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Federal Scientific Activities

2014/2015

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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
0s	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
*	significantly different from reference category ($p < 0.05$)

Note

This product, Federal Scientific Activities, will be the last edition of the publication. All of the data currently in the publication are available free of charge in CANSIM.

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Highlights

- Science and technology expenditures by federal departments and agencies are expected to decline 5.4% from the previous fiscal year to $10.3 billion dollars in 2014/2015. Federal government science and technology spending peaked in 2010/2011 and has posted annual declines in expenditures since then.
- Science and technology spending is composed of two components—research and development as well as related scientific activities. In 2014/2015, more than 63% (or $6.5 billion) of the anticipated federal spending will be dedicated to research and development activities, with the remaining $3.8 billion directed to related scientific activities. Research and development is defined as creative work with an appreciable element of novelty and uncertainty undertaken in a systematic manner to increase the stock of scientific and technical knowledge. Related scientific activities are focused on the generation, dissemination and application of scientific and technical knowledge.
- Federal government science and technology can also be categorized by intramural (or in-house) and extramural science and technology expenditures. Extramural expenditures are expected to account for just over half (50.7%), or $5.2 billion, of federal government expenditures in 2014/2015. The higher education sector is anticipated to be the largest extramural performer, making up 31% of federal science and technology expenditures, followed by business enterprises at 9%.
- More than three-quarters of federal science and technology expenditures, or $7.9 billion, are expected to be directed to natural sciences and engineering, with the remaining $2.4 billion on social sciences and humanities.
- Federal departments and agencies reported that they anticipate 35,189 full-time equivalent positions to be engaged in science and technology activities in 2014/2015, down 2.8% from 2013/2014. Over half of these positions, or 19,109 full-time equivalent positions, are expected to be in the scientific and professional class.

Analysis

- Federal departments and agencies reported that they intend on spending $10.3 billion on science and technology activities (S&T) for fiscal year 2014-2015, down 5.4% from the previous fiscal year (table 1).
- Federal government S&T expenditures were on the rise from 2002-2003, peaking in 2010-2011($12 billion) and, since then, have continuously declined (table 1).
- From 2010-2011 to 2012-2013, actual federal government S&T expenditures fell by 7.1%. Despite the drop in recent years, from fiscal year 2002-2003 to 2012-2013, actual expenditures increased 39.3% in current dollars. When inflation is taken into account this increase is 8.9% in real or constant dollars (table 1).

Research and experimental development (R&D) and Related scientific activities (RSA)

Federal S&T expenditures are composed of two components: research and development (R&D) and related scientific activities (RSA). R&D is defined as "creative work, undertaken in a systematic manner to increase the stock of knowledge" (OECD, 2002). RSA are focused on the generation, dissemination and application of scientific and technical knowledge, examples include the gathering, processing and analyzing of data, feasibility and policy studies, information services and museum services.

- In 2014-2015, more than 63%, or $6.5 billion, of the anticipated federal spending will be dedicated to R&D activities, with the remaining $3.8 billion directed to RSA. Compared to the previous fiscal year, it is anticipated that R&D expenditures will drop by 5.2% and RSA expenditures reduced by 5.7% (table 1 or table 2).
- From 2002-2003 to 2012-2013 expenditures on R&D increased 42.9% in current dollars and 11.7% in constant dollars. In comparison, RSA expenditures during the same time period increased 33.7% in current dollars and 4.5% in constant dollars (table 1).

Federal expenditures on science and technology can also be categorized by R&D or RSA sub-activities (such as R&D contracts, Research fellowships, Data collection, etc.).

- The largest sub-activity of S&T expenses is typically research and development (R&D) grants and contributions (G&Cs). In 2014-2015, R&D grants and contributions are expected to be $3.7 billion and account for 36.4% of the total S&T expenditures (table 4).
- The second largest S&T expenditure sub-activity is the RSA activity of general purpose data collection, which is anticipated to be $1.9 billion and account for 18.7% of total federal S&T expenditures (table 4).

Federal science and technology (S&T) expenditures by science type

S&T expenditures are also available for two science types: natural sciences and engineering; and social sciences and humanities.

- More than three-quarters of federal S&T expenditures, or $7.9 billion (76.4%), are expected to be directed to natural sciences and engineering, with the remaining $2.4 billion (23.6%) to social sciences and humanities (table 3).
- Compared to 2013-2014, expenditures directed toward natural sciences and engineering are expected to decline in 2014-2015 by six percent. Expenditures directed toward social sciences and humanities are also expected to decline in 2014-2015 by 3.7% compared to the previous year (table 3).

Intramural and Extramural performance of Science and Technology (S&T) activities

S&T expenditures made within the federal government, such as salaries of scientific personnel and the materials and equipment required to support their activities, are known as intramural expenditures (in-house). S&T payments for research and development (R&D) and related scientific activities (RSA) made to other performing sectors, such as higher education, business enterprises, private non-profit organizations, provincial and municipal governments, foreign and other entities are known as extramural expenditures.

- Extramural expenditures are expected to account for just over half (50.7%) or $5.2 billion of federal government expenditures in 2014-2015, a drop of 5.0% compared to 2013-2014 (table 6). Intramural expenditures are projected to account for the remainder ($5.1 billion), with an anticipated decrease of 5.9% from 2013-2014 (table 5).

- Over half (54.5%) of the total intramural S&T expenditures are expected to be directed toward RSA (table 5). In comparison, extramural expenditures are highly concentrated in R&D activities and for 2014-2015 are anticipated to make up 80.6% of total S&T spending (table 6).

- Almost all of the extramural performers, with the exception of provincial and municipal governments and other Canadian performers are expected to receive less funding for federal S&T activities in 2014-2015 compared to 2013-2014. Provincial and municipal governments anticipate a 6.7 percent increase in 2014-2015, resulting primarily from expected increases in RSA activity. The overall funding for the other Canadian performers is expected to remain unchanged (table 6).

