

Ongoing innovation and progress are essential to Canada's achievements in fast-moving science and technology (S&T) activities. Scientists and engineers are continuously searching for the knowledge and abilities that will help solve the increasingly complex problems we encounter in many areas of life. Several sectors in Canada—including governments, universities, hospitals, businesses, non-profit organizations and foreign entities—take an active role in funding these S&T activities.

In 2010/2011, the government anticipated spending \$11.7 billion on S&T, up from the \$11.3 billion planned for 2009/2010 and the \$10.6 billion spent in 2008/2009. Of this \$11.7 billion, \$5.9 billion was dedicated to the S&T performance of federal departments and agencies, while \$5.8 billion went to universities, businesses, non-profit organizations and other entities.

S&T activities

The majority of S&T work is what most Canadians imagine—scientists running tests in labs or engineers developing prototypes in research facilities. This is known as research and development (R&D). However, a large portion of S&T work falls under the category of related scientific activities. This includes data collection, information services, special studies, education support and administration. An anticipated \$7.4 billion (64%) of the federal government's 2010/2011 S&T funding was designated for R&D, while the remaining \$4.3 billion was for related scientific activities.

Businesses are the other major performer of R&D activities, with anticipated spending of \$14.8 billion in 2010. Of this amount, 43% is expected to be split among five industries: scientific R&D services (\$1.6 billion), communications equipment (\$1.3 billion), wholesale trade

(\$1.2 billion), computer system design and related services (\$1.1 billion), and information and culture (\$1.1 billion). In 2008, the majority (79%) of industrial R&D funding came from the businesses active in R&D themselves, with 13% coming from foreign sources, 2% from the federal government, and the remaining 6% from other Canadian sources.

How much a country spends on R&D in a given year from all funding sources is called its gross domestic expenditures on research and development (GERD). Canada's GERD in 2010 totalled \$29.2 billion. The Organisation for Economic Cooperation and Development (OECD) tracks GERD amounts from its member countries, with 2008 being the most recent year available. In 2008, Canada had a GERD of 1.8% of our GDP, placing us below the OECD average of 2.3%.

S&T objectives

Federal S&T expenditures are classified into socioeconomic objectives. This is a way to track trends and spending across different areas, such as health, industry, agriculture, energy, space and defence.

The objective receiving the highest overall government S&T spending in 2008/2009 was protection and improvement of human health, at \$2.2 billion. The objectives receiving the most R&D

To learn more about

biotechnology, business enterprise research and development, gross domestic expenditure on research and development, industrial development, innovation, intellectual property, product development, research and development workers, software development and computer services, technological innovation

visit www.statcan.gc.ca

spending were protection and improvement of human health (\$1.6 billion), industrial protection and technology (\$1.0 billion) and non-oriented research (\$754 million).

The most notable changes in socio-economic categories from 2006/2007 to 2008/2009 were an increase in R&D spending for production, distribution and rational use of energy (36%); transport (33%); social structures and relationships (26%); and protection and improvement of human health (20%). Only fishing saw a large decrease (58%) in R&D spending.

S&T personnel

In 2010/2011, the total number of full-time equivalent employees working for the federal government in S&T roles is expected to reach 39,182. This is an almost 9% increase from the 36,027 S&T personnel employed in 2006/2007. Nearly half (46%) of the 2010/2011 employees are classified as scientific and professional (18,028), while the others are divided between technical roles (9,280) and those

Table 27.a
Federal employees in science and technology, by major field of science

	2008/2009 ^a	2009/2010 ^b	2010/2011 ^c
	number		
Total science and technology	37,333	38,513	39,182
Natural sciences and engineering	25,977	27,100	27,141
Social sciences and humanities	11,356	11,413	12,041

