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Survey of Intellectual Property Commercialization in the Higher Education Sector, 2004

by Cathy Read

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

Telephone: 1-800-263-1136



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x	suppressed to meet the confidentiality requirements of the <i>Statistics Act</i>
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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 and governments. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

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>.

2004 Survey of Intellectual Property Commercialization in the Higher Education Sector

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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, 2003 and 2004 to track progress in this area. This report highlights some of the changes between 2003 and 2004, as well as presenting the 2004 regional results.

Highlights

- Between 2003 and 2004, the number of inventions reported or disclosed by researchers to universities and hospitals increased from 1,133 to 1,432 (26%).
- The number of patents issued to these institutions also increased from 347 to 397 (14%) and the total number of patents held rose from 3,047 to 3,827 (26%).
- Patents are typically licensed to other parties, such as to other institutions and companies. New licenses rose from 422 to 494 (17%) while total active licenses rose from 1,756 to 2,022 (15%).
- At the end of 2004, 50% of patents obtained in Canada by universities and hospitals had been licensed, assigned or otherwise commercialized, compared to 35% at the end of 2003.
- In 2002, the Government of Canada and the Association of Universities and Colleges of Canada (AUCC) unveiled the Framework Agreement on federally funded research whereby universities agreed to double the amount of research they perform and to triple their commercialization outcomes by 2010. The indicator used by the AUCC to measure the tripling of commercialization outcomes is the sum of income from intellectual property (IP), cash dividends received by institutions and equity holdings, options and warrants cashed in by institutions. Between 2003 and 2004, this indicator increased from \$58.5 million to \$60.2 million (3%).
- In 2003 and 2004, Canadian universities and hospitals created 50 spin-off companies to commercialize their technologies, for a total of 968 created to date. However, 40 spin-offs also closed between 2003 and 2004. Overall, the percentage of inactive plus closed spin-offs increased from 20% in 2003 to 25% in 2004.

Results

More institutions doing IP management

Intellectual property (IP) management is defined as the identification, protection, promotion and/or commercialization of IP. In 2004, 76% of institutions reported actively managing their IP, compared to 72% in 2003. The change was due to increased activity in hospitals and among the smaller universities. (Table 1)

Institutions spending more on IP management

In 2004, universities and hospitals had \$36.9 million in total operational expenditures for IP management, up 1% from \$36.4 million in 2003. The number of employees engaged in IP management also rose from 255 in 2003 to 280 in 2004. The average salary (including benefits) was \$71,385. (Table 2)

Sources of funds for IP management

Concerning the \$36.9 million spent on IP management in 2004, the funding sources and the proportions were as follows:

- institutional base funding (36%)

- institutional one-time allocations (5%)
- IP commercialization revenues (e.g., licensing, cashed-in equity) (34%)
- external sources (25%).

The external sources included the following:

- Atlantic Canada Opportunities Agency (ACOA)
- Canadian Institutes of Health Research (CIHR)
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Social Sciences and Humanities Research Council of Canada (SSHRC)
- Western Economic Diversification (WED)
- 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-nine percent had a bachelor's degree as the highest degree, 38% had a master's degree and 22% had a Ph.D. Five percent had no degree (e.g., support staff), 3% listed other qualifications (e.g., community college, P.Eng, CA) and the remaining 3% were unspecified. (Table 5)

The years of experience of technology transfer personnel in that field ranged from zero to over 30, with an average of 6.9 years. Nearly one half (47%) 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, 41% used an outside legal counsel exclusively, 10% used an in-house legal counsel exclusively, 30% used both and the remaining 19% were unspecified. Concerning patent agent services, 55% of institutions used an external service exclusively, none (0%) used an in-house service exclusively, 7% used both and the remaining 38% were unspecified. (Tables 6 and 7)

Providing space for start-ups

In 2004, 33 universities and hospitals provided space to a total of 87 start-up companies. This compares to 25 institutions that provided space to 74 start-up companies in 2003.

Policy changes

In 2004, six universities and one hospital changed their IP policies. The policy changes included:

- clarifying the disclosure process
- negotiating a new collective agreement that included articles on IP.