- With respect to the performing sector for 2014-2015, the share of the higher education sector is expected to make up almost 31% of total federal S&T expenditures, followed by the business enterprise sector at around 9% (table 3).

- The higher education sector continues to be the largest expected extramural performer of the federal government's extramural S&T spending. This sector expects to receive 61% of total extramural expenditures; this share is expected to increase 2.4% compared to 2013-2014. The second largest recipient of federal extramural S&T spending is the business enterprise sector which expects to receive 17.7% of total extramural expenditures, down 2.3% compared to the previous year (table 6).

Federal Science and Technology (S&T) personnel

- In 2014/2015, federal departments and agencies reported that they anticipate a total of 35,189 full-time equivalent (FTE) positions to be engaged in S&T activities. This represents a 2.8% decline from 2013/2014 values. Over half of these positions, or 19,109 FTE's, are expected to be in the scientific and professional personnel category (table 8).

- Between 2013/2014 and 2014/2015, both R&D and RSA personnel expect around a 3% decline to 15,541 and 19,648 FTEs, respectively. The RSA scientific and professional category remains the largest component at 11,553 FTE's representing 32.8% of all anticipated federal science and technology personnel (table 8).

- When total S&T personnel are split by science type for 2014-2015, natural sciences and engineering anticipate 25,768 FTEs or 73% of the total personnel, with the remainder expected to be in the social sciences and humanities. Compared to the 2013-2014, S&T personnel working in the social sciences and humanities show a larger percentage decrease in FTEs (-3.6%) compared with those in the natural sciences and engineering (-2.5%). However, in terms of absolute numbers more S&T personnel are anticipated to be lost in the natural sciences and engineering field at 651, versus the social sciences and humanities which expect to lose 355 S&T personnel (table 7).

Federal science and technology (S&T) investment by region in 2012-2013

- In 2012-2013, overall federal S&T expenditures in Canada decreased by 2.1%, mainly due to a decrease of $178 million in spending in the National Capital Region (NCR) of Ontario and Quebec. In 2012/2013 the NCR spending of $3.3 billion was down 5.2% from the previous year and represented 29.3% of total (Canada and foreign) S&T expenditures, the highest total amongst all regions (table 9).

Socio-economic objectives of expenditures on research and development (R&D) activities, 2012-2013

Socio-economic objectives allow departments to classify their S&T resource allocations according to the purpose for which the expenditure is intended. The objectives are based on the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets produced by the Statistical Office of the European Communities (Eurostat).

- The three most important socio-economic objectives for federal extramural R&D spending in 2012-2013 were: Protection and improvement of human health ($1.5 billion), Industrial production and technology ($937 million), and Non-oriented research ($636 million). These have remained the principal objectives in terms of spending since 2002-2003. Non-oriented research covers basic activities motivated by scientific curiosity with the objective of increasing scientific knowledge. It also includes funding used to support postgraduate studies and fellowships (table 10).

- In 2012-2013, the three primary socio-economic objectives for federal intramural R&D spending were: Production, distribution and rational utilization of energy ($561 million), Agricultural production and technology ($485 million), and Defence ($258 million). Agriculture production and technology is a combination of the socio-economic objectives of: Agriculture, Fishing and Forestry (table 10).

Related products

Selected publications from Statistics Canada

88-001-X	Science Statistics
88-202-X	Industrial Research and Development: Intentions
88F0017M	Science, Innovation and Electronic Information Division Research Papers

Selected technical and analytical products from Statistics Canada

88F0017M1999006	Diffusion of Biotechnologies in Canada: Results from the Survey of Biotechnology Use in Canadian Industries
88F0017M2000008	Explaining Rapid Growth in Canadian Biotechnology Firms
88F0017M2001010	Analysis of the Survey on Innovation, Advanced Technologies and Practices in the Construction and Related Industries, 1999
88F0017M2001011	Capacity to Innovate, Innovation and Impact: The Canadian Engineering Services Industry
88F0017M2001012	Patterns of Advanced Manufacturing Technology (AMT) Use in Canadian Manufacturing: 1998 AMT Survey Results

Selected CANSIM tables from Statistics Canada

358-0001	Gross domestic expenditures on research and development, by science type and by funder and performer sector, annual
358-0026	Intellectual property management, by federal departments and agencies indicators, annual
358-0142	Federal expenditures on science and technology and its components in current dollars and 2007 constant dollars, annual
358-0143	Federal expenditures on science and technology and its components, by type of science and performing sector, annual
358-0144	Federal expenditures on science and technology and its components, by activity and performing sector, annual

358-0145	Federal intramural expenditures on science and technology and its components, by type of science for the National Capital Region, annual
358-0146	Federal personnel engaged in science and technology activities, by type of science and personnel category, annual
358-0147	Federal personnel engaged in science and technology and its components, by type of science and personnel category, annual
358-0148	Federal personnel engaged in science and technology and its components, by type of science, personnel category, Canada, provinces and territories, annual
358-0149	Federal expenditures on science and technology and its components, by type of science, performing sector, Canada, provinces and territories, annual
358-0150	Federal extramural expenditures on science and technology and its components, by type of science, performing sector, type of payment, Canada, provinces and territories, annual
358-0151	Federal expenditures on science and technology and its components, by socio-economic objectives, annual
358-0163	Federal expenditures on science and technology, by major departments and agencies
358-0164	Federal extramural expenditures on science and technology, by performing sector and major departments and agencies
358-0165	Federal personnel engaged in science and technological activities, by occupational category and major departments and agencies
358-0166	Federal personnel engaged in science and technological activities, by major departments and agencies

Selected surveys from Statistics Canada

4212	Federal Science Expenditures and Personnel, Activities in the Social Sciences and Natural Sciences

Selected summary tables from Statistics Canada

- *Domestic spending on research and development (GERD), funding sector, by province*
- *Domestic spending on research and development (GERD), performing sector, by province*
- *Domestic spending on research and development (GERD)*

Statistical tables

Table 1

Federal expenditures – On science and technology, research and development and related scientific activities in current dollars and in constant 2007 dollars