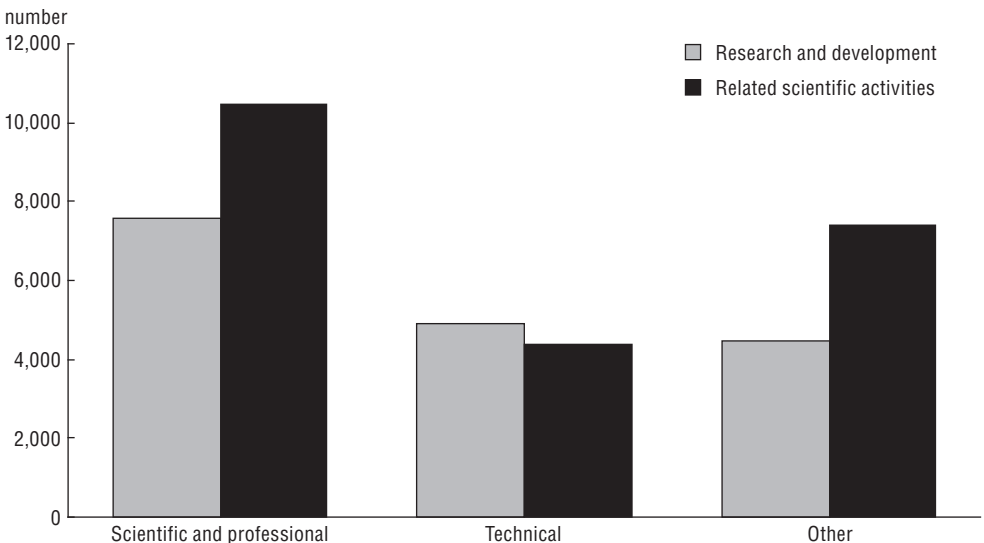
Source: Statistics Canada, Catalogue no. 88-204-X.

engaged in support activities (11,874).

Federal government S&T activities are available for natural sciences and engineering and for social sciences and humanities. Seven in 10 federal S&T employees work in natural sciences and engineering and the rest work in social sciences and humanities. These ratios have held steady since 2007/2008 and align with anticipated federal funding in 2010/2011: \$8.7 billion directed at natural sciences and engineering and \$2.9 billion for social sciences and humanities.

Chart 27.1

Federal employees in science and technology, by job category, 2010/2011



Note: Personnel counts are full-time equivalents and include administrative and foreign service, administrative support, operational and military personnel.

Source: Statistics Canada, Catalogue no. 88-204-X.

Provincial S&T activities

Like the federal government, provincial governments support and undertake activities in science and technology (S&T). And, like the federal government, the majority of provincial funding is directed at research and development (R&D). Figures on provincial spending include expenditures from the governments of New Brunswick, Quebec (for R&D only), Ontario, Manitoba, Saskatchewan, Alberta and British Columbia.

In 2008/2009, the S&T funding from the six participating provinces was directed mainly toward protection and improvement of human health (\$505.6 million), basic research (\$337.8 million) and control and care of the environment (\$293.2 million).

Ontario (\$866.6 million) and Alberta (\$622.7 million) spent the most on overall S&T activities. For Alberta, this was a near doubling of its 2004/2005 expenditures of \$362.6 million.

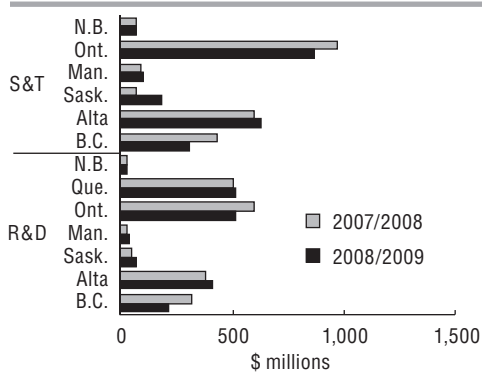
R&D funding in higher education

In Canada, the higher education sector includes institutions such as universities and affiliated research hospitals, experimental stations and clinics. These organizations play an important role in science and technology by both funding and undertaking research and development (R&D) activities.

In 2008/2009, the higher education sector spent \$10.9 billion on R&D, up 7.3% from 2007/2008. Just over two-thirds of this spending took place in Ontario and Quebec, where the majority of universities and research hospitals are located.

Of this \$10.9 billion, \$5.1 billion (47%) was provided by higher education institutions themselves, while the federal government provided another \$2.8 billion (26%) through funding programs such as the Natural Sciences and Engineering

Chart 27.2
Provincial government expenditures on scientific activities, by activity

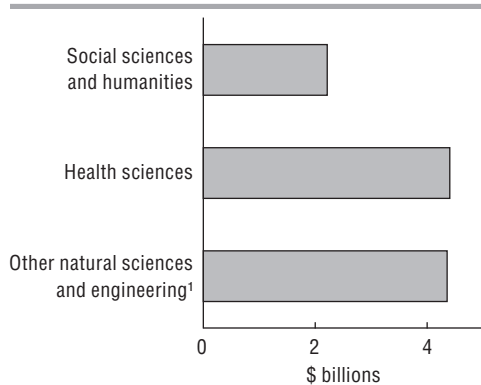


Note: S&T and R&D for Sask. (2007/2008) and B.C. (2008/2009) should be used with caution. 2007/2008 S&T for Ont. and R&D for Que. are revised.