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 119 institutions in the survey, 65 said that researchers have this right and seven responded negatively. Of the remaining institutions, 13 did not respond to the question, 16 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.

Policy on disposal of equity holdings in spin-off companies

Six universities and four hospitals reported having a policy on the disposal of equity holdings in spin-off companies.

Faculty consulting

Only 10% of institutions always recorded information about faculty consulting activities, a further 29% did sometimes, 44% never did and 17% did not respond. Among the 17 largest universities, defined as those with \$80 million more in sponsored research in 2004, only two always recorded information about faculty consulting activities, four did sometimes, 10 never did and one did not respond. (Table 10)

At most institutions and for most fields of study, between 1% and 25% of faculty were doing external consulting in 2004. (Table 11)

Higher percentages of external faculty consulting were found in the more “practical” fields, such as commerce, engineering and health. For example, 23 institutions reported that between 26% and 100% of their commerce faculty were consulting on the side. The comparable numbers were 13 in engineering and nine in health.

Seven institutions indicated that they always or sometimes kept records of faculty consulting but did not or could not answer the questions on percentage of faculty engaged in consulting activities.

Research contracts

Between 2003 and 2004, the total number of research contracts rose 25% from 11,432 to 14,324 while the value of research contracts rose 16% from \$810.4 million to \$941.0 million. Of the 119 institutions in the 2004 survey, 86 or 72% reported research contracts. (Table 12)

The main type of research contract was clinical trials at \$263.6 million. For several hospitals, this was their only type of research contract. (Table 13)

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 (\$81.0 million). The second most common arrangement is the “other” category at \$59.0 million. This includes responses such as “researcher owns”, “institution owns”, “institution/inventor owns”, “joint ownership” “sponsor and researcher co-own 50/50” and “free for public use.”

The other arrangements are “the sponsor has a license to the IP” (\$35.1 million), “the IP is unrestricted” (\$24.0 million) and “the sponsor owns the IP” (\$15.2 million). (Table 14)

Research funding, inventions and patents

In recent years, the Government of Canada has made substantial new investment in university research. Between 2003 and 2004, total sponsored research funding rose from \$4.3 billion to \$5.0 billion. During this period, many indicators of the outcomes of university research also increased.

Between 2003 and 2004, the number of inventions reported or disclosed by researchers to universities and hospitals increased from 1,133 to 1,432 (26%). The number of patents issued to these institutions also increased from 347 to 397 (14%) and the total number of patents held rose from 3,047 to 3,827 (26%).

At the end of 2004, 44% of all patents held by institutions were licensed, assigned or otherwise commercialized, down 1% from 45% in 2003. However, the percentages vary for patents obtained in Canada, the US and other countries. Notably, 55% of patents obtained in other countries were commercialized, compared to 50% in Canada and 25% 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 15 to 18)

Licenses and sub-licenses

Patents are typically licensed to other parties, such as to other institutions and companies. New licenses rose from 422 to 494 (17%) while total active licenses rose from 1,756 to 2,022 (15%). (Table 19)

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 38 institutions that granted exclusive licenses during the reference year or had a policy on the matter, 34 always reserved these rights and two more did sometimes, for a total of 36 (95%). One institution reported never reserving these rights and the other did not report.

In 2004, eight institutions reported a total of 37 sublicenses of the institution's IP. This compares to ten institutions reporting a total of 56 sublicenses in 2003.

Research funding related to licenses and options

In 2004, 23 institutions received commitments of \$12.3 million in research funding related to license or option agreements.

Income from IP

Between 2003 and 2004, income from IP decreased from \$55.5 million to \$51.2 million (-8%). In 2004, this income, less \$5.0 million in patent and legal costs, was distributed as follows:

- \$18.2 million (40%) to inventors and co-inventors
- \$21.5 million (48%) to administrative units in the reporting institution
- \$2.0 million (5%) to other institutions
- \$3.2 million (7%) to other parties, such as to technology transfer offices for operations. (Tables 20 and 21)

