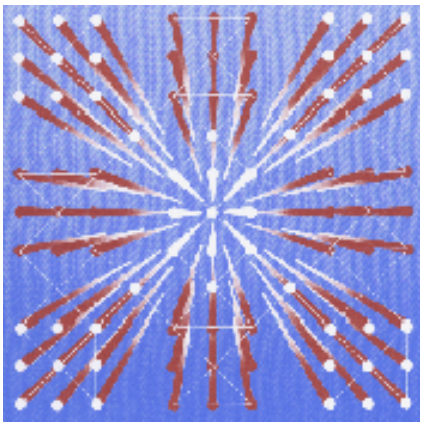
Catalogue no. 88-202-XIE

Industrial Research and Development

2004 intentions

(with 2003 preliminary estimates and 2002 actual expenditures)



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Statistics Canada
Science, Innovation and Electronic Information Division

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Note of appreciation

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

Symbols

The following standard symbols are used in Statistics Canada Publications:

. not available for any reference period

.. not available for a specific reference period

… not applicable

0 true zero or a value rounded to zero

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

^{p} preliminary figures

^{r} revised figures

x suppressed to meet confidentiality requirements of the Statistics Act

^{E} use with caution

F too unreliable to be published

Other symbols

^{i} spending intentions

NOTE

Due to rounding, components may not add to totals.

Foreword

Innovation is essential to economic progress. Properly applied in developing new products and services, innovation may also conserve resources, preserve the environment, and add to our quality of life. The innovation process involves a number of elements concerned with the generation, dissemination and application of new knowledge: research and development (R&D) to provide new ideas; education and information services to develop the required personnel; and design, engineering and marketing services to incorporate the new ideas into the production and distribution systems.

R&D statistics, therefore, measure only part of the effort necessary for innovation. However, R&D is at the heart of the innovation process.

While R&D is also carried out by other sectors, such as governments and universities, industrial R&D is most clearly linked to technological innovation and, hence, economic growth. Canada does not, of course, rely only on domestic R&D for new ideas and innovation. A great deal of information comes from abroad in the form of information embodied in new machinery and equipment, in the minds of scientists and engineers, in scientific and technical journals, and in designs, drawings, tooling and manufacturing specifications. Some data are presented on the acquisition of R&D from abroad, but much of the flow of technological information cannot be measured.

In many ways it is more efficient to acquire the results of R&D performed by others since the cost of securing such information is usually less than the cost of duplicating it. However, some indigenous R&D is necessary not only to ensure that new inventions are appropriate to Canadian manufacturing and marketing conditions, but also to ensure that foreign R&D can be properly assimilated, i.e., understood and adapted. It also provides Canadian firms with a better bargaining position for exchanges of technological information. Domestic performance of R&D is, therefore, necessary even if we wish only to be effective imitators and adapters.

Statistics Canada has collected data on R&D in Canadian industry for 48 years. Maintaining the continuity and comparability of these data over time is of considerable importance. This publication, the eighteenth issue of an annual series, summarizes industrial R&D activities in Canada. It presents historical and current statistical information on industrial research and development activities for the years 1963 to 2004. Actual data for 2002 expenditures, 2003 preliminary estimates, and 2004 spending intentions are derived from the survey “Research and Development in Canadian Industry” conducted in 2003.

In 1999 a new methodology was introduced for estimating R&D expenditure in the business sector in Canada. The new approach substitutes the use of administrative data from the Canada Revenue Agency (CRA), in place of survey data, for any firm funding or performing less than $1 million worth of R&D. This enabled the elimination of 8,008 questionnaire mailouts for the 2002 survey, thus substantially reducing the survey reporting burden.

Firms that perform or fund R&D in Canada may apply for a tax credit to the CRA under the Scientific Research and Experimental Development (SR&ED) program. Under the current regulations, the filing must take place within 18 months of the expenditure. Once the claims are submitted, they are processed and forwarded to Statistics Canada. This means that data can arrive up to two years after the expenditure was made.

In an effort to provide timely data on R&D activities, the release of the estimates relies mostly on data from the surveyed firms (those spending more than $1 million on R&D). Included in the estimates are all available data, including revisions for past years, that have been processed from the CRA records up to that point in time.

The use of CRA data results in a small understatement of total R&D activities for the most recent years reported and this is explained in the note on Methodology on page 39.