Source: Statistics Canada, Catalogue no. 88-001-X.

For R&D expenditures in 2008/2009, the leading provinces were Ontario (\$514.2 million), Quebec (\$511.7 million) and Alberta (\$407.3 million).

Chart 27.3
Funding, by major field of science, 2008/2009



¹ Includes engineering, mathematical and physical sciences.

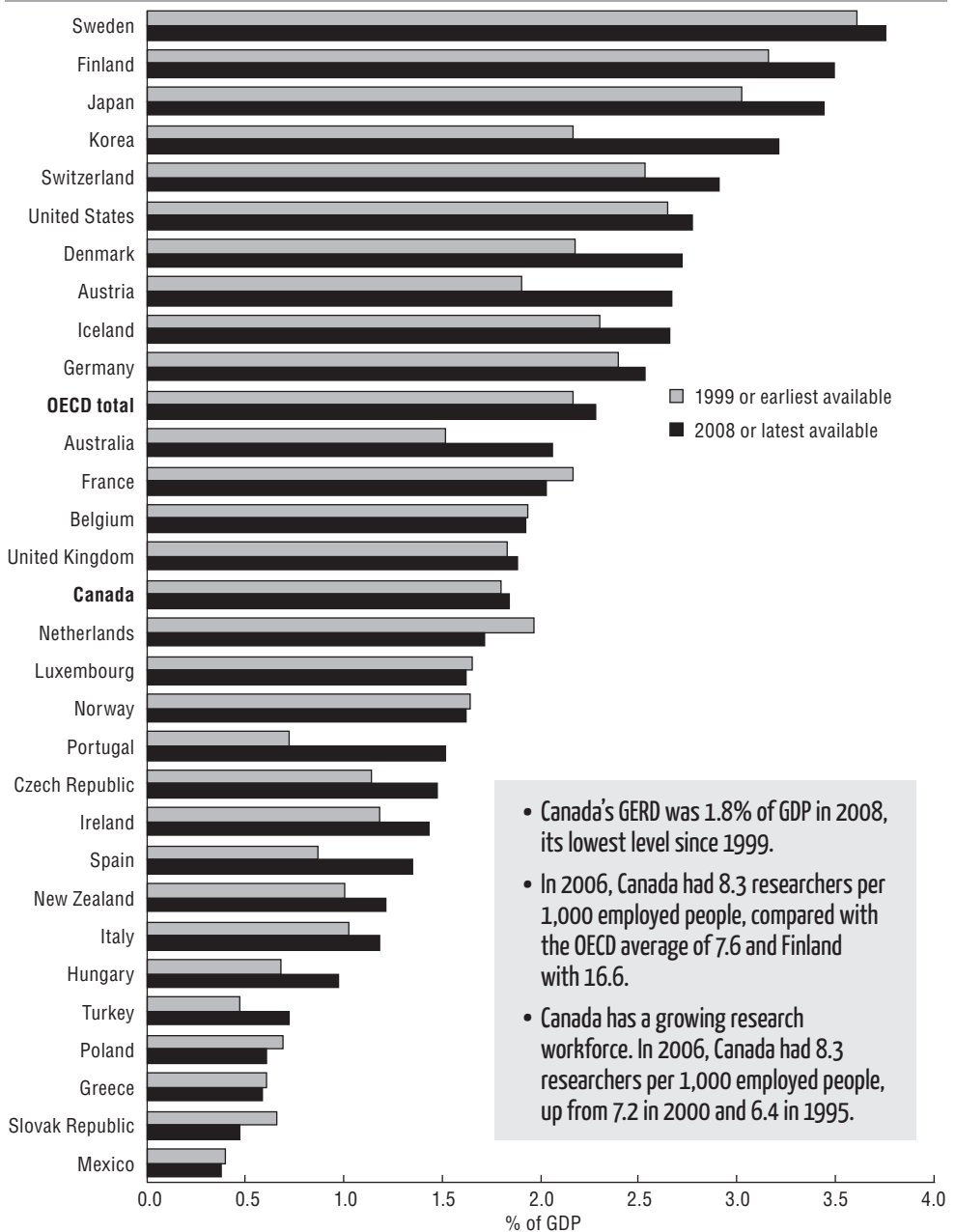
Source: Statistics Canada, Catalogue no. 88-001-X.

