutions used an external service exclusively, 3% used an in-house service exclusively, 4% used both and the remaining 38% were unspecified. (Tables 5 and 6)

Providing space for start-ups

Twenty-five universities and hospitals provided space to a total of 74 start-up companies. One institution noted that rent is charged for the space provided. Another said that space is provided

on a cost recovery basis. Another said that tenants must sign a lease. Clearly, the terms under which institutions provide space to start-ups are an important consideration.

Policy changes

Between 2001 and 2003, a total of 16 institutions changed their IP policies. The policy changes included:

- adopting an IP policy for the first time
- updating existing policies on IP matters
- negotiating a new collective agreement that included articles on IP.

Researcher requirement to report IP

In 2003, for every IP type, there was a substantial increase in "always required to report," as well as a notable decrease in "no policy on reporting." For example, in 2003, 47 institutions reported that researchers must always report inventions compared to 37 institutions in 2001. The same was true for software or databases, educational materials, other materials protected by copyright, industrial designs, trade-marks or official marks and new plant varieties. (Tables 7 and 8)

Ownership of IP created at the institution

In 2003, for the question on ownership of IP created at the institution, the changes are more muted than for the question on requirement to report but the same trend is evident. There is a movement away from "no policy" toward "joint ownership of IP."

In 2003, for every IP type, there was an increase in "joint ownership of IP – institution(s) and researcher." There were also decreases in:

- "no policy on ownership" for all IP types except "other materials."
- "researcher owns" for all IP types except "trademarks or official marks" and "new plant varieties." (Tables 9 and 10)

Researcher right to decide that their inventions will not be commercialized

In most institutions where the issue arises, researchers have the right to decide that their inventions will not be commercialized. Of the 121 institutions in the survey, 54 said that researchers have this right and seven responded negatively. Of the remaining institutions, 24 did not respond to the question, 18 did not have inventions and another 18 answered "not applicable. Among the latter group were institutions that do research that could result in an invention but the level is quite low. (Table 11)

Policy on disposal of equity holdings in spin-off companies

Nine universities and two hospitals reported having a policy on the disposal of equity holdings in spin-off companies. One important element of these policies is the percentage split between the institution(s) and the inventor(s) when such transactions occur.

Faculty consulting

Only 17% of institutions formally recorded information about faculty consulting activities. Looking at universities alone, those that answered yes included small, medium and large institutions. This would indicate that it is feasible for even the larger universities to obtain and keep written records of faculty consulting activities. (Table 12)

For most fields of study, the predominant response was that between 1% and 25% of faculty were doing external consulting in 2003. (Table 13)

The highest percentages of external faculty consulting were found in the more "practical" fields, such as commerce, engineering and health. For example, 15 institutions reported that between 26% and 100% of their commerce faculty were consulting on the side. The comparable numbers were nine in engineering and six in health.

Several institutions indicated that they kept records of faculty consulting but did not answer the questions on percentage of faculty engaged in consulting activities. Another institution said that the information was reported but not "centrally collated."

In summary, survey feedback indicates that there are at least three issues regarding faculty consulting: reporting, recording and centrally collating the information.

Research contracts

Between 2001 and 2003, the total number of research contracts rose 39% from 8,247 to 11,432 while the value of research contracts rose 54% from $527 million to $810 million. Of the 121 institutions in the 2003 survey, 84 or 69% reported research contracts. (Table 14)

The main type of research contract was clinical trials at $164.5 million. For several hospitals, this was their only type of research contract. (Table 15)

Concerning the IP clauses in these contracts, the most common arrangement is where the sponsor has an option to acquire a license to the IP under commercially reasonable terms ($55.4 million). The second most common arrangement is where the sponsor has a (terms pre-negotiated) license to the IP ($29.9 million). The third most common arrangement is where the IP is unrestricted ($18.9 million).

There were nine responses concerning "other" IP provisions, representing a total value of contracts of $5.3 million. These included: "researcher owns"(2), "institution owns", "institution/inventor owns", "joint ownership" "sponsor and researcher co-own 50/50" and "publicly available."

The least common arrangement is where the contract states upfront that the sponsor owns the IP ($5.0 million). (Table 16)

Research funding, inventions and patents

In recent years, the Government of Canada has made substantial new investment in university research. Between 2001 and 2003, total sponsored research funding rose from $3.3 billion to $4.3 billion. During this period, many indicators of the outcomes of university research also increased.

Between 2001 and 2003, the number of inventions reported or disclosed by researchers to universities and hospitals increased from 1,105 to 1,133 (3%). The number of patent applications filed by these institutions also increased from 932 to 1,252 (34%) and the total number of patents held rose from 2,133 to 3,047 (43%).

At the end of 2003, 45 percent of all patents held by institutions were licensed, assigned or otherwise commercialized. However, the percentages vary for patents obtained in Canada, the US and other countries. Notably, 54% of patents obtained in other countries were commercialized, compared to 35% in Canada and 30% in the US. The higher percentage of other country patents commercialized may be explained as follows.

For reasons of cost, institutions may be less likely to obtain a patent in European or other countries further afield unless they have already found a licensee. Hence, there would be a higher percentage of other country patents commercialized. (Tables 17 to 20)

Licenses and sub-licenses

Patents are typically licensed to other parties, such as to other institutions and companies. New licenses rose from 354 to 422 (19%) while total active licenses rose from 1,424 to 1,756 (23%). (Table 21)

When granting exclusive licenses, the overwhelming practice is for the institution to reserve for itself the rights to the IP for educational or non-commercial research practices. Of the 28 institutions that granted exclusive licenses during the reference year, 22 always reserved these rights and two more did sometimes, for a total of 24 (86%). No institutions reported never reserving these rights and the remaining four institutions did not report.

In 2003, ten institutions reported a total of 56 sublicenses of the institution's IP. Interestingly, four institutions in Quebec reported 49 of the 56 sublicenses (88%).

Research funding related to licenses and options

In 2003, 14 institutions received commitments of $10.7 million in research funding related to license or option agreements.