Enquiries should be directed to the Science, Innovation and Electronic Information Division. We are grateful to the responding firms who cooperated in this survey. We realize that the data requested are generally not readily available and require considerable effort to prepare. Any suggestions from these firms, or other users, for modifications to either the questionnaire or publication will be carefully considered.

This publication was written by Jason Leonard, Senior Statistical Officer – Private Sector, under the direction of Robert Schellings, Subject Matter Manager, Science and Innovation Surveys Section, Science, Innovation and Electronic Information Division.

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Highlights

- At 1.1% of Gross Domestic Product (GDP) in 2002, business enterprise expenditures on R&D (BERD) were similar to those of the middle rank OECD countries. Between 1991 and 2002, Canada's BERD/GDP ratio increased from 0.8% to 1.1%, ranking Canada third behind Sweden and Denmark for the largest 10 year increase in industrial R&D.

- The year 2004 marked a modest increase in research and development spending intentions following an unprecedented decline in 2002. It is worth noting that the increase is due to a rise in current expenditures and that capital expenditures are remaining virtually unchanged from the 2003 preliminary data.

- In 2003, the business enterprise sector continued to be the largest performing sector in Canada with 54% of all Canadian R&D, followed by Higher Education (35%) and the Federal Government (10%).

- While R&D spending decreases are expected across many industries, there are several industries projecting increases for 2003 and 2004. These increases result in a 2% growth in overall 2004 spending intentions over the 2003 preliminary figures. Notable industries reporting growth include: Semiconductor and other electronic components (+8%), Health care and social assistance (+7%), Pharmaceutical and medicine (+5%), and Machinery (+5%). The largest performing industry, Communication equipment, will remain relatively stable for 2003 and shows a slight decline (-1%) in 2004 spending intentions.

- The majority of R&D performed in Canada was done by a relatively small number of firms. In fact, out of the 8,892 companies that performed R&D in 2002, the top 75 accounted for more than 50% of the total R&D performed. When broken down by expenditure, only 39 companies spent more than $50 million, 80 more than $25 million and 326 more than $5 million.

- Quebec and Ontario remained the most heavily concentrated regions for R&D activity in 2002. Together they accounted for 78% of all R&D facilities and 84% of total intramural expenditures.

- The dominant industries in Quebec and Ontario continued to be Aerospace products & parts and Communications equipment respectively. 82% of the R&D in the Communications equipment industry was performed in Ontario, while Quebec's portion of R&D activity in Aerospace products & parts was 67%.

- R&D personnel in 2002 were heavily concentrated in seven industries: Communications equipment; Pharmaceutical and medicine; Computer system design and related services; Aerospace products and parts; Semiconductor and other electronic components; Information and cultural industries; and Scientific research and development services. These industries accounted for over half of the 100,750 person-years in 2002.