Research Council, Canadian Institutes of Health Research, Social Sciences and Humanities Research Council and the Canada Foundation for Innovation.

INTERNATIONAL perspective

Chart 27.4

Gross domestic expenditures on research and development, by selected country



- Canada's GERD was 1.8% of GDP in 2008, its lowest level since 1999.
- In 2006, Canada had 8.3 researchers per 1,000 employed people, compared with the OECD average of 7.6 and Finland with 16.6.
- Canada has a growing research workforce. In 2006, Canada had 8.3 researchers per 1,000 employed people, up from 7.2 in 2000 and 6.4 in 1995.

Source: Data based on OECD (2010), *OECD Factbook 2010*.

Table 27.1 Gross domestic expenditures on research and development, by performing sector and funding sector, 1996 to 2010

	Total	Federal government	Provincial governments	Provincial research organizations	Business enterprises	Higher education	Private non-profit	Foreign sources
	\$ millions							
Performing sector								
1996	13,817	1,792	163	79	7,997	3,697	89	...
1997	14,635	1,720	156	58	8,739	3,879	82	...
1998	16,088	1,743	155	61	9,682	4,370	77	...
1999	17,637	1,859	173	60	10,399	5,082	63	...
2000	20,556	2,080	164	66	12,395	5,793	58	...
2001	23,133	2,103	253	23	14,266	6,424	63	...
2002	23,536	2,190	256	26	13,545	7,455	63	...
2003	24,691	2,083	254	24	14,095	8,143	92	...
2004	26,679	2,084	265	25	15,144	9,058	103	...
2005	28,023	2,414	280	23	15,638	9,518	149	...
2006	29,080	2,496	311	22	16,474	9,625	152	...
2007	29,919	2,532	335	57	16,644	10,187	164	...
2008	29,894	2,599	364	38	15,792	10,932	169	...
2009 ^p	29,394	2,573	357	29	15,202	11,063	171	...
2010 ^p	29,222	2,690	348	29	14,808	11,174	174	...
Funding sector								
1996	13,817	2,814	629	0	6,395	1,905	358	1,714
1997	14,635	2,813	656	0	7,030	1,971	367	1,795
1998	16,088	2,830	640	1	7,355	2,339	372	2,552
1999	17,637	3,216	767	0	7,917	2,649	380	2,705
2000	20,556	3,560	853	3	9,223	2,892	445	3,582
2001	23,133	4,095	1,023	1	11,637	2,928	536	2,915
2002	23,536	4,251	1,152	0	12,117	3,462	628	1,925
2003	24,691	4,526	1,354	0	12,427	3,589	637	2,158
2004	26,679	4,651	1,370	0	13,388	4,147	735	2,389
2005	28,023	5,252	1,358	0	13,827	4,341	784	2,460
2006	29,080	5,226	1,467	0	14,874	4,435	827	2,252
2007	29,919	5,483	1,454	0	14,923	4,574	957	2,527
2008	29,894	5,676	1,564	0	14,471	5,060	1,015	2,108
2009 ^p	29,394	5,674	1,548	0	13,990	5,121	1,027	2,035
2010 ^p	29,222	5,814	1,544	0	13,670	5,172	1,037	1,987

Source: Statistics Canada, CANSIM table 358-0001.

Table 27.2 Gross domestic expenditures on research and development, by province and territory, 1996, 2000, 2004 and 2008

	1996	2000	2004	2008
	\$ millions			
Canada	13,817	20,556	26,679	29,894
Newfoundland and Labrador	102	138	173	278
Prince Edward Island	17	37	41	64
Nova Scotia	257	362	447	515
New Brunswick	150	158	227	300
Quebec	3,820	5,717	7,244	7,895
Ontario	6,924	10,383	12,956	13,874
Manitoba	295	393	518	567
Saskatchewan	232	376	425	528
Alberta	1,005	1,319	2,262	2,877
British Columbia	1,002	1,606	2,263	2,804
Yukon, Northwest Territories and Nunavut	5	9	19	24

Source: Statistics Canada, CANSIM table 358-0001.