Spin-off companies

In 2003 and 2004, Canadian universities and hospitals created 50 spin-off companies to commercialize their technologies, for a total of 968 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 2004, 13 institutions held \$49.9 million in equity in publicly traded spin-off companies, down 5% from \$52.4 million in 2003. In 2004, nine institutions also helped their spin-offs to raise \$56.4 million in venture capital and other forms of investment, up 3% from \$54.6 million in 2003. (Tables 22 to 27)

Regional variations

Research funding varies widely from institution to institution and from region to region. For example, the 18 universities and hospitals in the Atlantic region, which are mainly small, received \$227 million in research funding in 2004. This compares to 37 institutions in Ontario that received \$1.9 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 10% of total research funding but accounted for a higher proportion of five major indicators of IP commercialization: 17% of inventions disclosed, 20% of inventions protected, 17% of new licenses and options, 17% of total licenses and options and 23% of spin-off companies created to date.

Prairie institutions obtained 18% of sponsored research funding and accounted for 21% of inventions disclosed, 26% of patents issued and 24% of total active licenses and options. However, they had a lower share of six major indicators of IP commercialization: income from IP (17%), inventions protected (10%), patent applications filed (13%), total patents held (17%), new licenses and options (14%) and spin-off companies created to date (17%).

Ontario institutions received 37% of total research funding and accounted for an equal or higher proportion of three of eight indicators of IP commercialization: 40% of inventions disclosed, 37% of inventions protected and 49% of new licenses and options. However, they accounted for a lower

proportion of the following five indicators: 22% of income from IP, 31% of patent applications filed, 22% of patents issued, 26% of total patents held, 33% of total active licenses and options and 36% of spin-off companies created to date.

Quebec institutions obtained 31% of sponsored research funding and accounted for 31% of patent applications filed. However, on all other published indicators, they had a lower result: 17% of inventions disclosed, 29% of inventions protected, 27% of patents issued, 27% of total patents held, 18% of new licenses and options, 24% of total active licenses and options and 17% 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 5% of inventions disclosed, 4% of inventions protected and 7% of spin-off companies created to date. However, they lagged in both new and total licenses and options (2%), as well as income from IP (1%).

Other indicators that may play a role in IP commercialization outcomes are expenditures on IP management and the value of research contracts. (Table 28, Parts 1 and 2)

Methodology and data quality

In 2003, the 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. In 2004, minor changes were made to questions 1.4e (on changes to the institution's IP policies) and 1.5a (on the recording of faculty consulting activities).

The 2004 survey was mailed out in June 2005 to:

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

The final response rate for this voluntary survey was 83% for universities and 63% for hospitals. (Tables 30 and 31)

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 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/english/sdds/00180t.htm>

Tables

Table 1 Intellectual property (IP) management infrastructure

	Institutions					Number of central offices
	Total number	Actively managing IP		With central offices for IP management		
		number	percent	number	percent	
Hospitals	33	21	64	12	36	12
Universities	86	70	81	61	71	85
Total	119	91	76	73	61	97

Table 2 Expenditures on intellectual property 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 of dollars				
280	19,988	10,617	432	5,890	36,927

Table 3 Sources of funding for intellectual property management, Canada and regions

Region	Institutional base funding	Institutional one-time allocations	IP commercialization revenues	External sources	Total
	percent				
Canada	36	5	34	25	100
Atlantic	40	x	x	x	100
Quebec	51	x	30	x	100
Ontario	47	x	29	x	100
Prairies	17	x	45	x	100
British Columbia	18	x	41	x	100

Table 4 Years of experience of technology transfer personnel

	Number of years of technology transfer (TT) experience							Total	
	0	1-2	3-4	5-9	10-14	15-19	20 and over		Unknown
Number of TT personnel	2	59	66	75	34	20	14	0	270
Percent	1	22	24	28	13	7	5	0	100