Income from IP

Between 2001 and 2003, income from IP increased from $52.5 million to $55.5 million (6%). In 2003, this income, less $4.5 million in patent and legal costs, was distributed as follows:

- $19.4 million (38%) to inventors and co-inventors
- $22.1 million (44%) to administrative units in the reporting institution
- $1.4 million (3%) to other institutions
- $7.4 million (15%) to other parties, such as to technology transfer offices for operations. (Tables 22 and 23)

Spin-off companies

In 2002 and 2003, Canadian universities and hospitals created 64 spin-off companies to commercialize their technologies, for a total of 876 created to date. The spin-offs cover a wide range of industries, for example, research and development, computer systems design, engineering and medical devices manufacturing. At the end of 2003, 13 institutions held $52.4 million in equity in publicly traded spin-off companies. In 2003, 11 institutions also helped their spin-offs to raise $54.6 million in venture capital and other forms of investment. (Tables 24 to 30)

Note: Information on the revenues and employment of spin-off companies will be available at a later date.

Regional variations

Research funding varies widely from institution to institution and from region to region. For example, the 19 universities and hospitals in the Atlantic region, which are mainly small, received $186 million in research funding in 2003. This compares to 37 institutions in Ontario that received $1.6 billion in research funding in the same year.

Regional differences in IP commercialization can be examined in proportion to research funding. Universities and hospitals in British Columbia received 11% of total research funding but accounted for a higher proportion of three major indicators of IP commercialization: 19% of inventions disclosed, 20% of inventions protected and 25% of spin-off companies created to date.

Prairie institutions also had above average results. They obtained 17% of sponsored research funding but earned a disproportionate 22% of income from IP. They also accounted for 20% of inventions disclosed, 26% of patents issued, 17% of new licenses and options, 21% of total active licenses and options and 18% of spin-off companies created to date. However, Prairie institutions had a lower share of inventions protected (10%) and patent applications filed (14%).

In contrast, Ontario institutions received 38% of total research funding but accounted for a lesser proportion of most of the major indicators of IP commercialization: 26% of income from IP, 36% of inventions disclosed, 35% of inventions protected, 29% of patent applications filed, 22% of patents issued, 30% of total patents held, 35% of total active licenses and options and 36% of spin-off companies created to date. However, on one major indicator – new licenses and options – Ontario obtained a better result of 42%.

Quebec institutions obtained 30% of sponsored research funding and accounted for 30% of inventions protected and 34% of patent applications filed. However, on most indicators, Quebec had a lower result: 21% of inventions disclosed, 26% of patents issued, 22% of total patents held, 26% of new licenses and options, 25% of total active licenses and options and 14% of spin-off companies created to date.

In recent years, Atlantic institutions have become more active in IP commercialization. Atlantic institutions obtained 4% of sponsored research funding and accounted for 4% of inventions disclosed, 5% of inventions protected and 7% of spin-off companies created to date. However, they lagged in both income from IP and total patents held, with only 1%.

Other indicators that may play a role in IP commercialization outcomes are expenditures on IP management and the value of research contracts. (Table 31, Parts 1 and 2)

Methodology and data quality

The 2003 Survey of Intellectual Property Commercialization in the Higher Education Sector was redesigned by a working group consisting of the Association of Universities and Colleges of Canada (AUCC), the Association of University Technology Managers (AUTM), Industry Canada and Statistics Canada.

The 2003 survey was mailed out in July 2004 to:

- all members of the AUCC
- all known research hospitals.

The final response rate for this voluntary survey was 81% for universities and 44% for hospitals. (Tables 32 and 33)

Surveys are subject to certain types of errors: coverage, non-response, interpretation and processing errors. The methodology of this survey has been designed to minimize errors and to reduce their potential impact.

Limited imputation or estimation of missing information is done for this survey. Due to the small number of institutions, imputation is done manually as opposed to by computer. Below is a summary of the method.

Firstly, imputation is closely tied to editing. Any missing information that can be filled in based on related answers is so completed.

Secondly, for larger institutions, some of the information is available from public sources, such as university websites, the AUTM survey, annual reports, press releases and even conference presentations.

Thirdly, certain types of questions have a logical default answer:

YES/NO questions: The default is NO unless external information or the corresponding previous response was YES.

Fourthly, some information is logically carried forward from the previous year's response, for example:

Policy questions: If the policy questions are not answered and the information is not available on the institution's website, the latest year's response is carried forward. This is because institutional policies are fairly constant. To assist in this regard, a file of all previous questionnaires and attachments is kept.

Spin-off companies: The survey requests a cumulative list of spin-off companies. Therefore, the previous year's information for all spin-off variables is automatically carried forward. For each spin-off, the incorporation year, status and technology field is compared to the STC Business

Register (BR) and may be updated accordingly. The BR is an administrative data source based on Canada Customs and Revenue Agency records.

At the end of these procedures, a certain amount of information is still missing. One of the most common cases is information provided in aggregate only and not broken down into the categories requested. In these cases, an "unallocated" category is created and published. This allows data users to see and assess the extent of non-response.

If no information whatsoever is available, the field is left blank and no estimation is done.

Further details on the methodology of the survey can be found at:

http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4222&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Tables

Table 1. IP management infrastructure

Institutions						Number of central offices
	Total number	Actively managing IP		With central offices for IP management		
		Number	%	Number	%	
Hospitals	34	19	56	10	29	10
Universities	87	68	78	59	68	72
Total	**121**	**87**	**72**	**69**	**57**	**82**

Table 2. Expenditures on IP management

Employees engaged in IP management	Salaries and benefits (corresponding to FTEs)	Patent and regular legal expenditures	Litigation expenditures	Other operational expenditures	Total operational expenditures for IP management
FTEs	$ thousands				
255	16,955	10,382	1,417	7,665	36,419