	Current dollars				Implicit price indexes [2]	Constant 2007 dollars			
		Science and technology					Science and technology		
	Main estimates [1]	Total science and technology	Research and development	Related scientific activities		Main estimates [1]	Total science and technology	Research and development	Related scientific activities
	millions of dollars					millions of dollars			
2002/2003	170,367	8,014	4,927	3,087	85.6	199,027	9,362	5,756	3,606
2003/2004	175,937	8,765	5,462	3,303	88.5	198,799	9,904	6,172	3,732
2004/2005	183,290	8,934	5,454	3,480	91.4	200,536	9,775	5,967	3,807
2005/2006	194,863	9,449	6,042	3,407	94.3	206,642	10,020	6,407	3,613
2006/2007	207,986	9,633	6,073	3,560	96.9	214,640	9,941	6,267	3,674
2007/2008 r	230,772	10,176	6,521	3,655	100.0	230,772	10,176	6,521	3,655
2008/2009 r	241,308	10,573	6,573	4,000	103.9	232,250	10,176	6,326	3,850
2009/2010 r	236,135	11,614	7,374	4,239	101.7	232,188	11,420	7,251	4,168
2010/2011 r	261,200	12,014	7,745	4,269	104.4	250,192	11,508	7,419	4,089
2011/2012 r	250,786	11,395	7,030	4,365	107.7	232,856	10,580	6,527	4,053
2012/2013 r	227,570	11,166	7,039	4,128	109.5	207,826	10,197	6,428	3,770
2013/2014 r	232,580	10,868	6,864	4,005	111.0	209,720	9,800	6,189	3,611
2014/2015 p	235,330	10,281	6,504	3,777	..	..	..	..	..

1. Part 1, Government Expenditure Plans, Estimates.
2. CANSIM, table 380-0102.

Note(s): Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM table 358-0142.

Table 2

Federal expenditures – On science and technology and its components, by activity

	2010/2011 r	2011/2012 r	2012/2013 r	2013/2014 r	2014/2015 p
	millions of dollars				
Total science and technology	**12,014**	**11,395**	**11,166**	**10,868**	**10,281**
Total research and development	**7,745**	**7,030**	**7,039**	**6,864**	**6,504**
Current expenditures	7,053	6,518	6,534	6,329	5,943
Administration of extramural programs	310	314	298	294	291
Capital	381	198	207	241	269
Total related scientific activities	**4,269**	**4,365**	**4,128**	**4,005**	**3,777**
Data collection	2,195	2,347	2,127	1,997	1,923
Information services	717	744	713	759	693
Special services and studies	812	815	819	792	738
Education support	329	287	267	262	244
Administration of extramural programs	89	95	92	85	76
Capital	128	77	110	111	103

Note(s): Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0144.

Table 3
Federal expenditures – On science and technology, by science and by performing sector

	2010/2011 r	2011/2012 r	2012/2013 r	2013/2014 r	2014/2015 p
	millions of dollars				
Total sciences	**12,014**	**11,395**	**11,166**	**10,868**	**10,281**
Federal government (intramural)	6,059	5,803	5,552	5,384	5,068
Business enterprise	1,201	1,090	1,032	1,093	920
Higher education	3,329	3,251	3,371	3,215	3,180
Canadian non-profit institutions	473	457	484	482	441
Provincial and municipal governments	394	167	107	105	112
Foreign performers	535	595	598	566	535
Other Canadian performers	23	33	22	24	24
Natural sciences and engineering	**9,161**	**8,433**	**8,458**	**8,350**	**7,853**
Federal government (intramural)	4,483	4,082	4,047	4,007	3,741
Business enterprise	1,125	1,010	965	1,022	862
Higher education	2,583	2,528	2,651	2,507	2,487
Canadian non-profit institutions	270	260	263	290	260
Provincial and municipal governments	372 [1]	148	99	96	105
Foreign performers	319	391	427	420	389
Other Canadian performers	8	14	7	8	9
Social sciences and humanities	**2,853**	**2,963**	**2,708**	**2,519**	**2,427**
Federal government (intramural)	1,576	1,721	1,506	1,377	1,327
Business enterprise	75	80	67	72	58
Higher education	746	724	719	708	693
Canadian non-profit institutions	202	196	222	192	181
Provincial and municipal governments	22	19	9	9	7
Foreign performers	216	203	171	146	146
Other Canadian performers	15	19	16	16	15

1. Includes $836 million allocated to S&T activities from the Knowledge Infrastructure Program (KIP), a $2 billion two-year program which started in 2009/2010.

Note(s): As reported by the funder, the federal government, not by the performers. Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0143.

Table 4
Federal expenditures – On science and technology and its components, by activity and performing sector, 2014/2015p

	Federal government (intramural)	Business enterprise	Higher education	Canadian non-profit institutions	Provincial and municipal governments	Foreign performers	Other Canadian performers	Total, all performing sectors
	millions of dollars							
Total science and technology	**5,068**	**920**	**3,180**	**441**	**112**	**535**	**24**	**10,281**
Total research and development	**2,305**	**758**	**2,932**	**253**	**52**	**188**	**16**	**6,504**
In-house research and development	1,497	.	.	.	.	.	.	1,497
Research and development contracts	204	319	24	1	2	17	2	568
Supporting contracts	36	.	.	.	.	.	.	36
Research and development grants and contributions	.	431	2,855	252	51	154	4	3,746
Research fellowships	8	8	53	0 s	0 s	18	10	96
Administration of extramural programs	291	.	.	.	.	.	.	291
Capital	269	.	.	.	.	.	.	269
Total related scientific activities	**2,763**	**162**	**248**	**188**	**60**	**347**	**9**	**3,777**
Data collection	1,627	85	12	115	53	27	4	1,923
Information services	653	14	16	8	1	1	1	693
Special services and studies	303	57	10	55	6	306	1	738
Education support	1	6	211	9	0 s	14	3	244
Administration of extramural programs	76	.	.	.	.	.	.	76
Capital	103	.	.	.	.	.	.	103

Note(s): As reported by the funder, the federal government, not by the performers. Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0144.