Chapters 1 to 4

1. R&D expenditures

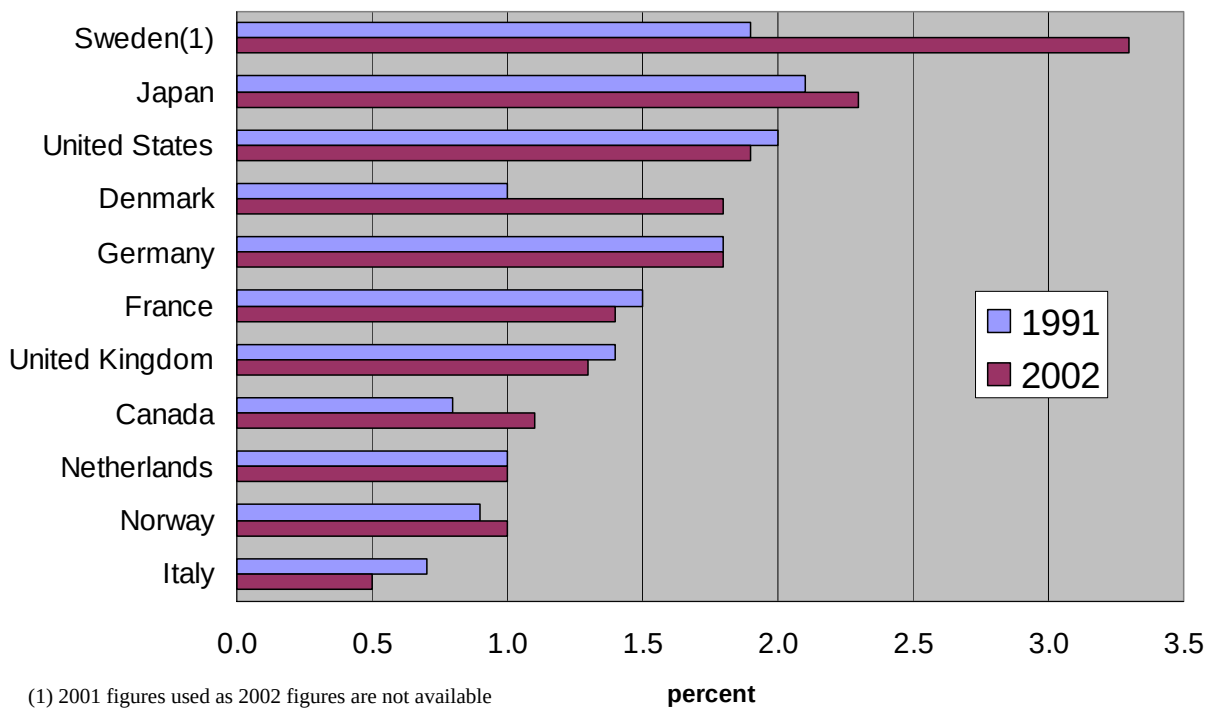
International comparisons

- Business enterprise expenditures on R&D (BERD) for 2002 have remained stable at 1.1% of Gross Domestic Product (GDP). Canada is in the "middle rank" of OECD member countries with BERD/GDP ratios similar to countries such as Norway and the Netherlands. Countries with the highest ranking BERD/GDP ratios continue to be Sweden, Japan, and the United States as shown in Table 1.1.

- Most countries, including Canada, have increased their industrial R&D effort over the last 10 years. While Sweden and Denmark have shown the largest increases, certain countries such as France, the United Kingdom, and Italy are currently at a lower level of BERD/GDP than a decade ago as demonstrated by Chart 1.1.

- Table 1.2 shows the current level of company-funded R&D in Canada and the United States over the last 5 years.

Chart – 1.1 BERD as a percent of GDP, by selected OECD countries, 1991 and 2002



(1) 2001 figures used as 2002 figures are not available

Source: OECD, Main Science and Technology Indicators No. 1, 2004

Table 1.1 International comparison of BERD, by selected OECD countries, 1998 to 2002

	BERD/GDP				
	1998[r]	1999[r]	2000[r]	2001[r]	2002[r]
	percent				
Sweden	..	2.7	..	3.3	..
Japan	2.1	2.1	2.1	2.3	2,3
United States	1.9	2.0	2.0	2.0	1,9
Denmark	1.3	1.4	..	1.7	1,8
Germany	1.6	1.7	1.8	1.8	1,8
France	1.4	1.4	1.4	1.4	1,4
United Kingdom	1.2	1.3	1.2	1.2	1,3
Canada	**1.1**	**1.1**	**1.2**	**1.2**	**1,1**
Netherlands	1.1	1.1	1.1	1.1	1,0
Norway	..	0.9	..	1.0	1,0
Italy	0.5	0.5	0.5	0.6	0,5

Source: OECD, Main Science and Technology Indicators No. 1, 2004

Table 1.2 Canada and United States company-funded R&D, 1998 to 2002

	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
United States[1]	145,016	160,288	180,421	181,606	174,408
Percentage change	**8.5**	**10.5**	**12.6**	**0.7**	**(4.0)**
Canada[2]	6,397	6,969	8,020	10,009	9,624
Percentage change	**4.4**	**8.9**	**15.1**	**24.8**	**(3.8)**

1. In millions of U.S. dollars.
2. In millions of Canadian dollars.
Source: National science foundation / SRS, survey of industrial research and development: 2002

Compared to GERD

- The largest performing sector in 2002 was business enterprises. This sector is expected to perform about 55% of all Canadian R&D, often referred to as GERD (gross domestic expenditures on research and development).

- Over the period 1981-2004, the business enterprise sector's participation (natural sciences and engineering only) in GERD has increased from 48% to 51% with the highest years (60%) occurring in 1997-1998 and 2000-2001. The federal government share has fallen by half, from 21% to 9%, while the higher education sector's participation grew from 27% to 38% over the same time period.