Table 27.3 Gross domestic expenditures on research and development, health sector compared with all sectors, 1990 to 2010

	All sectors	Health sector		
	\$ millions	\$ millions	% of all sectors	\$ per capita
1990	10,260	1,551	15.1	56
1991	10,767	1,665	15.5	59
1992	11,338	1,783	15.7	63
1993	12,184	2,006	16.5	70
1994	13,341	2,105	15.8	73
1995	13,754	2,196	16.0	75
1996	13,817	2,316	16.8	78
1997	14,635	2,644	18.1	88
1998	16,088	2,930	18.2	97
1999	17,637	3,246	18.4	107
2000	20,556	3,696	18.0	120
2001	23,133	4,383	18.9	141
2002	23,536	5,273	22.4	168
2003	24,691	5,361	21.7	169
2004	26,679	6,127	22.8	192
2005	28,023	6,164 ¹	21.9	191
2006	29,080	5,942 ¹	20.8	182
2007	29,919	6,271	21.5	190
2008	29,894	6,349 ¹	21.5	190
2009	29,394 ^p	6,387 ¹	21.4	189
2010	29,222 ^p	..	..	..

1. Estimate.

Source: Statistics Canada, CANSIM table 358-0001 and Catalogue no. 88-001-X.

Table 27.4 Federal expenditures on research and development, by performing province and territory and by funding province and territory, 1994 to 2008

	Canada	Newfoundland and Labrador	Prince Edward Island	Nova Scotia	New Brunswick
	\$ millions				
Performing province/territory					
1994	1,753	33	11	84	28
1995	1,727	27	9	77	29
1996	1,792	25	10	79	32
1997	1,720	23	10	71	29
1998	1,743	26	10	77	32
1999	1,859	26	12	72	32
2000	2,080	30	16	88	27
2001	2,103	27	16	70	26
2002	2,190	32	8	76	46
2003	2,083	23	12	66	30
2004	2,084	23	10	81	26
2005	2,414	28	28	66	26
2006	2,496	27	26	73	30
2007	2,532	28	13	77	46
2008	2,599	19	14	77	36
Funding province/territory					
1994	3,094	52	12	127	60
1995	2,989	42	11	113	60
1996	2,814	42	12	112	44
1997	2,813	40	11	108	42
1998	2,830	45	12	113	44
1999	3,216	48	13	113	49
2000	3,560	54	19	129	42
2001	4,095	53	19	121	45
2002	4,251	63	13	131	68
2003	4,526	61	20	131	61
2004	4,651	61	18	157	57
2005	5,252	80	37	150	63
2006	5,226	75	35	158	65
2007	5,483	81	26	159	84
2008	5,676	56	25	172	74

1. Yukon, Northwest Territories and Nunavut.

Source: Statistics Canada, CANSIM table 358-0001.

Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Territories ¹
\$ millions						
268	998	79	48	93	103	7
248	1,034	71	52	98	81	1
247	1,098	77	47	94	77	5
230	1,040	59	74	96	83	5
257	1,057	49	54	94	84	4
283	1,096	58	60	108	106	7
390	1,164	69	62	116	111	9
413	1,213	77	63	98	97	3
436	1,273	72	53	92	99	3
364	1,301	63	54	87	80	5
368	1,241	73	54	110	91	6
451	1,435	83	68	130	91	9
457	1,506	81	67	133	91	5
410	1,582	85	63	116	108	4
413	1,668	85	64	126	93	3
635	1,540	119	82	190	270	7
610	1,523	108	81	207	234	1
566	1,452	108	74	192	205	5
565	1,462	88	97	195	200	5
570	1,504	81	78	182	198	4
697	1,630	98	103	219	238	7
844	1,733	111	120	234	262	8
1,038	1,994	124	123	282	290	3
1,055	2,046	130	113	282	338	3
1,099	2,222	131	121	321	340	5
1,111	2,223	146	123	328	409	5
1,244	2,521	157	126	405	418	9
1,225	2,563	150	123	370	419	4
1,275	2,712	163	135	348	452	5
1,303	2,793	161	151	397	489	6

Table 27.5 Federal expenditures on science and technology, by province and territory, 2004/2005 to 2008/2009