Table 5
Federal intramural expenditures – On science and technology and its components, by activity

	2010/2011	2011/2012	2012/2013 r	2013/2014 r	2014/2015 p
	millions of dollars				
Total science and technology	**6,059**	**5,803**	**5,552**	**5,384**	**5,068**
Total research and development	**3,007**	**2,649**	**2,555**	**2,475**	**2,305**
Current expenditures	2,316	2,138	2,050	1,939	1,745
Administration of extramural programs	310	314	298	294	291
Capital	381	198	207	241	269
Total related scientific activities	**3,052**	**3,154**	**2,997**	**2,910**	**2,763**
Data collection	1,884	2,009	1,825	1,693	1,627
Information services	640	676	657	705	653
Special services and studies	311	296	311	316	303
Education support	1	1	1	1	1
Administration of extramural programs	89	95	92	85	76
Capital	128	77	110	111	103

Note(s): Due to rounding, components may not add to the totals. CANSIM, table 358-0144.

Table 6
Federal extramural expenditures – On science and technology and its components, by performing sector

	2010/2011 r	2011/2012 r	2012/2013 r	2013/2014 r	2014/2015 p
	millions of dollars				
Total science and technology	**5,955**	**5,592**	**5,614**	**5,484**	**5,212**
Business enterprises	1,201	1,090	1,032	1,093	920
Higher education	3,329	3,251	3,371	3,215	3,180
Canadian non-profit institutions	473	457	484	482	441
Provincial and municipal governments	394 [1]	167	107	105	112
Foreign performers	535	595	598	566	535
Other Canadian performers	23	33	22	24	24
Research and development	**4,738**	**4,381**	**4,483**	**4,389**	**4,199**
Business enterprises	968	860	844	904	758
Higher education	2,983	2,944	3,089	2,944	2,932
Canadian non-profit institutions	221	227	243	272	253
Provincial and municipal governments	366 [1]	121	58	54	52
Foreign performers	186	210	235	200	188
Other Canadian performers	13	19	13	14	16
Related scientific activities	**1,217**	**1,211**	**1,131**	**1,095**	**1,014**
Business enterprises	233	230	188	189	162
Higher education	346	307	281	270	248
Canadian non-profit institutions	252	230	241	210	188
Provincial and municipal governments	28 [1]	46	49	50	60
Foreign performers	349	385	363	365	347
Other Canadian performers	9	14	9	10	9

1. Includes $836 million allocated to S&T activities from the Knowledge Infrastructure Program (KIP), a $2 billion two-year program which started in 2009/2010.

Note(s): As reported by the funder, the federal government, not by the performers. Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0164.

Table 7
Federal personnel – Engaged in science and technology activities

	2010/2011	2011/2012	2012/2013 r	2013/2014 r	2014/2015 p
	number				
Total sciences	**38,594**	**39,189**	**36,982**	**36,194**	**35,189**
Research and development (excluding administration of extramural research and development programs)	15,012	14,876	14,329	14,054	13,622
Administration of extramural research and development programs	2,071	2,086	1,960	1,951	1,919
Related scientific activities (excluding administration of extramural related scientific activities programs)	20,759	21,455	19,931	19,434	18,964
Administration of extramural related scientific activities programs	753	772	763	756	684
Natural sciences and engineering	**27,073**	**27,163**	**26,851**	**26,419**	**25,768**
Research and development (excluding administration of extramural research and development programs)	13,616	13,966	13,303	12,905	12,606
Administration of extramural research and development programs	1,711	1,715	1,602	1,580	1,555
Related scientific activities (excluding administration of extramural related scientific activities programs)	11,308	11,004	11,376	11,371	11,106
Administration of extramural related scientific activities programs	438	478	570	563	500
Social sciences and humanities	**11,521**	**12,026**	**10,131**	**9,776**	**9,421**
Research and development (excluding administration of extramural research and development programs)	1,395	910	1,026	1,149	1,016
Administration of extramural research and development programs	360	372	358	371	364
Related scientific activities (excluding administration of extramural related scientific activities programs)	9,451	10,451	8,555	8,063	7,857
Administration of extramural related scientific activities programs	315	294	193	192	184

Note(s): Personnel counts are reported as full-time equivalents. Due to rounding, components may not add to the totals. Environment Canada revised their methodology for calculating FTEs commencing fiscal year 2012-2013. Caution must be used in comparing the previous fiscal years' data. CANSIM, table 358-0146.

Table 8
Federal personnel – Engaged in science and technology activities, by category and activity

	2010/2011	2011/2012	2012/2013 r	2013/2014 r	2014/2015 p
	number				
Total science and technology	**38,594**	**39,189**	**36,982**	**36,194**	**35,189**
Scientific and professional personnel	20,341	20,489	20,045	19,591	19,109
Technical personnel	8,255	8,055	7,776	7,773	7,572
Other personnel	9,998	10,645	9,161	8,830	8,508
Research and development	**17,082**	**16,962**	**16,289**	**16,005**	**15,541**
Scientific and professional personnel	8,010	7,854	7,870	7,797	7,556
Technical personnel	4,900	4,761	4,485	4,383	4,288
Other personnel	4,172	4,347	3,934	3,825	3,697
Related scientific activities	**21,512**	**22,227**	**20,694**	**20,190**	**19,648**
Scientific and professional personnel	12,331	12,635	12,174	11,794	11,553
Technical personnel	3,355	3,294	3,292	3,390	3,284
Other personnel	5,826	6,298	5,228	5,006	4,811

Note(s): Personnel counts are reported as full-time equivalents. Due to rounding, components may not add to the totals. Environment Canada revised their methodology for calculating FTEs commencing fiscal year 2012-2013. Caution must be used in comparing the previous fiscal years' data. CANSIM, table 358-0147.