Table 1.3 GERD by performing sector, 1981 to 2004

Year	Federal government	Provincial governments	Business enterprises[1]	Higher education	Private non-profit organizations	Total
			percent			
1981	21	4	48	27	1	100
1982	21	4	48	26	1	100
1983	22	4	47	26	1	100
1984	22	3	48	26	1	100
1985	19	3	52	25	1	100
1986	19	3	53	24	1	100
1987	17	3	55	24	1	100
1988	16	3	51	30	1	100
1989	16	3	50	30	1	100
1990	16	3	50	30	1	100
1991	16	3	50	31	1	100
1992[e]	15	3	51	31	1	100
1993	14	2	53	30	1	100
1994	13	2	57	28	1	100
1995	13	2	58	27	1	100
1996	13	2	58	27	1	100
1997	12	1	60	27	1	100
1998	11	1	60	27	1	100
1999[r]	11	1	59	29	0[s]	100
2000[r]	10	1	60	28	0[s]	100
2001[r]	9	1	61	28	0[s]	100
2002[r]	10	1	55	33	0[s]	100
2003[p]	10	1	53	35	0[s]	100
2004[p]	9	1	51	38	0[s]	100

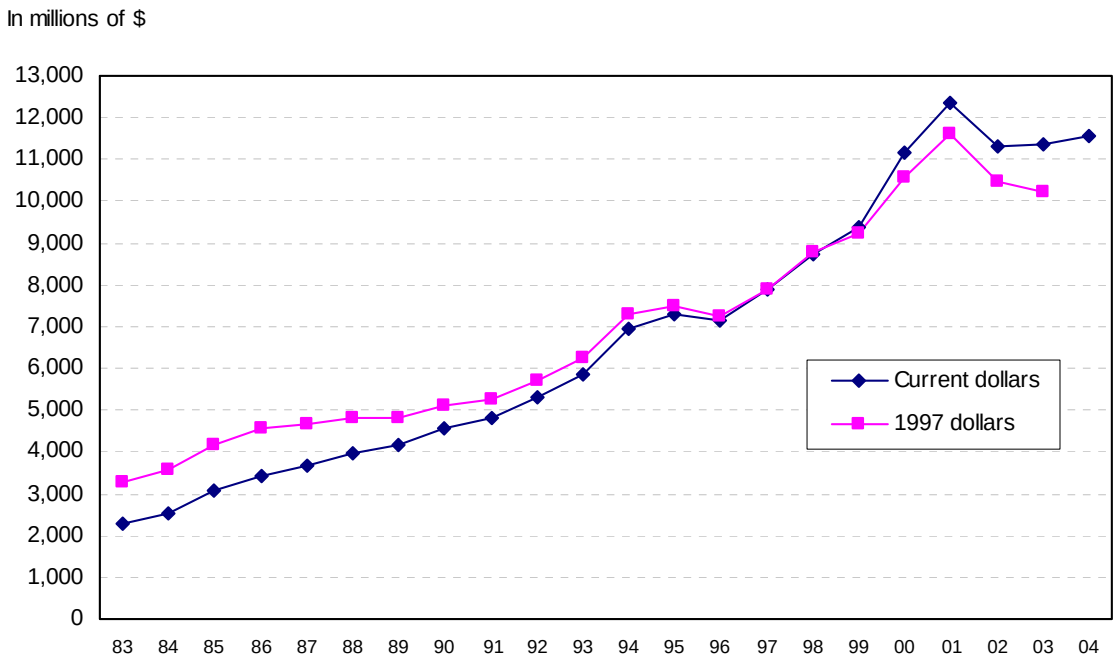
1. Excludes R&D in the social sciences and humanities
Source: appendix II, table 1.

Trends

- Industrial R&D activity is made up of current intramural expenditures and capital expenditures. Since individual companies do not regularly purchase land, buildings or major R&D equipment, capital expenditures can fluctuate considerably from year to year. Current intramural expenditures cover the costs of wages and salaries plus other current costs associated with workers who are usually permanent employees. This acts as a good indicator of a firm's commitment to R&D and therefore, analysis of trends in R&D activity will concentrate on current intramural expenditures.