	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009
\$ millions					
Canada	8,517	9,142	9,347	9,732	10,016
National Capital Region ¹	2,709	2,912	2,989	2,922	3,104
Newfoundland and Labrador	137	128	119	126	118
Prince Edward Island	39	47	47	41	53
Nova Scotia	294	260	304	307	317
New Brunswick	122	93	108	130	111
Quebec ²	1,352	1,484	1,470	1,517	1,623
Ontario ²	1,966	2,101	2,046	2,383	2,548
Manitoba	226	254	237	266	306
Saskatchewan	157	193	211	193	216
Alberta	474	484	505	471	515
British Columbia	645	674	681	822	730
Yukon, Northwest Territories and Nunavut	35	51	43	43	51
Unallocated (within Canada)	361	461	587	511	324
Foreign (outside Canada)	342	306	302	445	556

1. Federal intramural expenditures only.

2. Includes extramural expenditures made in the National Capital Region and executed within the province.

Source: Statistics Canada, Catalogue no. 88-204-X.

Table 27.6 Federal expenditures on research and development, by activity, 2006/2007 to 2010/2011

	2006/2007	2007/2008	2008/2009 ^a	2009/2010 ^b	2010/2011 ^b
\$ millions					
Research and development and related scientific activities	9,633	10,176	10,573	11,285	11,675
Research and development	6,073	6,603	6,655	7,183	7,419
Current expenditures	5,642	6,170	6,107	6,641	6,901
Administration of extramural programs	279	294	321	328	337
Capital expenditures	152	139	228	214	180
Related scientific activities	3,560	3,573	3,918	4,102	4,256
Data collection	1,870	1,759	2,049	2,035	2,168
Information services	669	639	613	733	750
Special services and studies	576	743	802	829	811
Education support	298	286	300	324	328
Administration of extramural programs	64	70	75	78	75
Capital expenditures	83	77	79	105	122

Source: Statistics Canada, Catalogue no. 88-204-X.

Table 27.7 Research and development performed by the business enterprise sector, 2006 to 2010

	2006 ^r	2007 ^r	2008 ^p	2009 ^p	2010 ^p
All industries					
\$ millions					
Total research and development expenditures	16,474	16,644	15,792	15,202	14,808
Current expenditures	15,318	15,573	14,794	14,235	13,780
Wages and salaries	9,877	9,582	8,928	8,860	8,465
Other current expenditures	5,442	5,991	5,866	5,375	5,315
Capital expenditures	1,155	1,071	998	967	1,028
number of full-time equivalents					
Total research and development personnel	151,726	164,103	158,926	..	..
Professionals	88,226	92,758	90,303	..	..
Technicians	44,510	50,820	47,173	..	..
Other support staff	18,990	20,525	21,450	..	..

Note: Business enterprise research and development refers to research and development activities performed in Canada by the industrial (business enterprise) sector.

Source: Statistics Canada, CANSIM table 358-0024 and Catalogue no. 88-202-X.

Table 27.8 Intellectual property management at universities and research hospitals, 2004 to 2008

	2004	2005	2006	2007	2008
%					
Institutions engaged in intellectual property management	76	80	82	71	81
number					
Full-time equivalent employees engaged in intellectual property management	280	292	323	285	321
Research contracts	14,324	15,877	13,996	..	..
Invention disclosures	1,432	1,452	1,356	1,357	1,613
Inventions protected ¹	629	761	707	668	820
Inventions declined by the institution	355	322	353	333	492
Patent applications	1,264	1,410	1,442	1,634	1,791
Patents issued	397	376	339	479	346
Patents held	3,827	3,961	4,784	4,185	5,908
New licences and options	494	621	437	538	524
Active licences and options	2,022	2,836	2,038	2,679	3,343
\$ thousands					
Total operational expenditures for intellectual property management	36,927	41,544	42,492	41,851	51,124
Value of research contracts	940,993	1,001,270	1,154,268	1,273,677	1,971,207
Income from intellectual property	51,210	55,173	59,689	52,477	53,183
Value of remaining equity held by the institution in publicly traded spinoffs	49,872	41,336	41,524	34,754	37,821
Investment in spinoffs raised with the assistance of the institution	56,421	23,002	x	5,884	22,762

1. Resulted in protection activity.

Source: Statistics Canada, CANSIM table 358-0025.