Table 9
Federal expenditures by province and territories – On science and technology

	2008/2009 r	2009/2010 r	2010/2011 r	2011/2012 r	2012/2013 r
	millions of dollars				
Canada and foreign	10,573	11,614	12,014	11,395	11,166
Canada	10,017	11,060	11,479	10,801	10,569
Newfoundland and Labrador	118	138	127	102	103
Prince Edward Island	53	45	49	45	40
Nova Scotia	317	377	337	277	284
New Brunswick	111	151	131	111	118
Quebec [1]	1,623	1,751 [2]	1,825	1,670	1,720
Ontario [1]	2,548	2,992	3,175	2,679	2,743
Manitoba	306	368	355	321	326
Saskatchewan	216	249	248	224	246
Alberta	515	613	691	578	532
British Columbia	730	920	924	886	885
Yukon, Northwest Territories and Nunavut	51	62	104	67	54
National Capital Region, Ontario/Quebec [3]	3,104	3,191 [2]	3,305	3,455	3,277
Unallocated (within Canada)	324	201	208	384	239
Foreign (outside Canada)	556	553	535	595	598

1. Includes the extramural expenditures of the National Capital Region.
2. This value has been revised due to a redistribution of personnel from the Nation Capital Region (Quebec) to the National Capital Region (Ontario) and Quebec (excluding the National Capital Region).
3. Federal intramural expenditures only.

Note(s): Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0149.

Table 10
Federal expenditures by socio-economic objectives – On research and development

	2010/2011 r		2011/2012 r		2012/2013 r	
	Intramural [1]	Extramural	Intramural [1]	Extramural	Intramural [1]	Extramural
	millions of dollars					
Total socio-economic objectives	**2,863**	**4,738**	**2,520**	**4,381**	**2,428**	**4,483**
Exploration and exploitation of the earth	90	77	86	92	59	93
Infrastructure and general planning of land use						
Transport	64	56	60	58	51	49
Telecommunication	46	52	41	35	34	35
Other infrastructure and general planning of land use	44	76	42	37	35	43
Control and care of the environment	200	227	208	225	121	251
Protection and improvement of human health	280	1,432	264	1,415	240	1,512
Production, distribution and rational utilization of energy	717	269	545	257	561	161
Agricultural production and technology						
Agriculture	360	179	354	154	409	163
Fishing	7	29	7	21	6	17
Forestry	70	90	69	58	70	54
Industrial production and technology	206	801	182	799	153	937
Social structures and relationships	156	222	125	243	141	264
Exploration and exploitation of space	78	228	74	268	61	195
Non-oriented research	247	938	240	641	211	636
Other civil research	21	4	14	2	16	1
Defence	276	57	211	76	258	71
Other socio-economic objectives	..	..	..	..	..	..

1. Non-program (indirect) costs are excluded.

Note(s): Due to rounding, components may not add to the totals. Extramural data for Health Canada was revised from 2007 to 2011. CANSIM, table 358-0151.

Bibliography

Organization for Economic Cooperation and Development (OECD). 2002. *Frascati Manual* (6th ed.). OECD: Paris.

Organisation for Economic Co-operation and Development (OECD). 2011. *Main Science and Technology Indicators*. Volume 2011/1. OECD: Paris

Methodology

The Federal Government is a principal funder of science and technology in Canada. This report presents information on the disposition of monies and human resources for science and technology (S&T) by federal departments and agencies. The information has been assembled to serve as a reference document for program managers, government officials, the media and the general public. It records the allocation of S&T resources for the last five years.

The statistics are collected through the survey of Federal Science Expenditures and Personnel, which records past, current and preliminary expenditures for activities in the natural and social sciences. The survey is designed to correspond as much as possible to the system of budgetary estimates used by the federal government. This is done to ease the response burden, assist in editing and, most importantly, to produce comparable data for policy planning and program evaluation. Thus, the questionnaire covers the same time span as the estimates including: actual expenditures for the past fiscal year, e.g., 2012/2013; forecast expenditures for the current fiscal year, e.g., 2013/2014; and proposed estimates for the fiscal year, e.g., 2014/2015 (as also reported in the Public Accounts).

Sixty-eight different federal government departments and agencies either perform science and technology (S&T) activities or have a budgetary allocation to fund S&T. In addition to the expenditures attributable to program budgets, there are additional costs attributable to scientific activities which must be included if a full picture of the resources devoted to science activities is to be obtained. These include other sources of funds and other S&T costs which are defined below:

Transfers into the program from other federal government departments and agencies, net of transfers out;

Income from external sources such as industry and provincial governments;

Other S&T costs: Non-program costs (indirect costs) are costs that are not part of the budgets of scientific programs and include services provided by other departments, such as:

- accommodation by Public Works and Government Services Canada and own department;
- employer’s share of health and employment insurance premiums paid by Treasury Board;
- employee compensation under Workers Compensation Acts paid by Human Resources and Social Development Canada;
- cost of legal services provided by the Department of Justice;
- cheques issue cost by Public Works and Government Services Canada.

Indirect costs are included in departmental totals; however, these costs have not been included in expenditures classified by socio-economic objective.

According to international convention, science and technology activities are divided into two fields; natural sciences and engineering (NSE) and social sciences and humanities (SSH). These fields of science are further divided into research and development (R&D) and related scientific activities (RSA). The Federal Government may choose to perform S&T in its own laboratories (intramural expenditures) or may pay another organization to perform S&T (extramural expenditures). Data are presented in this article on S&T activities funded by the federal government for R&D and RSA and distinguished by performer (that is, intramurally by the government itself or extramurally, by business enterprises (industry), higher education, provincial and municipal governments, Canadian non-profit organizations, other Canadian performers and foreign performers). Definitions of these terms are provided in the Technical Notes section. Crown corporations which have an industrial function are not included. They are treated as commercial enterprises and the crown corporation expenditures in aggregate are included in the Statistics Canada report, Industrial Research and Development, Catalogue No. 88-202-X

Considerable effort has been expended to maintain the continuity and compatibility of the data series to permit analysis and study of the impact of scientific activities. Efforts of the departments and agencies in ensuring accurate and complete information are gratefully acknowledged.