Table 3. Degrees of technology transfer personnel

Code	**Bachelor's degree is the only degree listed - 43**	No. employees
11	Bachelor of Arts (B.A.)	13
12	Bachelor of Commerce (B.Com) or Bachelor of Business Administration (B.B.A.)	9
13	Bachelor of Science (B.Sc.)	9
14	Bachelor of Engineering (B.Eng.) or Bachelor of Applied Sciences (B.A.Sc.)	5
15	Bachelor of Laws (LL.B.)	4
19	Other or unspecified bachelor's degree	3
	Combinations of degrees with bachelor's as the highest - 13	
21	B.A., LL.B.	4
22	B.Com/B.B.A, LL.B.	1
23	B.Sc., LL.B.	4
28	Other, with LL.B.	1
29	Other	3
	Master's is the only degree listed - 28	
31	Master of Arts (M.A.)	2
32	Master of Business Administration (M.B.A.)	12
33	Master of Science (M.Sc.)	10
34	Master of Engineering (M.Eng.) or Applied Sciences (M.A.Sc.)	1
39	Other or unspecified master's degree	3
	Combinations of degrees with master's as the highest - 63	
41	B.A., M.A.	2
42	B.A., M.B.A.	2
43	B.Sc., M.B.A.	13
44	B.Sc., M.Sc.	15
45	B.Sc, M.Sc., M.B.A.	4
46	M.Sc., M.B.A.	5
47	B.Eng./B.A.Sc. and M.Sc./M.A.Sc.	4
48	Other, with LL.B. and M.B.A.	2
49	Other	16
	Ph.D. is the highest degree listed - 48	
51	Ph.D. is the only degree listed	16
52	B.A., M.A., Ph.D.	3
53	B.Sc., Ph.D.	9
54	B.Sc., M.Sc., Ph.D.	5
55	B.Sc., M.Sc., M.B.A., Ph.D.	2
56	B.Sc., M.B.A., Ph.D.	3
57	M.B.A., Ph.D.	3
59	Other combinations of degrees with Ph.D. as the highest	7
	Other - 31	
96	Degree(s) inferred (e.g., P.Eng., CA)	4
97	Community college or other qualification (e.g., CGA, CMA)	6
98	No degree (e.g., support staff)	16
99	Unknown	5
	Total	**226**

Table 4. Years of experience of technology transfer personnel

	Number of years of technology transfer (TT) experience								
	0	1-2	3-4	5-9	10-14	15-19	20 and over	Unknown	**Total**
No. of TT personnel	14	51	49	49	26	21	11	5	**226**
%	6	22	22	22	12	9	5	2	**100**

Table 5. Legal services used for IP matters (1)

Type of service used:	No. institutions	%
In-house legal counsel	23	33
Outside legal counsel	39	57
In-house patent agent	5	7
Outside patent agent	41	59
None of the above or no information	19	28
Total number of institutions with central offices for IP management	69	…

Table 6. Legal services used for IP matters (2)

	In-house only	Outside only	Both	Neither or no information	**Total**
	Number of institutions				
Legal counsel	9	25	14	21	**69**
Patent agent	2	38	3	26	**69**

Table 7. Researcher requirement to report IP: 2003

		The institution's policies state:			No policy on reporting	No such IP at the institution	**Total**
		Always	Sometimes	Never			
		Number of institutions					
Inventions		47	26	10	20	18	**121**
IP protected by copyright	Software or databases	33	34	16	29	9	**121**
	Educational materials	24	35	23	30	9	**121**
	Other materials	27	32	22	31	9	**121**
Industrial designs		26	19	12	26	38	**121**
Trade-marks or official marks		28	20	9	30	34	**121**
New plant varieties		15	16	9	14	67	**121**

Table 8. Researcher requirement to report IP: 2001

	Always	Sometimes	Never	No policy on reporting	No such IP at the institution	**Total**
	Number of institutions					
Inventions	37	25	10	29	15	**116**
Software or databases	20	39	15	36	6	**116**
Educational materials	17	36	19	38	6	**116**
Literary, artistic works, etc.	16	25	26	38	11	**116**
Industrial designs	16	20	15	32	33	**116**
Trade-marks or official marks	18	18	11	35	34	**116**
New plant varieties	11	17	7	19	62	**116**

Table 9. Ownership of IP created at the institution: 2003

		Institution owns	Researcher owns	Joint ownership (institution(s) and researcher)	No policy on ownership	Other ownership	No such IP at the institution	**Total**
		Number of institutions						
Inventions		22	36	25	16	4	18	**121**
IP protected by copyright	Software or databases	20	42	22	22	6	9	**121**
	Educational materials	15	55	13	23	6	9	**121**
	Other materials	11	59	12	26	4	9	**121**
Industrial designs		17	28	16	20	2	38	**121**
Trade-marks or official marks		23	27	14	19	4	34	**121**
New plant varieties		9	24	9	10	2	67	**121**

Table 10. Ownership of IP created at the institution: 2001

	Institution owns	Researcher owns	Joint ownership (institution(s) and researcher)	No policy on ownership	Other ownership	No such IP at the institution	**Total**
	Number of institutions						
Inventions	20	38	17	22	4	15	**116**
Software or databases	20	43	15	26	6	6	**116**
Educational materials	15	58	9	24	4	6	**116**
Literary, artistic works, etc.	5	72	5	19	4	11	**116**
Industrial designs	14	32	8	27	2	33	**116**
Trade-marks or official marks	20	25	5	28	4	34	**116**
New plant varieties	10	22	5	16	1	62	**116**

Table 11. Researcher right to decide that their inventions will not be commercialized

	Yes-researchers have this right	No	Not applicable	No response	No such IP at the institution	**Total**
All institutions	54	7	18	24	18	**121**
Institutions with invention disclosures in 2003	35	5	5	9	0	**54**
Universities with $10 million or more in sponsored research in 2003	25	4	2	5	0	**36**

Table 12. Formal recording of consulting activity

	Yes - recorded	No – not recorded	No information	**Total**
Hospitals	4	13	17	**34**
Universities	17	54	16	**87**
Total	21	67	33	**121**

Table 13. Percentage of faculty involved in external consulting by field of study

	No such faculty at this institution	0%	1 to 25%	26 to 50%	51 to 75%	76 to 100%	Not reported	**Total**
	Number of institutions reporting							
Fine and applied arts, humanities and social sciences	16	5	38	2	0	0	60	**121**
Educational, recreational and counselling services	21	4	34	2	0	0	60	**121**
Commerce, management and business administration	18	6	22	10	4	1	60	**121**
Agricultural and biological sciences and technologies	22	5	31	3	1	0	59	**121**
Engineering and applied sciences	30	5	18	6	2	1	59	**121**
Health professions, sciences and technologies	20	6	30	4	1	1	59	**121**
Mathematics and physical sciences	20	7	30	4	0	0	60	**121**

Table 14. Number and value of research contracts

	Number of contracts	Value of contracts ($ thousands)
Federal government	1,546	141,446
Provincial and other levels of government	1,907	147,024
Canadian business	2,920	195,916
Canadian organizations	812	40,623
Foreign governments	159	24,990
Foreign businesses	859	87,047
Foreign organizations	220	14,961
Other	197	24,480
Unallocated	2,812	133,944
Total	**11,432**	**810,431**