Table 5 Degrees of technology transfer personnel

Code		Number of employees
	Bachelor's degree is the only degree listed - 61	
11	Bachelor of Arts (B.A.)	21
12	Bachelor of Commerce (B.Com) or Bachelor of Business Administration (B.B.A.)	14
13	Bachelor of Science (B.Sc.)	13
14	Bachelor of Engineering (B.Eng.) or Bachelor of Applied Sciences (B.A.Sc.)	7
15	Bachelor of Laws (LL.B.)	4
19	Other or unspecified bachelor's degree	2
	Combinations of degrees with bachelor's as the highest - 18	
21	B.A., LL.B.	3
22	B.Com/B.B.A, LL.B.	1
23	B.Sc., LL.B.	6
28	Other, with LL.B.	1
29	Other	7
	Master's is the only degree listed - 33	
31	Master of Arts (M.A.)	3
32	Master of Business Administration (M.B.A.)	13
33	Master of Science (M.Sc.)	14
34	Master of Engineering (M.Eng.) or Applied Sciences (M.A.Sc.)	1
39	Other or unspecified master's degree	2
	Combinations of degrees with master's as the highest - 71	
41	B.A., M.A.	3
42	B.A., M.B.A.	2
43	B.Sc., M.B.A.	12
44	B.Sc., M.Sc.	11
45	B.Sc, M.Sc., M.B.A.	3
46	M.Sc., M.B.A.	9
47	B.Eng./B.A.Sc. and M.Sc./M.A.Sc.	6
48	Other, with LL.B. and M.B.A.	2
49	Other	23
	Ph.D. is the highest degree listed - 59	
51	Ph.D. is the only degree listed	20
52	B.A., M.A., Ph.D.	3
53	B.Sc., Ph.D.	10
54	B.Sc., M.Sc., Ph.D.	8
55	B.Sc., M.Sc., M.B.A., Ph.D.	1
56	B.Sc., M.B.A., Ph.D.	1
57	M.B.A., Ph.D.	5
59	Other combinations of degrees with Ph.D. as the highest	11
	Other - 28	
96	Degree(s) inferred (e.g., P. Eng., CA)	2
97	Community college or other qualification (e.g., CGA, CMA)	5
98	No degree (e.g., support staff)	14
99	Unknown	7
	Total	270

Table 6 Legal services used for IP matters

Type of service used:	Number of institutions	Percent
In-house legal counsel	29	40
Outside legal counsel	52	71
In-house patent agent	5	7
Outside patent agent	45	62
None of the above or no information	12	16
Total number of institutions with central offices for IP management	73	...

Table 7 Combinations of legal services used for IP matters

	In-house only	Outside only	Both	Neither or no information	Total
	number of institutions				
Legal counsel	7	30	22	14	73
Patent agent	0	40	5	28	73

Table 8 Researcher requirement to report IP

	The institution's policies state:			No policy on reporting	No such IP at the institution	Total
	Always	Sometimes	Never			
number of institutions						
Inventions	49	23	6	25	16	119
IP protected by copyright						
Software or databases	31	36	9	32	11	119
Educational materials	25	36	15	40	3	119
Other materials	24	35	13	41	6	119
Industrial designs	32	17	9	29	32	119
Trade-marks or official marks	31	17	7	34	30	119
New plant varieties	18	15	6	17	63	119

Table 9 Ownership of IP created at the institution

	Institution owns	Researcher owns	Joint ownership (institution(s) and researcher)	No policy on ownership	Other ownership	No such IP at the institution	Total
Inventions	20	40	22	16	5	16	119
IP protected by copyright							
Software or databases	17	45	20	20	6	11	119
Educational materials	11	61	10	28	6	3	119
Other materials	10	56	11	33	3	6	119
Industrial designs	16	29	13	28	1	32	119
Trade-marks or official marks	22	26	12	26	3	30	119
New plant varieties	9	24	9	13	1	63	119

Table 10 Formal recording of consulting activity

	Always	Sometimes	Never	No information	Total
	number of institutions reporting				
Hospitals	3	5	15	10	33
Universities	9	29	38	10	86
Total	12	34	53	20	119

Table 11 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	21	9	46	2	1	0	40	119
Educational, recreational and counselling services	26	4	43	3	0	0	43	119
Commerce, management and business administration	26	6	22	18	5	0	42	119
Agricultural and biological sciences and technologies	27	6	39	6	0	0	41	119
Engineering and applied sciences	38	4	23	8	5	0	41	119
Health professions, sciences and technologies	18	5	46	6	2	1	41	119
Mathematics and physical sciences	30	10	35	3	0	0	41	119