- Table 1.4 shows that current intramural expenditures have grown steadily every year between 1981 and 2001 with the exception of a slight decline in 1996. The first significant decline in expenditures in more than 40 years of publishing these statistics occurred in 2002. Preliminary estimates for 2003 and spending intentions for 2004 indicate a slight recovery in current expenditures, although they are still below 2001 levels. Overall, the level of current intramural expenditure increased at an average annual rate of 8.2% from 1981 to 2003. However, when the expenditures are converted to 1997 constant dollars, the change in real terms is less than that. By using the implicit price index of the Gross Domestic Product, the annual compounded growth rate between 1981 and 2003 is 6.0%.

Chart - 1.2 Current intramural R&D expenditures, 1983 to 2004



Source: table 1.4

Table 1.4 Summary of industrial R&D expenditures, 1981 to 2004

Year	Current intramural expenditures (current dollars)	Capital expenditures (current dollars)	Total intramural expenditures (current dollars)	Current intramural expenditures (1997 dollars)	GDP Implicit price index (1997)[1]
			in millions of $		
1981	1,845	280	2,124	3,070	60.1
1982	2,151	337	2,489	3,305	65.1
1983	2,267	336	2,602	3,299	68.7
1984	2,540	482	3,022	3,583	70.9
1985	3,054	579	3,633	4,172	73.2
1986	3,447	575	4,022	4,572	75.4
1987	3,691	649	4,340	4,684	78.8
1988	3,980	643	4,623	4,831	82.4
1989	4,155	624	4,779	4,826	86.1
1990	4,541	628	5,169	5,108	88.9
1991	4,812	543	5,355	5,259	91.5
1992	5,286	457	5,742	5,702	92.7
1993	5,878	546	6,424	6,253	94.0
1994	6,938	629	7,567	7,296	95.1
1995	7,286	705	7,991	7,496	97.2
1996[r]	7,159	837	7,996	7,246	98.8
1997[r]	7,876	865	8,741	7,876	100.0
1998[r]	8,729	955	9,684	8,764	99.6
1999[r]	9,362	1,039	10,401	9,242	101.3
2000[r]	11,152	1,194	12,346	10,571	105.5
2001[r]	12,377	1,470	13,847	11,600	106.7
2002[p]	11,289	1,094	12,383	10,472	107.8
2003[p]	11,374	969	12,343	10,228	111.2
2004[i]	11,567	968	12,535	..	..

1. Source: CANSIM Table 380-0056

Concentration among companies

- Over half of the industrial R&D in Canada is performed by a relatively small number of companies. Although the degree of concentration is still high, it has decreased over the last 30 years. Out of 8,892 companies which reported performing R&D in 2002, 100 (or 1.1%) accounted for 59% of the total R&D performed (see Table 1.5). This is close to the lowest concentration in the last 30 years which occurred in 1994 and 1995 when the top 100 companies performed 58% of R&D for those years. The highest concentration occurred in 1978 and 1979 where 80% of all R&D was performed by only 100 companies.

- Even more notable is the concentration among the top 10 performing companies, who have averaged 33% of total intramural R&D over the twenty-four years covered in Table 5.1. Generally speaking, there is a trend towards less concentration among companies. Results for 2002 mark the first significant single year drop in the concentration of the top 10 companies since 1973. Preliminary figures for 2003 and 2004 indicate the top 10 companies will remain near this same level of concentration.

- When companies are grouped by NAICS 2002 (North American Industrial Classification System) code, there are generally few companies in each code (see Table 28). In this report, companies are grouped into 46 industries in order to maintain the confidentiality of individual returns. The concentration of R&D can have dramatic effects on expenditures. The decisions of a few companies can significantly alter overall R&D expenditures and particularly industry totals. Companies' R&D decisions are affected by government policies on defence, transportation and communications, as well as by national and international economic trends and their own financial positions.

Concentration among industries

- As a consequence of the concentration among companies, research and development expenditures are also concentrated within industry classifications.

- In 2002, the top five major industries represented $5,769 million or 47% of all intramural R&D. These industries – Communications equipment; Pharmaceutical and medicine; Computer system design and related services; Aerospace products and parts; and Semiconductor and other electronic components consistently dominate the industrial R&D sector over the six years as demonstrated by Table 1.6 and Chart 1.3. Significant changes for 2002 onward are noted in both the Communications equipment and the Pharmaceutical and medicine industries. While still the largest industry, Communications equipment has dropped from 23 to 16 percent of total intramural expenditures. Conversely, Pharmaceutical and medicine continues to grow with 2004 spending intentions showing 10 percent of total intramural expenditures, up from 6 percent in 1999.