Table 15. Research contracts by type

	Type of research contract	Definition/ significance	No. reporting	Value of contracts ($'000)
A	Clinical trials	The institution only tested drugs or other IP on behalf of another party (e.g., a pharmaceutical company) and therefore, the institution does not own the drug patents or other IP in question.	21	164,480
B	Service contracts	The purpose of these contracts is to provide a service and generally the IP developed belongs to the sponsor.	24	x
C	Collaborative R&D	The research sponsor and the institution collaborated in the performance of the research.	28	73,605
D	Sponsored research contracts	These contracts were performed entirely by parties within the institution.	32	126,541
E	Other		7	x
	Unallocated	Respondents were unable to provide the breakdowns requested.	36	388,938
		Total value of research contracts	**84**	**810,431**

Table 16. Research contracts by type of IP provision

	Type of IP provision	Number reporting	Value of contracts ($'000)
1	The sponsor owns the IP	9	5,010
2	The sponsor has a license to the IP	10	29,855
3	The sponsor has an option to acquire a license to the IP under commercially reasonable terms	17	55,410
4	The IP is unrestricted	17	18,913
5	Other	9	5,268
	Total	**29**	**114,456**

Note: The total in this table is supposed to equal C+D+E in Table 15 but is less due to incomplete reporting.

Table 17. IP management activities summary

IP type	Applicable IP protection activity	Institutions reporting this IP protection activity in the last 5 years		Number of intellectual properties			Number of institutions reporting intellectual properties		
		No.	%	Disclosed to the institution (A)	Protected (B)	Declined by the institution (C)	Disclosed (A)	Protected (B)	Declined (C)
Inventions	Patent application	62	51	1,133	527	256	54	49	26
Software or databases		25	21	48	12	x	18	8	1
Educational materials		26	21	158	x	0	15	4	0
Other IP protected by copyright	Copyright registration	21	17	982[1]	x	0	15	2	0
Industrial designs	Registration	5	4	0	0	0	0	0	0
Trademarks	Registration	39	32	24	31	0	9	9	0
New plant varieties	Registration (Canada) Patent (US)	7	6	x	x	x	4	3	1
Other (algorithms)		.	.	x	0	x	1	0	1
Materials transferred in	Adminis-tration of material transfer agreements (MTAs) inbound	43	36	.	.	.	.	.	.
Materials transferred out	Adminis-tration of MTAs outbound	37	31	.	.	.	.	.	.
Various	(Executing of) non-disclosure or confidentiality agreements	68	56	.	.	.	.	.	.
	Trade secret agreements	1	1	.	.	.	.	.	.
	Co-ownership agreements	1	1	.	.	.	.	.	.

(B) Protected means that a protection activity was undertaken but not necessarily concluded.

1. This value has a high degree of estimation at 65%.

Table 18. Patenting activities by field of study

Field of study	Patent applications				Patents issued in:				
	Initiating	Follow-on	Unallocated by type	Total	Canada	US	Other	Unallocated by country	Total
	Number								
Agriculture and biological sciences	26	39	0	65	x	27	x	0	48
Engineering and applied sciences	71	67	63	201	10	34	28	0	72
Health professions and sciences	100	91	61	252	8	40	22	0	70
Mathematics and physical sciences	31	27	0	58	x	22	x	0	47
All other not elsewhere classified	0	0	16	16	0	0	0	0	0
Unallocated by field of study	84	268	308	660	0	65	0	45	110
Total	**312**	**492**	**448**	**1,252**	**29**	**188**	**85**	**45**	**347**

Table 19. Number of patents held and number commercialized, all institutions

	Canada	US	Other countries	Unallocated by country	**Total**
No. patents held at the end of 2003, including patents issued that year	297	1,206	1,196	348	**3,047**
No. patents held at the end of 2001 (for comparison purposes)	373	1087	673	0	**2,133**
No. patents licensed, assigned or otherwise commercialized at the end of 2003 (new question in 2003 survey)	57	161	301	122	**641**

Table 20. Percentage of patents commercialized

		Canada	US	Other countries	Unallocated by country	**Total**
A	No. patents held at the end of 2003, including patents issued this year (only those institutions reporting both A and B)	164	537	557	160	**1,418**
B	No. patents licensed, assigned or otherwise commercialized at the end of 2003	57	161	301	122	**641**
C	Percentage of patents commercialized	35%	30%	54%	76%	**45%**

Table 21. Licenses and options

	Exclusive and sole licenses	Non-exclusive licenses	Unclassified (as to exclusive, sole or non-exclusive)	Total
a) **New licenses** executed with Canadian licensees that were: i) "Sponsors" of research contracts or participants in collaborative activities	56	6	0	62
ii) Not involved in generating the technology licensed ("Non-sponsors")	52	34	0	86
iii) Unclassified (as to sponsor or non-sponsor)	0	0	37	37
iv) Total new licenses with Canadian licensees (a.i+a.ii+a.iii)	108	40	37	185
b) **New licenses** executed with foreign licensees that were: i) "Sponsors" of research contracts or participants in collaborative activities	3	0	0	3
ii) Not involved in generating the technology licensed ("Non-sponsors")	20	116	0	136
iii) Unclassified (as to sponsor or non-sponsor)	19	21	0	40
iv) Total new licenses with foreign licensees (b.i+b.ii+b.iii)	42	137	0	179
v) New licenses (unclassified as to Canadian/foreign or sponsor/non-sponsor)	0	0	58	58
vi) Total new licenses (a.iv+b.iv+b.v)	150	177	95	422
c) **Active licenses** with Canadian licensees that were: i) "Sponsors" of research contracts or participants in collaborative activities	175	23	0	198
ii) Not involved in generating the technology licensed ("Non-sponsors")	208	66	0	274
iii) Unclassified (as to sponsor or non-sponsor)	178	38	33	249
iv) Total active licenses with Canadian licensees (c.i+c.ii+c.iii)	561	127	33	721
d) **Active licenses** with foreign licensees that were: i) "Sponsors" of research contracts or participants in collaborative activities	15	3	0	18
ii) Not involved in generating the technology licensed ("Non-sponsors")	80	303	0	383
iii) Unclassified (as to sponsor or non-sponsor)	66	52	0	118
iv) Total active licenses with foreign licensees (d.i+d.ii+d.iii)	161	358	0	519
v) Active licenses (unclassified as to Canadian/foreign or sponsor/non-sponsor)	0	0	516	516
vi) Total active licenses (c.iv+d.iv+d.v)	722	485	549	1,756