Technical notes

Scope and limitations of the data

The expenditures data for scientific activities controlled by federal departments and agencies provided in this document correspond to the budgetary expenditures by program presented in Main Estimates for the approval of Parliament. The following kinds of non-budgetary costs or expenditures are not included:

- loans or advances to and investments in Crown Corporations; loans or advances for specific purposes to other governments and international organizations or persons or corporations in the private sector.

Reliability of the data

All the possible sources of error were examined. Definitions have been taken from a compendium of methods of error evaluation in censuses and surveys, Statistics Canada, catalogue no. 13-564-X.

- A complete enumeration is carried out of all federal departments and agencies involved in scientific activities.
- Being a census, coverage and non-response are very minor causes of error.
- No imputation, coding, or sampling is done by Statistics Canada for this exercise.

Data capture

The data capture operation in a census or survey consists of converting the data received on questionnaires (e.g., respondent answers) or coding forms to a machine readable format.

All data capture for science statistics is through manual intervention, at a computer terminal.

Significant uncorrected data capture errors are unlikely because of the examination of numerous tables and listings prepared for data analysis before publication tables are created. Mistakes in expenditures due to coding error are believed to be less than 1%.

Edit

The edit procedures usually consist of:

- checking each field of every record to ascertain whether it contains a valid code or entry;
- checking codes or entries in certain predetermined combinations of fields to ascertain whether codes or entries are consistent with one another. Although there are a number of edits, all cases of failed edit checks are corrected after consideration by editors.

Definitions

Scope and limitations of the data

According to international convention, science and technology activities are divided into two fields; natural sciences and engineering (NSE) and social sciences and humanities (SSH). These fields of science are further divided into research and development (R&D) and related scientific activities (RSA). The federal government may choose to perform S&T in its own laboratories (intramural expenditures) or may pay another organization to perform S&T (extramural expenditures). Data are presented in this article on S&T activities funded by the federal government for R&D and RSA and distinguished by performer (that is, intramurally by the government itself or extramurally, by business enterprises (industry), the higher education sector, provincial and municipal governments, Canadian non-profit organizations, other performers and foreign performers).

Definitions applicable to both Natural sciences and engineering and Social science and humanities

Scientific research and experimental development (R&D)

Creative work undertaken on a systematic basis in order to increase the stock of scientific and technical knowledge and to use this knowledge in new applications.

The central characteristic of R&D is an appreciable element of novelty and of uncertainty. New knowledge, products or processes are sought. New knowledge involves the integration of newly acquired information into existing hypotheses, the formulation and testing of new hypotheses or the re-evaluation of existing observations.

An R&D project generally has three characteristics:

- a substantial element of uncertainty, novelty and innovation;
- a well-defined project design; and
- a report on the procedures and results of the projects.

Related scientific activities (RSA)

Those activities which complement and extend R&D by contributing to the generation, dissemination and application of scientific and technological knowledge.

Intramural performance

Where the science and technology (S&T) activities are managed and carried out primarily by federal government employees, they are classified as intramural S&T. Even where major components of the project are provided by outside agencies, such as computer services, laboratory construction, testing of prototype equipment, if the planning, supervision, reporting, and key operating functions are performed by federal personnel, then the activity is considered to be intramural. This also applies to S&T activities carried out by a department or agency on behalf of another federal department or agency on a cost recovery basis.

The intramural expenditures reported for scientific activities are those direct costs, including salaries, associated with scientific programs. These costs include that portion of a program's contribution to employee benefit plans (e.g., superannuation) which is applicable to the scientific personnel within the program.

Non-program ("indirect") costs, such as the value of services provided by other departments without charge, are to be excluded. Support services (i.e., administration, finance) provided by the reporting program, proportional to S&T expenditures should be included.

Extramural performance

The management and conduct of an S&T activity is entrusted to a non-federal organization. The six extramural performance sectors used in surveying S&T expenditures by the federal government are:

Business enterprise

This sector is composed of business and government enterprises, including public utilities and government-owned firms. Incorporated consultants providing scientific and engineering services are also included. Industrial research institutes located at Canadian universities are considered to be in the Higher education sector.

Higher education

This sector is composed of all universities, colleges of technology and other institutes of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of, or administered by, or associated with, the higher education establishments.

Canadian non-profit institutions

Charitable foundations, voluntary health organizations, scientific and professional societies, and other organizations not established to earn profits comprise this sector. Canadian non-profit institutions primarily serving or controlled by another sector should be included in that sector.

Provincial and municipal governments

Departments and agencies of these governments form this sector. Government enterprises, such as provincial utilities are included in the Business enterprise sector, and hospitals in the Canadian non-profit institutions.

Foreign performers

All foreign government agencies, foreign companies (including foreign subsidiaries of Canadian firms), international organizations, non resident foreign nationals and Canadians studying or teaching abroad, are included in this sector.

Other performers

This sector includes provincial research councils, and individuals or organizations in Canada not belonging to any of the above sectors.

Type of payment

Contracts

These are payments to organizations or individuals outside the federal government for the conduct of S&T by the recipient or to provide support for the federal government's in-house S&T programs.

Grants and contributions

Awards to organizations or individuals for the conduct of S&T and intended to benefit the recipients rather than provide the program with goods, services or information.

Research fellowships

Awards to individuals for advanced research training and experience. Awards intended primarily to support the education of the recipients are reported as education support.

Socio-economic objectives

Socio-economic objectives allow departments to classify their S&T resource allocations according to the purpose for which the expenditure is intended. The objectives are listed on the questionnaire at the highest level of aggregation with sub-levels given for clarification of categories. In many cases, projects have multiple objectives and a department should assign its expenditures consistent with the stated objectives of the department. Care must be taken to avoid “double counting”.

The objectives are based on the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS) produced by the Statistical Office of the European Communities (Eurostat).