Table 1.5 Concentration of industrial R&D among companies, 1981 to 2004

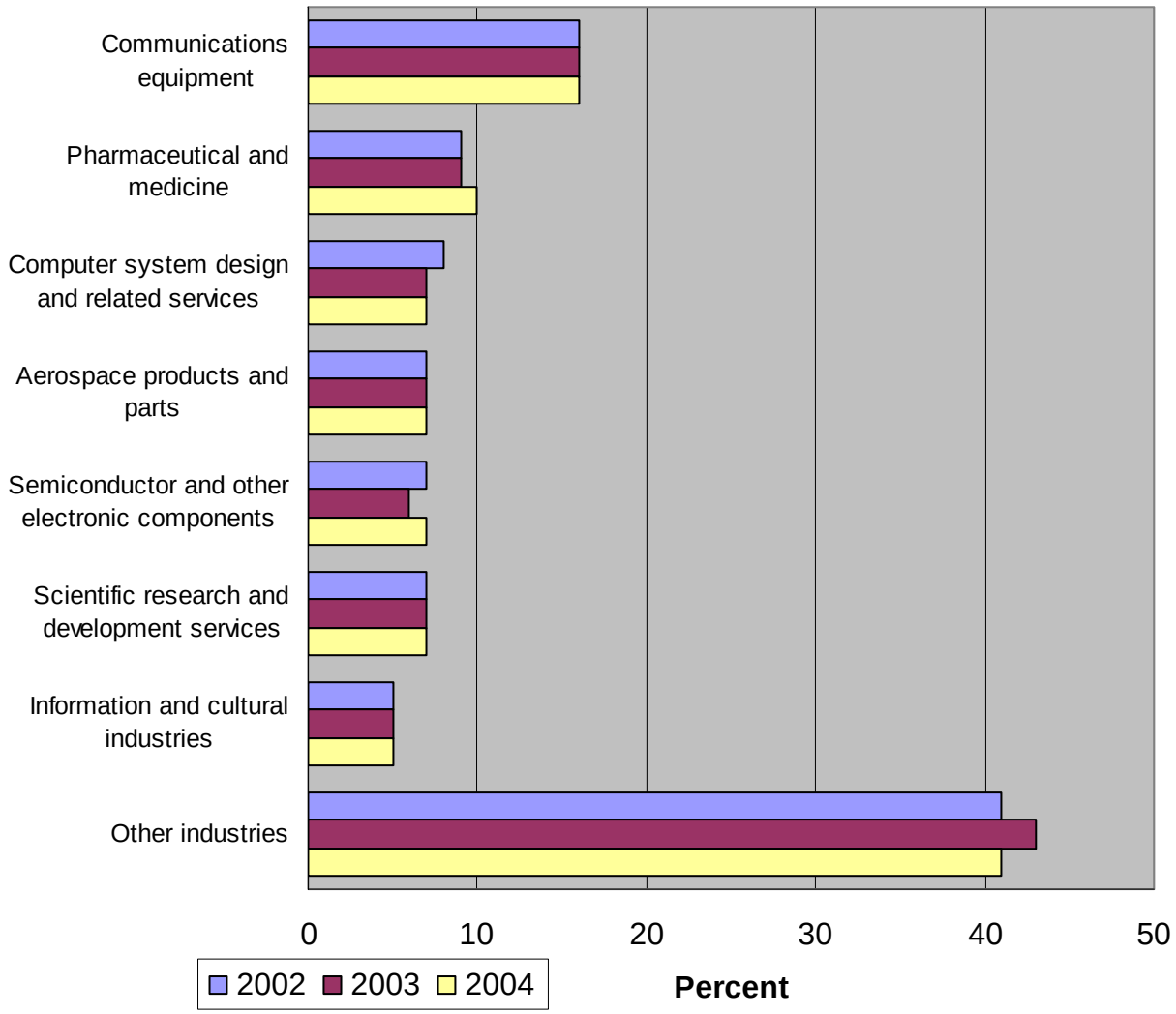
Year	Top 10	Top 25	Top 50	Top 75	Top 100	Total intramural expenditures
		percent of total intramural expenditures				in millions of $
1981	35	52	64	72	76	2,124
1982	35	51	63	71	75	2,489
1983	37	52	63	69	73	2,602
1984	36	51	61	68	73	3,022
1985	34	48	58	64	68	3,066
1986	33	47	57	63	67	4,022
1987	36	49	58	64	67	4,340
1988	35	49	59	64	68	4,623
1989	34	48	59	64	68	4,779
1990	34	47	58	64	68	5,169
1991[r]	34	47	57	63	67	5,355
1992	32	45	55	60	64	5,742
1993	30	43	54	60	64	6,424
1994	28	39	49	54	58	7,567
1995	30	39	48	54	58	7,991
1996[r]	31	41	50	56	61	7,996
1997[r]	34	44	53	59	63	8,741
1998[r]	36	46	55	60	64	9,684
1999[r]	34	44	54	59	63	10,401
2000[r]	37	46	54	59	63	12,346
2001[r]	33	42	50	56	60	13,847
2002[p]	26	37	48	54	59	12,383
2003[p]	27	38	48	55	60	12,343
2004[i]	27	37	48	55	60	12,535