Table 22. Income received from intellectual property

		Canadian sources	Foreign sources	Unallocated by country	Total
		$ thousands			
1	Running royalties	5,095	12,322	20,364	37,781
2	Milestone payments	68	x	0	x
3	From one time sales of IP (in exchange for a single or several payments)	x	x	x	3,033
4	Reimbursement of patent, legal and related costs	1,727	649	2,085	4,461
5	License income received from another Canadian institution under a revenue-sharing agreement	x	0	0	x
6	Other	x	x	x	3,893
7	Unallocated by income type	869	x	x	4,800
	Total	**8,920**	**19,116**	**27,489**	**55,525**

Table 23. Intellectual property income distributed

		$ thousands	%
1	To individuals (inventors and co-inventors)	19,418	38
2	To this institution or to administrative units therein	22,121	44
3	To other institutions	1,418	3
4	Other	7,377	15
	Total	**50,334**	**100**

Table 24. Institutional linkage of spin-off companies

	License (Type 1)	R&D (Type 2)	Service (Type 3)	License and R&D	Other	Unknown	**Total**
Number	326	118	21	43	20	348	**876**
%	37	14	2	5	2	40	**100**

Table 25. Year of incorporation of spin-off companies

	Before 1980	1980 to 1984	1985 to 1989	1990 to 1994	1995 to 1999	2000 to 2001	2002	2003	Unknown	**Total**
Number	41	60	86	169	325	105	47	17	26	**876**
%	5	7	10	19	37	12	5	2	3	**100**

Table 26. Status of spin-off companies

	Conceptual stage	Early stage	Active	Merged	Inactive	Closed	Unknown	**Total**
Number	13	81	516	35	112	66	53	**876**
%	1	9	59	4	13	8	6	**100**

Table 27. Technology field of spin-off companies

	Agriculture/ Biology	Health sciences	Engineering/ Applied sciences	Infor-mation	Mathe-matics/ Physical sciences	Business/ management	Other/ unknown	**Total**
Number	98	307	146	160	88	9	68	**876**
%	11	35	17	18	10	1	8	**100**

Table 28. Spin-offs with equity held by the institution, by percentage owned

	1 to 10%	11 to 20%	21 to 49%	50%	51 to 99%	100%	Equity is owned but amount is unknown	**Total**
Number	113	26	29	16	1	14	48	**247**
%	46	11	12	6	0	6	19	**100**

Table 29. Industry of spin-offs

NAICS code(s)	Industry name	No. spin-offs
	Services – 59%	
541710	R&D in the physical, engineering and life sciences	240
541510	Computer systems design and related services	119
5416	Management, scientific and technical consulting services	39
541330	Professional engineers	33
541380	Testing laboratories	16
621510	Medical and diagnostic laboratories	8
511210	Software publishers	7
551113	Holding companies	6
611420	Computer training	4
5239	Other financial investment activities	5
621110	Offices of physicians	2
	All other services (e.g., theatre company, museum, recording studio, physiotherapist, veterinarian)	37
	Total services	**516**
	Manufacturing – 11%	
334512	Measuring, medical and controlling devices manufacturing	27
339110	Medical equipment and supplies manufacturing	11
325410	Pharmaceutical and medicine manufacturing	6
335	Electrical equipment, appliance and component manufacturing	9
334220	Radio and television broadcasting and wireless communications equipment manufacturing	3
334310	Audio and video equipment manufacturing	4
334110	Computer and peripheral equipment manufacturing	3
	All other manufacturing	36
	Total manufacturing	**99**
	Wholesale trade – 2%	
417930	Professional machinery, equipment and supplies wholesaler-distributors	10
417310	Computer, computer peripheral and pre-packaged software wholesaler-distributors	2
	All other wholesaler-distributors	9
	Total wholesaler-distributors	**21**
	Other industries – 2%	
44-45	Retail trade	8
23	Construction	6
111-112	Agriculture	3
	Total other industries	**17**
	No industry information available – 25%	**223**
	Total spin-offs	**876**

Table 30. Dividends, equity disposition, remaining equity and venture capital

	Cash dividends received by institutions	Equity holdings, options and warrants disposed of (cashed in) by institutions	Remaining equity (held by the institutions) in publicly traded spin-offs	Investment in spin-offs raised with the assistance of the institution
No. reporting	5	4	13	11
$ '000	x	x	52,351	54,640

Table 31. Regional differences in IP commercialization, 2003, Part 1

	Insti-tutions	Sponsored research	Income from IP	Inventions		Patents		
				Disclosed	Protected	Applications filed	Issued	Total held
	No.	$ millions	$ thousands	Number				
Atlantic	19	186	626	51	28	x	x	49
Quebec	29	1,279	x	236	156	427	89	682
Ontario	37	1,628	14,347	404	186	361	78	924
Prairies	21	718	11,955	227	50	178	89	x
BC	15	471	x	215	107	x	x	x
Total	**121**	**4,282**	**55,525**	**1,133**	**527**	**1,252**	**347**	**3,047**
	Percentage of national total							
Atlantic	16	4	1	4	5	x	x	1
Quebec	24	30	x	21	30	34	26	22
Ontario	31	38	26	36	35	29	22	30
Prairies	17	17	22	20	10	14	26	x
BC	12	11	x	19	20	x	x	x
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 31. Regional differences in IP commercialization, 2003, Part 2

	Licenses and options		Spin-off companies created to date	Other indicators of note		
	New	Total active		Expenditures on IP management	Research contracts	Inventions declined
	number			$ thousands	$ millions	number
Atlantic	x	x	63	1,869	66	x
Quebec	111	446	127	8,118	152	44
Ontario	178	611	314	13,855	394	66
Prairies	72	367	156	4,501	91	x
BC	x	x	216	8,076	107	93
Total	**422**	**1,756**	**876**	**36,419**	**810**	**256**
	Percentage of national total					
Atlantic	x	x	7	5	8	x
Quebec	26	25	14	22	19	17
Ontario	42	35	36	38	49	26
Prairies	17	21	18	13	11	x
BC	x	x	25	22	13	36
Total	**100**	**100**	**100**	**100**	**100**	**100**

Table 32. Response rate: universities

Code	Type of response	Number
1	Completed or largely completed	68
2	Total refusal (declined, would not return phone calls, etc.)	15
3	Partial refusal (major sections relevant to the university not completed)	4
10	Affiliated colleges that have never responded (and therefore no record exists on the database)	2
	Total number of universities	89