Table 12 Number and value of research contracts

	Number of contracts	Value of contracts (\$'000)
Federal government	1,721	167,630
Provincial and other levels of government	2,571	173,844
Canadian business	3,906	237,648
Canadian organizations	1,244	58,463
Foreign governments	200	17,271
Foreign businesses	1,115	127,826
Foreign organizations	221	19,354
Other	132	11,589
Unallocated business contracts	1,463	47,385
Other unallocated contracts	1,751	79,982
Total	14,324	940,992

Table 13 Research contracts by type

	Type of research contract	Definition/ significance	Number 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.	26	263,575
B	Service contracts	The purpose of these contracts is to provide a service and generally the IP developed belongs to the sponsor.	34	x
C	Collaborative R&D	The research sponsor and the institution collaborated in the performance of the research.	33	103,352
D	Sponsored research contracts	These contracts were performed entirely by parties within the institution.	43	202,609
E	Other		10	x
	Unallocated	Respondents were unable to provide the breakdowns requested.	28	306,088
		Total value of research contracts	86	940,992

Table 14 Research contracts by type of IP provision

Type of IP provision	Number reporting	Value of contracts (\$'000)
The sponsor owns the IP.	21	15,182
The sponsor has a license to the IP.	18	35,067
The sponsor has an option to acquire a license to the IP under commercially reasonable terms.	20	80,972
The IP is unrestricted.	19	23,963
Other	14	59,007
Total	43	214,191

Note: The total in this table is supposed to equal C+D+E in Table 13 but is less due to incomplete reporting.

Table 15 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		
				Disclosed to the institution (A)	Protected (B)	Declined by the institution (C)	Disclosed (A)	Protected (B)	Declined (C)
		no.	%						
Inventions	Patent application	61	51	1,432	629	355	53	52	33
Software or databases	Copyright registration	27	23	31	8	11	14	5	6
Educational materials		29	24	162	x	0	16	8	0
Other IP protected by copyright		23	19	723	x	x	12	2	1
Industrial designs	Registration	4	3	0	0	0	0	0	0
Trademarks	Registration	42	35	21	22	0	7	8	0
New plant varieties	Registration (Canada) Patent (US)	10	8	55	14	0	4	3	0
Materials transferred in	Administration of material transfer agreements (MTAs) inbound	47	39	.	.	.	.	.	.
Materials transferred out	Administration of MTAs outbound	47	39	.	.	.	.	.	.
Various	(Executing of) non-disclosure or confidentiality agreements	72	60	.	.	.	.	.	.
	Trade secret agreements	1	1	.	.	.	.	.	.
	IP sharing/co-ownership agreements	2	2	.	.	.	.	.	.

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

Table 16 Patenting activities by field of study

Field of study	Patent applications				Patents issued in:			
	Initiating	Follow-on	Unallocated by type	Total	Canada	US	Other	Total
	number							
Agriculture and biological sciences	44	73	0	117	x	18	x	26
Engineering and applied sciences	98	92	0	190	7	27	35	69
Health professions and sciences	159	132	0	291	7	38	90	135
Mathematics and physical sciences	22	76	0	98	x	12	x	18
All other not elsewhere classified	10	0	0	10	0	0	0	0
Unallocated by field of study	67	134	357	558	9	63	77	149
Total	400	507	357	1,264	29	158	210	397

Table 17 Number of patents held and number commercialized, all institutions

	Canada	US	Other countries	Unallocated by country	Total
No. patents held at the end of 2004, including patents issued that year	355	1,556	1,461	455	3,827
No. patents held at the end of 2003 (for comparison purposes)	297	1,206	1,196	348	3,047
No. patents licensed, assigned or otherwise commercialized at the end of 2004	131	261	417	200	1,009

Table 18 Percentage of patents commercialized

	Canada	US	Other countries	Unallocated by country	Total
A No. patents held at the end of 2004, including patents issued that year (only those institutions reporting both A and B)	263	1,024	754	252	2,293
B No. patents licensed, assigned or otherwise commercialized at the end of 2004	131	261	417	200	1,009
C Percentage of patents commercialized	50	25	55	79	44