- **Exploration and exploitation of the Earth**
  Scientific activities with objectives related to the exploration of the Earth’s crust and mantle, seas, oceans and atmosphere, and scientific activities on their exploitation. It also includes climatic and meteorological research, polar exploration and hydrology.

- **Infrastructure and general planning of land use**
  Scientific activities on infrastructure and land development, including research on the construction of buildings. More generally, it covers all scientific activities relating to the general planning of land-use. This includes scientific activities into protection against harmful effects in town and country planning but not scientific activities into other types of pollution.

- **Control and care of the environment**
  Covers scientific activities into the control of pollution, aimed at the identification and analysis of the sources of pollution and their causes, and all pollutants, including their dispersal in the environment and the effects on man, species (fauna, flora, microorganisms) and biosphere. Development of monitoring facilities for the measurement of all kinds of pollution is included. The same is valid for the elimination and prevention of all forms of pollution in all types of environment.

- **Protection and improvement of human health**
  Scientific activities aimed at protecting, promoting and restoring human health broadly interpreted to include health aspects of nutrition and food hygiene. It ranges from preventative medicine, including all aspects of medical and surgical treatment, both for individuals and groups, and the provision of hospital and home care, to social medicine and pediatric and geriatric research.

- **Production, distribution and rational utilization of energy**
  Covers scientific activities into the production, storage, transportation, distribution and rational use of all forms of energy. It also includes scientific activities on processes designed to increase the efficiency of energy production and distribution, and the study of energy conservation.

- **Agricultural production and technology**
  Covers all scientific activities on the promotion of agriculture, forestry, fisheries and foodstuff production. It includes: scientific research on chemical fertilizers, biocides, biological pest control and the mechanization of agriculture; research on the impact of scientific activities in the field of developing food productivity and technology.

- **Industrial production and technology**
  Covers scientific activities on the improvement of industrial production and technology. It includes scientific activities on industrial products and their manufacturing processes except where they form an integral part of the pursuit of other objectives (e.g., defence, space, energy, agriculture).

- **Social structures and relationships**
  Scientific activities on social objectives, as analysed in particular by social and human sciences, which have no obvious connection with other objectives. This analysis includes quantitative, qualitative, organizational and forecasting aspects of social problems.

- **Exploration and exploitation of space**
  All civil space scientific activities. Corresponding scientific activities in the defence field is classified in the Defence objective. (Although civil space research is not, in general, concerned with particular objectives, it frequently has a specific goal, such as the increase of general knowledge (e.g., astronomy), or relates to particular applications (e.g., telecommunications satellites).

- **Non-oriented research**
  Basic activities motivated by scientific curiosity with the objective of increasing scientific knowledge. It also includes funding used to support postgraduate studies and fellowships.

- **Other civil research**
  Civil scientific activities which cannot (yet) be classified to a particular objective.

- **Defence**
  Covers scientific activities for military purposes. It also includes basic research and nuclear and space research financed by ministries of defence. Civil scientific activities financed by ministries of defence, for example, in the fields of meteorology, telecommunications and health, should be classified in the relevant objectives.

Personnel

Intramural expenditure data should be supported by data on the personnel devoted to scientific activities by all the employees engaged in these activities.

Scientific and professional

People in jobs that require at least one academic degree or nationally recognized professional qualification, as well as those with equivalent experience.

Technical

People in jobs that require specialized vocational or technical training beyond the secondary level (e.g., community colleges and technical institutes) as well as those with experience equivalent to this training.

Other

Clerical, secretarial, administrative, operational and other support personnel.

In regard to personnel resources, there are two caveats:

- where the S&T activities are a part of the program being reported, only the auxiliary staff relevant to the S&T activities are reported on a prorated basis; and

- whenever financial and administrative support is provided from another program, that support is allocated to the S&T resources for the program being reported.

Full-time equivalent (FTE)

A measure of the time actually devoted to the conduct of scientific activities. An employee who is engaged in scientific activities for a half a year has a full-time equivalence of 0.5. Personnel data reported should be consistent with expenditure data.

Administration of extramural programs (AEP)

AEP identifies the FTEs engaged in the administration of contracts and grants and contributions for scientific activities that are to be performed outside the federal government. These FTEs are broken down by the type of scientific activity supported, i.e., R&D or RSA.

Definitions specific to natural sciences and engineering

The natural sciences and engineering (NSE) field consists of disciplines concerned with understanding, exploring, developing or utilizing the natural world. Included are the engineering, mathematical, life and physical sciences.

Related scientific activities (RSA)

The kinds of related scientific activities for the natural sciences are described below.

Scientific data collection

The gathering, processing, collating and analyzing of data on natural phenomena. These data are normally the results of surveys, routine laboratory analyses or compilations of operating records.

Data collected as part of an existing or proposed R&D project are charged to research. Similarly, the costs of analyzing existing data as part of a research project are R&D costs, even when the data were originally collected for some other purpose. The development of new techniques for data collection is also to be considered to be a research activity. Examples of scientific data collection are: routine geological, hydrographic, oceanographic and topographic surveys; routine astronomical observations; maintenance of meteorological records; and wildlife and fisheries surveys.

Information services

All work directed to recording, classifying, translating and disseminating scientific and technological information as well as museum services. Included are the operations of scientific and technical libraries, S&T consulting and advisory services, the Patent Office, the publication of scientific journals and monographs, and the organizing of scientific conferences. Grants for the publication of scholarly works are also included.

General purpose information services or information services directed primarily towards the general public are excluded, as are general departmental and public libraries. When individual budgets exist, the costs of libraries which belong to institutions otherwise entirely classified to another activity, such as R&D, should be assigned to information services. The costs of printing and distributing reports from another activity, such as R&D, are normally attributable to that activity.