Table 33. Response rate: hospitals

Code	Designation	Definition	Number
4	Completed	Main questionnaire was completed or largely completed in 2003.	19
5	Refusal with previous response carried forward	Hospital refused to complete the main questionnaire in 2003 but a previous one exists (and the information to date indicates that the survey is applicable)	15
6	Ineligible (per 2003)	The 2003 Preface indicated that the hospital is ineligible to complete the survey.	3
7/8	Resolved or unresolved	Hospital refused to complete the main questionnaire in all three years and 7) a Preface (current or previous) indicates that the survey is applicable	6
		8) it is still unresolved as to whether the survey is applicable.	7
9	Invalid institution	Institution was found to be amalgamated with another institution and will be removed from mailing list.	2
	Total mailed out	Total number of questionnaire packages mailed out	52

References

Advisory Council on Science and Technology (ACST), 1999, *Public investments in university research: reaping the benefits; Report of the expert panel on the commercialization of university research*. May 4, 1999. http://www.acst-ccst.gc.ca

AUTM, *FY 03 Licensing Survey*, http://www.autm.net

Baldwin, John, 1997, *Innovation and intellectual property*, Statistics Canada Cat. No. 88-515-XPE, Ottawa, Canada.

Baldwin, John, Petr Hanel and David Sabourin, 2000, *Determinants of innovative activity in Canadian manufacturing firms: the role of intellectual property rights*. Statistics Canada, Analytical Studies Branch Research Paper Series No. 122, Ottawa, Canada.

Chrisman, James J., 1994, *Economic benefits provided to the province of Alberta by the faculty of the University of Calgary*, University of Calgary, Calgary, Alberta, Canada.

Framework of Agreed Principles on Federally Funded University Research between the Government of Canada and the Association of Universities and Colleges of Canada, November 18, 2002 http://www.aucc.ca

Gu, Wulong and Lori Whewell, 1999*, University research and the commercialization of intellectual property in Canada*. Industry Canada (available on the ACST web site http://www.acst-ccst.gc.ca).

Link, Albert N., 1999, *A suggested method for assessing the economic impacts of university R&D: including identifying roles for technology transfer officers.* Journal of the Association of University Technology Managers (AUTM), Volume XI (1999).

Livingstone, Angus, 1997, *Report on UBC spin-off company formation and growth*. University of British Columbia, Vancouver.

Pressman, Lori, Sonia K. Guterman, Irene Abrams, David E. Geist and Lita L. Neilsen, 1995, *Pre-production investment and jobs induced by MIT exclusive patent licenses: a preliminary model to measure the economic impact of university licensing*. Journal of the Association of University Technology Managers (AUTM), Volume VII (1995).

Statistics Canada, 1997, *Commercialization of intellectual property in the higher education sector: a feasibility study*. Cat. No. 88F0006XIB No. 97-11, Ottawa, Canada. Available on the Internet at http://www.statcan.ca/english/research/88F0006XIE/88F0006XIB1997011.pdf

Statistics Canada, 1999, *Survey of intellectual property commercialization in the higher education sector, 1998*. Cat. No. 88F0006XIB No. 99-01. Ottawa, Canada. Available on the Internet at http://www.statcan.ca/english/research/88F0006XIE/88F0006XIB1999001.pdf

Statistics Canada, 2000, *Survey of intellectual property commercialization in the higher education sector, 1999*. Cat. No. 88F0006XIB No. 00-01. Ottawa, Canada. Available on the Internet at http://www.statcan.ca/english/research/88F0006XIE/B88F0006XIB2000001.pdf

Statistics Canada, 2003, *Survey of intellectual property commercialization in the higher education sector, 2001*. Cat. No. 88F0006XIE No. 03-12. Ottawa, Canada. Available on the Internet at http://www.statcan.ca/english/research/88F0006XIE/88F0006XIE2003012.pdf

Unrau, Yvonne and Jack McDonald, 1995. *The frequency, nature, and impact of faculty influence on policy external to the University of Calgary*, University of Calgary , Calgary, Alberta, Canada. Catalogued publications

Catalogued Publications

Statistical publication

88-202-XIE Industrial Research and Development, 2004 Intentions (with 2003 preliminary estimates and 2002 actual expenditures)

88-204-XIE Federal Scientific Activities, 2003-2004[e] (annual)

88-001-XIE Science Statistics (monthly)

Volume 28

No. 1 Estimation of research and development expenditures in the higher education sector, 2001-2002

No. 2 Total spending on research and development in Canada, 1990 to 2003[p], and provinces, 1990 to 2001

No. 3 Distribution of federal expenditures on science and technology by province and territories, 2001-2002

No. 4 Research and Development (R&D) expenditures of Private Non-Profit (PNP) organizations, 2002

No. 5 The provincial research organizations, 2001

No. 6 Scientific and technological (S&T) activities of provincial governments, 1994-95 to 2002-03

No. 7 Biotechnology scientific activities in selected federal government departments and agencies, 2002-2003

No. 8 Estimates of total spending on research and development in the health field in Canada, 1988 to 2003

No. 9 Industrial Research and Development, 2000 to 2004

No. 10 Estimation of Research and Development Expenditures in the Higher Education Sector, 2002-2003

No. 11 Federal government expenditures on scientific activities, 2004-2005[p]

No. 12 Total spending on research and development in Canada, 1990 to 2004[p], and provinces, 1990 to 2002

Volume 29

No. 1 Distribution of federal expenditures on science and technology by province and territories, 2002-2003

No. 2 Research and development (R&D) personnel in Canada, 1993 to 2002

No. 3 Biotechnology scientific activities in federal government departments and agencies, 2003-2004

No. 4 Industrial Research and Development, 2001 to 2005

No. 5 Estimates of total spending on research and development in the health field in Canada, 1988 to 2004

Working papers - 1998

These working papers are available from the Science and Innovation Surveys Section of Statistics Canada, please contact:

Science and Innovation Surveys Section
Science, Innovation and Electronic Information Division
Statistics Canada
Ottawa, Ontario
K1A 0T6

ST-98-01 A Compendium of Science and Technology Statistics, February 1998

ST-98-02 Exports and Related Employment in Canadian Industries, February 1998

ST-98-03 Job Creation, Job Destruction and Job Reallocation in the Canadian Economy, February 1998

ST-98-04 A Dynamic Analysis of the Flows of Canadian Science and Technology Graduates into the Labour Market, February 1998