Table 19 Licenses and options

	Exclusive and sole licenses	Non-exclusive licenses	Unclassified (as to exclusive, sole or non-exclusive)	Total
	number			
a) New licenses executed with Canadian licensees that were:				
i) "Sponsors" of research contracts or participants in collaborative activities	39	7	0	46
ii) Not involved in generating the technology licensed ("Non-sponsors")	64	34	0	98
iii) Unclassified (as to sponsor or non-sponsor)	0	0	47	47
iv) Total new licenses with Canadian licensees (a.i+a.ii+a.iii)	103	41	47	191
b) New licenses executed with foreign licensees that were:				
i) "Sponsors" of research contracts or participants in collaborative activities	11	0	0	11
ii) Not involved in generating the technology licensed ("Non-sponsors")	22	178	0	200
iii) Unclassified (as to sponsor or non-sponsor)	22	0	0	22
iv) Total new licenses with foreign licensees (b.i+b.ii+b.iii)	55	178	0	233
v) New licenses (unclassified as to Canadian/foreign or sponsor/non-sponsor)	0	0	70	70
vi) Total new licenses (a.iv+b.iv+b.v)	158	219	117	494
c) Active licenses with Canadian licensees that were:				
i) "Sponsors" of research contracts or participants in collaborative activities	122	28	17	167
ii) Not involved in generating the technology licensed ("Non-sponsors")	167	54	17	238
iii) Unclassified (as to sponsor or non-sponsor)	268	52	16	336
iv) Total active licenses with Canadian licensees (c.i+c.ii+c.iii)	557	134	50	741
d) Active licenses with foreign licensees that were:				
i) "Sponsors" of research contracts or participants in collaborative activities	30	29	0	59
ii) Not involved in generating the technology licensed ("Non-sponsors")	76	376	0	452
iii) Unclassified (as to sponsor or non-sponsor)	95	77	21	193
iv) Total active licenses with foreign licensees (d.i+d.ii+d.iii)	201	482	21	704
v) Active licenses (unclassified as to Canadian/foreign or sponsor/non-sponsor)	0	0	577	577
vi) Total active licenses (c.iv+d.iv+d.v)	758	616	648	2,022

Table 20 Income received from intellectual property

	Canadian sources	Foreign sources	Unallocated by country	Total
	thousands of dollars			
Running royalties	3,594	16,472	18,559	38,625
Milestone payments	444	900	0	1,344
From one time sales of IP (in exchange for a single or several payments)	312	1,593	0	1,905
Reimbursement of patent, legal and related costs	1,901	993	2,065	4,959
License income received from another Canadian institution under a revenue-sharing agreement	x	x	0	x
Other	x	x	x	2,918
Unallocated by income type	x	x	x	x
Total	6,634	21,133	23,443	51,210

Table 21 Intellectual property income distributed

	Thousands of dollars	Percent
To individuals (inventors and co-inventors)	18,152	40
To this institution or to administrative units therein	21,481	48
To other institutions	2,026	5
Other	3,239	7
Total	44,898	100

Table 22 Institutional linkage of spin-off companies

	License (Type 1)	R&D (Type 2)	Service (Type 3)	License and R&D	Other	Unknown	Total
Number	353	148	29	37	22	379	968
Percent	36	15	3	4	2	40	100

Table 23 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	2004	Unknown	Total
Number	43	62	88	175	341	123	61	40	10	25	968
Percent	5	6	9	18	35	13	6	4	1	3	100

Table 24 Status of spin-off companies

	Conceptual stage	Early stage	Active	Merged	Inactive	Closed	Unknown	Total
Number	15	75	545	46	136	106	45	968
Percent	1	8	56	5	14	11	5	100

Table 25 Technology field of spin-off companies

	Agriculture or biology	Health sciences	Engineering or applied sciences	Information	Mathematics or physical sciences	Business or management	Other or unknown	Total
Number	113	349	159	174	93	11	69	968
Percent	12	36	16	18	10	1	7	100

Table 26 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	127	33	35	18	1	15	57	286
Percent	45	12	12	6	0	5	20	100