Sub category under 'Information services'

- **Museum services**
  The collecting, cataloguing, and displaying of specimens of the natural world or of representations of natural phenomena. The activity involves a systematic attempt to preserve and display items from the natural world; in some ways it could be considered an extension of information services. The scientific activities of natural history museums, zoological and botanical gardens, aquaria, planetaria and nature reserves are included. Parks which are not primarily restricted reserves for certain fauna or flora are excluded. In all cases the costs of providing entertainment and recreation to visitors should be excluded (e.g. restaurants, children's gardens and museums).

When a museum also covers not only natural history but also aspects of human cultural activities, the museum's resources should be appropriated between the natural and social sciences. However, museums of science and technology, war, etc., which display synthetic or artificial objects and may also illustrate the operations of certain technologies, should be considered as engaged in museum services in social sciences.

Special services and studies

Work directed towards the establishment of national and provincial standards for materials, devices, products and processes; the calibration of secondary standards; non-routine quality testing; feasibility studies and demonstration projects.

Sub categories under 'Special services and studies' include:

- **Testing and standardization**
  Work directed towards the establishment of national and international standards for materials, devices, products and processes, the calibration of secondary standards and non-routine quality testing. The development of new measures for standards, or of new methods of measuring or testing, is R&D and should be reported as such. Exclude routine testing such as monitoring radioactivity levels or soil tests before construction.

- **Feasibility studies**
  Technical investigations of proposed engineering projects to provide additional information required to reach decisions on implementation. Besides feasibility studies per se, the related activity of demonstration projects are to be included. Demonstration projects involve the operation of scaled-up versions of a facility or process, or data on factors such as costs, operational characteristics, market demand and public acceptance. Projects called 'demonstration projects' but which conform to the definition of R&D should be considered R&D. Once a facility or process is operated primarily to provide a service or to gain revenue, rather than as a demonstration, it should no longer be included with feasibility studies. In all demonstration projects, only the net costs should be considered.

Education support

Grants to individuals or institutions on behalf of individuals which are intended to support the post-secondary education of students in technology and the natural sciences. General operating or capital grants are excluded. The activity includes the support of foreign students in their studies of the natural sciences at Canadian or foreign institutions. Grants intended primarily to support the research of individuals at universities are either R&D grants or research fellowships.

Definitions specific to Scial sciences and humanities

The social sciences and humanities (SSH) field embraces all disciplines involving the study of human actions and conditions and the social, economic and institutional mechanisms affecting humans. Included are such disciplines as anthropology, business administration and commerce, information and knowledge management, criminology, demography, economics, geography, history, languages, literature and linguistics, law, library science, philosophy, political science, psychology, religious studies, social work, sociology, and urban and regional studies.

Related scientific activities (RSA)

The kinds of related scientific activities for the social sciences and humanities are described below.

General purpose data collection

The routine gathering, processing, collating, analysis and publication of information on human phenomena using surveys, regular and special investigations and compilations of existing records. It excludes data collected primarily for internal administrative purposes (e.g., departmental personnel statistics) as well as the collection of data as part of an R&D project.

Data collected as part of an existing or proposed research project are charged to research. Similarly the costs of analyzing existing data as part of a research project are R&D costs, even when the data were originally collected for some other purpose. The development of new techniques for data collection is also considered a research activity. The institutions involved are generally the statistical bureaus of Canadian governments and the statistical sections of departments and agencies. If there are units whose principal activity is R&D, their costs and personnel should be assigned to R&D; specialized libraries with separate budgets should be assigned to information services.

Information services

All work related to recording, classifying, translating and disseminating scientific and technological information as well as museum services. Included are the operations of scientific and technical libraries, S&T consulting and advisory services, the Patent Office, the publication of scientific journals and monographs, and the organizing of scientific conferences. Grants for the publication of scholarly works are also included.

General purpose information services or information services directed primarily towards the general public are excluded, as are general departmental and public libraries. When individual budgets exist, the costs of libraries which belong to institutions otherwise entirely classified to another activity, such as R&D, should be assigned to information services. The costs of printing and distributing reports from another activity, such as R&D, are normally attributable to that activity.

Sub category under 'Information services' include:

- **Museum services**
  The collecting, cataloguing, and displaying of specimens and representations relating to human history, social organization and creations. The activity involves a systematic attempt to preserve and display the works of human beings and to provide information on their works, history, and nature. The scientific activities of historical museums, archaeological displays, and art galleries are included. In all cases, the costs of providing entertainment and recreation to visitors should be excluded (e.g. restaurants, children's gardens and museums).

  When a museum also covers aspects of natural history, the museum's operation should be divided between the social and natural sciences. However, museums of science and technology, war, etc., which display synthetic or artificial objects and may also illustrate the operations of certain technologies, should be considered as engaged in museum services in social sciences.

Special services and studies

Systematic investigations carried out in order to provide information needed for planning or policy formulation. Demonstration projects are also included.

The work is usually carried out by specialized units in some government departments, by consultants, by royal commissions, and by task forces. The activity is similar to R&D since it may require innovative analyses and a high degree of scientific ability. However, such studies are not intended to acquire new knowledge but to provide specific answers to specific problems (generally immediate, localized and perhaps temporary). The day-to-day operations of units concerned with departmental planning, organization or management are not normally included (i.e. administrative records kept by departments of education) but special projects may be relevant.

Sub categories under 'Special services and studies' include:

- **Economic and feasibility studies**
  Investigations of the socio-economic characteristics and implications of specific situations. Such studies are generally limited to a specific problem and involve the application of established social science techniques and methodologies.

- **Operations and policy studies**
  The analysis and assessment of departmental programs, policies and operations, the activities of units concerned with the continuing analysis and monitoring of external phenomena (e.g., foreign economic statistics, defence and security information) as well as studies to provide an information base for policy development. The work is carried out by specialized units in some government departments, by consultants, by royal commissions and by task forces.

Education support

Grants to individuals or institutions on behalf of individuals which are intended to support the post-secondary education of students in technology and the social sciences. General purpose grants to educational institutions are excluded. The activity includes the support of foreign students in their studies of the social sciences at Canadian or foreign institutions. Grants intended primarily to support the research of individuals at universities are either R&D grants or research fellowships.