ST-98-05 Biotechnology Use by Canadian Industry – 1996, March 1998

ST-98-06 An Overview of Statistical Indicators of Regional Innovation in Canada: A Provincial Comparison, March 1998

ST-98-07 Federal Government Payments to Industry 1992-93, 1994-95 and 1995-96, September 1998

ST-98-08 Bibliometric Analysis of Scientific and Technological Research: A User's Guide to the Methodology, September 1998

ST-98-09 Federal Government Expenditures and Personnel on Activities in the Natural and Social Sciences, 1989-90 to 1998-99[e], September 1998

ST-98-10 Knowledge Flows in Canada as Measured by Bibliometrics, October 1998

ST-98-11 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1987 to 1998[e], and by Province, 1987 to 1996, October 1998

ST-98-12 Estimation of Research and Development Expenditures in the Higher Education Sector, 1996-97, November 1998

Working papers - 1999

ST-99-01 Survey of Intellectual Property Commercialization in the Higher Education Sector, 1998, February 1999

ST-99-02 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology, 1988-89 to 1996-97, June 1999

ST-99-03 An Analysis of Science and Technology Workers: Deployment in the Canadian Economy, June 1999

ST-99-04 Estimates of Gross Expenditures on Research and Development in the Health Field in Canada, 1970 to 1998[e] , July 1999

ST-99-05 Technology Adoption in Canadian Manufacturing, 1998, August 1999

ST-99-06 A Reality Check to Defining E-Commerce, 1999, August 1999

ST-99-07 Scientific and Technological Activities of Provincial Governments, 1990-1991 to 1998-1999[e], August 1999

ST-99-08 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1988 to 1999[e], and by Province, 1988 to 1997, November 1999

ST-99-09 Estimation of Research and Development Expenditures in the Higher Education Sector, 1997-98

ST-99-10 Measuring the Attractiveness of R&D Tax Incentives: Canada and Major Industrial Countries, December 1999

Working papers - 2000

ST-00-01 Survey of Intellectual Property Commercialization in the Higher Education Sector, 1999, April 2000

ST-00-02 Federal Government Expenditures and Personnel in the Natural and Social Sciences, 1990-91 to 1999-2000[e], July 2000

ST-00-03 A Framework for Enhanced Estimations of Higher Education and Health R&D Expenditures, by Mireille Brochu, July 2000

ST-00-04 Information and Communications Technologies and Electronic Commerce in Canadian Industry, 1999, November 2000

Working papers - 2001

ST-01-01 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1989 to 2000[e], and by Province 1989 to 1998, January 2001

ST-01-02 Estimation of Research and Development Expenditures in the Higher Education Sector, 1998-99, January 2001

ST-01-03 Innovation, Advanced Technologies and Practices in the Construction and Related Industries: Provincial Estimates, 1999, January 2001

ST-01-04 Innovation, Advanced Technologies and Practices in the Construction and Related Industries: National Estimates, 1999, February 2001

ST-01-05 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology 1990-91 to 1998-99, February 2001

ST-01-06 Estimates of Total Expenditures on Research and Development in the Health Field in Canada, 1988 to 2000[e], March 2001

ST-01-07 Biotechnology Use and Development, 1999, March 2001

ST-01-08 Federal Government Expenditures and Personnel in the Natural and Social Sciences, 1991-92 to 2000-2001[e], April 2001

ST-01-09 Estimates of Research and Development Personnel in Canada, 1979 to 1999[e], June 2001

ST-01-10 Innovation in Canadian Manufacturing: National Estimates, 1999, June 2001

ST-01-11 Practices and Activities of Canadian Biotechnology Firms: Results from the Biotechnology Use & Development Survey -- 1999, August 2001

ST-01-12 Canadian Biotechnology Industrial Activities: Features from the 1997 Biotechnology Survey, September 2001

ST-01-13 Innovation in Canadian Manufacturing: Provincial Estimates, 1999, September 2001

ST-01-14 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1990 to 2001[e], and by Province, 1990 to 1999, November 2001

ST-01-15 Estimation of Research and Development Expenditures in the Higher Education Sector, 1999-2000, December 2001

Working papers - 2002

ST-02-01 Innovation and Change in the Public Sector: A Seeming Oxymoron, January 2002

ST-02-02 Measuring the Networked Economy, March 2002

ST-02-03 Use of Biotechnologies in the Canadian Industrial Sector: Results from the Biotechnology Use & Development Survey - 1999, March 2002

ST-02-04 Profile of Spin-off Firms in the Biotechnology Sector: Results from the Biotechnology Use and Development Survey - 1999, March 2002

ST-02-05 Scientific and Technological Activities of Provincial Governments, 1992-1993 to 2000-2001[e], April 2002

ST-02-06 Are we Managing our Knowledge? Results from the Pilot Knowledge Management Practices Survey, 2001, April 2002

ST-02-07 Estimates of Total Expenditures on Research and Development in the Health Fields in Canada, 1988 to 2001[p], May 2002

ST-02-08 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology, 1991-92 to 1999-2000, May 2002

ST-02-09 An Overview of Organisational and Technological Change in the Private Sector, 1998-2000, June 2002

ST-02-10 Federal Government Expenditures and Personnel in the Natural and Social Sciences, 1992-1993 to 2001-2002[p], June 2002

ST-02-11 Innovation in the Forest Sector, June 2002

ST-02-12 Survey of Innovation 1999, Methodological Framework: Decisions Taken and Lessons Learned, June 2002

ST-02-13 Innovation and the Use of Advanced Technologies in Canada's Mineral Sector: Metal Ore Mining, July 2002

ST-02-14 Estimation of Research and Development Expenditures in the Higher Education Sector, 2000-2001, December 2002

ST-02-15 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1991 to 2002[p], and by Province 1991 to 2000, December 2002

ST-02-16 Survey of Innovation 1999, Statistical Tables, Manufacturing Industries, Canada, December 2002

ST-02-17 Determinants of Product and Process Innovations in Canada's Dynamic Service Industries, December 2002

Working papers - 2003

ST-03-01 A Comparison of International R&D Performance: An Analysis of Countries That Have Significantly Increased Their GERD/GDP Ratios During the Period 1989-1999, February 2003

ST-03-02 Who's Sharing What With Whom? How Canadian Businesses Used Electronic Networks to Share Information in 2001, February 2003

ST-03-03 How is the Canadian Biotechnology Evolving: A Comparison of the 1997 and 1999 Biotechnology Use and Development Surveys, March 2003