Table 27 Dividends, equity disposition, remaining equity and venture capital

	Cash dividends received by institutions ¹	Equity holdings, options and warrants disposed of (cashed in) by institutions ¹	Remaining equity (held by the institutions) in publicly traded spin-offs	Investment in spin-offs raised with the assistance of the institution
Number reporting	4	7	13	9
Thousands of dollars	x	x	49,872	56,421

1. The sum of cash dividends plus equity holdings, options and warrants cashed in is \$8.97 million.

Table 28 Regional differences in IP commercialization, 2004, Part 1

	Insti- tutions	Sponsored research	Income from IP	Inventions		Patents		
				Disclosed	Protected	Applications filed	Issued	Total held
	no.	\$ millions	\$ thousands	number				
Atlantic	18	227	554	71	26	x	x	x
Quebec	29	1,577	x	244	181	387	106	1,027
Ontario	37	1,864	11,418	567	230	398	87	1,013
Prairies	20	885	8,670	302	65	170	102	634
BC	15	495	x	248	127	x	x	x
Total	119	5,048	51,210	1,432	629	1,264	397	3,827
Percent of national total								
Atlantic	15	4	1	5	4	x	x	x
Quebec	24	31	x	17	29	31	27	27
Ontario	31	37	22	40	37	31	22	26
Prairies	17	18	17	21	10	13	26	17
BC	13	10	x	17	20	x	x	x
Total	100	100	100	100	100	100	100	100

Table 28 Regional differences in IP commercialization, 2004, 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	12	36	65	1,743	73	30
Quebec	89	496	165	9,196	153	40
Ontario	240	678	346	12,133	469	122
Prairies	71	477	170	5,492	145	53
BC	82	335	224	8,363	101	110
Total	494	2,022	970	36,927	941	355
Percent of national total						
Atlantic	2	2	7	5	8	9
Quebec	18	24	17	25	16	11
Ontario	49	33	36	33	50	34
Prairies	14	24	17	15	15	15
BC	17	17	23	22	11	31
Total	100	100	100	100	100	100

Table 29 Industry of spin-offs

NAICS code(s)	Industry name	Number of spin-offs
	Services – 59%	
541710	R&D in the physical, engineering and life sciences	270
541510	Computer systems design and related services	128
5416	Management, scientific and technical consulting services	43
541330	Professional engineers	33
541380	Testing laboratories	17
621510	Medical and diagnostic laboratories	8
511210	Software publishers	7
551113	Holding companies	7
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)	46
	Total services	570
	Manufacturing – 11%	
334512	Measuring, medical and controlling devices manufacturing	28
339110	Medical equipment and supplies manufacturing	12
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	4
	All other manufacturing	37
	Total manufacturing	103
	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	9
23	Construction	6
111-112	Agriculture	3
	Total other industries	18
	No industry information available – 26%	256
	Total spin-offs – 100%	968

Table 30 Response rate: universities

Code	Type of response	Number
1	Completed or largely completed	71
2	Total refusal	13
3	Partial refusal	2
10	Affiliated colleges that have never responded (and therefore no record exists on the database)	2
	Total number of universities	88

Table 31 Response rate: hospitals

Code	Designation	Definition	Number
4	Completed	Main questionnaire was completed or largely completed in the current year.	24
5	Refusal with previous response carried forward	Hospital refused to complete the main questionnaire in the current year but a previous one exists (and the information to date indicates that the survey is applicable)	9
6	Ineligible (per 2004)	The current Preface indicates that the hospital is ineligible to complete the survey.	5
7/8	Resolved or unresolved	Hospital refused to complete the main questionnaire in all years and 7) a Preface (current or previous) indicates that the survey is applicable 8) it is still unresolved as to whether the survey is applicable.	4
			4
9	Invalid institution	Institution was found to be amalgamated with another institution and will be removed from mailing list.	1
	Total mailed out	Total number of questionnaire packages mailed out	47

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88-003-XIE	Innovation analysis bulletin
88-202-XIE	Industrial research and development, intentions (with 2004 preliminary estimates and 2003 actual expenditures) (annual)
88-204-XIE	Federal scientific activities (annual)
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