ST-03-04 Scientific and Technological Activities of Provincial Governments, 1993-1994 to 2001-2002[e], March 2003

ST-03-05 Features of Canadian biotech innovative firms: results from the biotechnology use and development survey - 2001, March 2003

ST-03-06 Innovation is a social process, March 2003

ST-03-07 Knowledge management in practice in Canada, 2001, March 2003

ST-03-08 Provincial distribution of federal expenditures and personnel on science and technology, 1994-95 to 2000-2001, April 2003

ST-03-09 Federal government expenditures and personnel in the natural and social sciences, 1993-1994 to 2002-2003, April 2003

ST-03-10 Estimates of total expenditures on research and development in the health field in Canada, 1988 to 2002[p] , November 2003

ST-03-11 Estimates of research and development personnel in Canada, 1979 to 2000, November 2003

ST-03-12 Survey of intellectual property commercialization in the higher education sector, 2001, November 2003

ST-03-13 Bioproducts development by Canadian biotechnology firms: findings from the 2001 Biotechnology Use and Development Survey, December 2003

Working papers - 2004

ST-04-01 Starting the new century: technological change in the Canadian private sector, 2000-2002, January 2004

ST-04-02 Estimation of research and development expenditures in the higher education sector, 2001-2002, January 2004

ST-04-03 Estimates of Canadian research and development expenditures (GERD), Canada, 1992 to 2003[p], and by province 1992 to 2001, January 2004

ST-04-04 The many guises of innovation: what we have learnt and where we are heading, 2003, January 2004

ST-04-05 Provincial distribution of federal expenditures and personnel on science and technology, 1995-96 to 2001-2002, February 2004

ST-04-06 Biotechnology use and development survey: methodology, issues and responses, February 2004

ST-04-07 An historical comparison of technological change, 1998-2000 and 2000-2002, in the private and public sectors, March 2004

ST-04-08 Technological change in the public sector, 2000-2002, March 2004

ST-04-09 Regional disparities of research and development in the business services sector, April 2004

ST-04-10 Innovative firms: A look at small firms, May 2004

ST-04-11 Scientific and technological activities of provincial governments, 1994/95 to 2002/2003, June 2004

ST-04-12 Federal government payments to industry, 1997-1998 to 2001-2002, July 2004

ST-04-13 Community innovation: Industrial specialization in Canadian cities, July 2004

ST-04-14 Estimates of total expenditures on research and development in the health field in Canada, 1988 to 2003, July 2004

ST-04-15 Community innovation: innovation performance of manufacturing firms in Canadian communities, September 2004

ST-04-16 List of papers published by Kluwer Academic Publishers, in the Economics of Science, Technology and Innovation Series, October 2004

ST-04-17 Trends in Canadian biotechnology activity: 1997 to 2001, October 2004

ST-04-18 Public sector technology transfer in Canada, 2003, November 2004

ST-04-19 Estimation of research and development expenditures in the higher education sector, 2002-2003, November 2004

ST-04-20 Estimates of Canadian research and development expenditures (GERD), Canada, 1993 to 2004^{p}, and by province 1993 to 2002, December 2004

ST-04-21 Characteristics of firms that grow from small to medium size: growth factors--interviews and measurability, 1999, December 2004

ST-04-22 Characteristics of firms that grow from small to medium size: innovation and growth in small manufacturing firms, 1997 to 1999, December 2004

Working papers - 2005

ST-05-01 Federal government expenditures and personnel in the natural and social sciences, 1995/96 to 2004/05, January 2005

ST-05-02 Provincial distribution of federal expenditures and personnel on science and technology, 1996-97 to 2002-03, January 2005

ST-05-03 Industrial R&D statistics by region, 1994 to 2002, January 2005

ST-05-04 Knowledge sharing succeeds: how selected service industries rated the importance of using knowledge management practices to their success, February 2005

ST-05-05 Characteristics of firms that grow from small to medium size: Industrial and geographic distribution of small high-growth firms, February 2005

ST-05-06 Summary: Joint Statistics Canada – University of Windsor workshop on intellectual property commercialization indicators, Windsor, November 2004, March 2005

ST-05-07 Summary: Meeting on commercialization measurement, indicators, gaps and frameworks, Ottawa, December 2004, March 2005

ST-05-08 Estimates of research and development personnel in Canada, 1979 to 2002, April 2005

ST-05-09 Overview of the Biotechnology Use and Development Survey – 2003, April 2005

ST-05-10 Access to Financing Capital by Canadian Innovative Biotechnology Firms, April 2005

ST-05-11 Scientific and technological (S&T) activities of provincial governments and provincial research organizations, 1995-96 to 2003-04, September 2005

Research papers – 1996-2002

No. 1 The State of Science and Technology Indicators in the OECD Countries, by Benoit Godin, August 1996.

No. 2 Knowledge as a Capacity for Action, by Nico Stehr, June 1996.

No. 3 Linking Outcomes for Workers to Changes in Workplace Practices: An Experimental Canadian Workplace and Employee Survey, by Garnett Picot and Ted Wannell, June 1996.

No. 4 Are the Costs and Benefits of Health Research Measurable?, by M.B. Wilk, February 1997.

No. 5 Technology and Economic Growth: A Survey, by Petr Hanel and Jorge Niosi, April 1998.

No. 6 Diffusion of Biotechnologies in Canada, by Anthony Arundel, February 1999.

No. 7 Barriers to Innovation in Services Industries in Canada, by Pierre Mohnen and Julio Rosa, November 1999.

No. 8 Explaining Rapid Growth in Canadian Biotechnology Firms, by Jorge Niosi, August 2000.

No. 9 Internationally Comparable Indicators on Biotechnology: A Stocktaking, a Proposal for Work and Supporting Material, by W. Pattinson, B. Van Beuzekom and A. Wyckoff, January 2001.

No. 10 Analysis of the Survey on Innovation, Advanced Technologies and Practices in the Construction and Related Industries, 1999, by George Seaden, Michael Guolla, Jérôme Doutriaux and John Nash, January 2001.

No. 11 Capacity to Innovate, Innovation and Impact: The Canadian Engineering Services Industry, by Daood Hamdani, March 2001.

No. 12 Patterns of Advanced Manufacturing Technology (AMT) Use in Canadian Manufacturing: 1998 AMT Survey Results, by Anthony Arundel and Viki Sonntag, November 2001.