Table 1.6 Concentration of industrial R&D among industries, 1999 to 2004

Selected industries	1999[r]	2000[r]	2001[r]	2002[p]	2003[p]	2004[i]
			percent of total intramural expenditures			
Communications equipment	22	26	23	16	16	16
Pharmaceutical and medicine	6	6	6	9	9	10
Computer system design and related services	6	6	8	8	7	7
Aerospace products and parts	11	7	7	7	7	7
Semiconductor and other electronic components	6	7	6	7	6	7
Scientific research and development services	3	3	5	7	7	7
Information and cultural industries	3	3	4	5	5	5
Other industries	43	42	41	41	43	41
			in millions of $			
Total expenditures, all industries	**10,401**	**12,346**	**13,847**	**12,383**	**12,343**	**12,535**

Source: appendix II, table 3.

Chart - 1.3 Estimated relative R&D spending for selected industries as a share of total R&D spending, 2002 to 2004



Source: table 1.6.

By company size

- The amount that a company can afford to spend on research and development is, up to a point, dependent on its size. Company size can be defined in several ways. The two most common comparison variables are company revenue and number of employees.

- On average, companies with higher revenue figures also show higher R&D expenditures. As shown in Table 1.7, the average total intramural R&D expenditure of companies with revenues greater than $400 million was $38.8 million in 2002. This category included only 148 (or 1.7%) of all firms reporting R&D in the year. At the other end of the spectrum companies with less than $1 million in revenues spent an average of $0.2 million on intramural R&D in 2002. This category represents 3,892 (or 43.8%) of all reporting firms. However, as shown later in table 1.12, smaller companies spend proportionately more on R&D compared to their revenues.

- Average R&D expenditures show comparable increases as employment size rises. As shown in Table 1.8, companies with more than 5,000 employees had an average total intramural R&D expenditure of $86.3 million for 2002. For smaller companies, this number steadily declines as the employment size decreases.

Table 1.7 Average total intramural R&D expenditures, by revenue size, 2002

Revenue size	Number of firms	Expenditures	Average expenditures
	number	in millions of $	in millions of $
Non-commercial firms	18	163	9.1
< $ 1,000,000	3,892	857	0.2
$ 1,000,000 - 9,999,999	3,485	1,628	0.5
$ 10,000,000 - 49,999,999	961	1,486	1.5
$ 50,000,000 - 99,999,999	194	911	4.7
$ 100,000,000 - 399,999,999	194	1,594	8.2
> $ 399,999,999	148	5,744	38.8
Total	**8,892**	**12,383**	**1.4**

Table 1.8 Average total intramural R&D expenditures, by employment size, 2002

Employment size	Number of firms	Expenditures	Average expenditures
	number	in millions of $	in millions of $
Non-commercial firms	18	163	9.1
1 - 49	6,959	1,489	0.2
50 - 99	811	1,042	1.3
100 - 199	509	1,109	2.2
200 - 499	307	1,201	3.9
500 - 999	114	1,165	10.2
1 000 – 1 999	88	1,815	20.6
2 000 – 4 999	48	1,120	23.3
> 4 999	38	3,279	86.3
Total	**8,892**	**12,383**	**1.4**

By country of control of performers

- The existence, size and nature of an R&D program in a company may be affected by who controls the company and the links which may exist with affiliated firms.

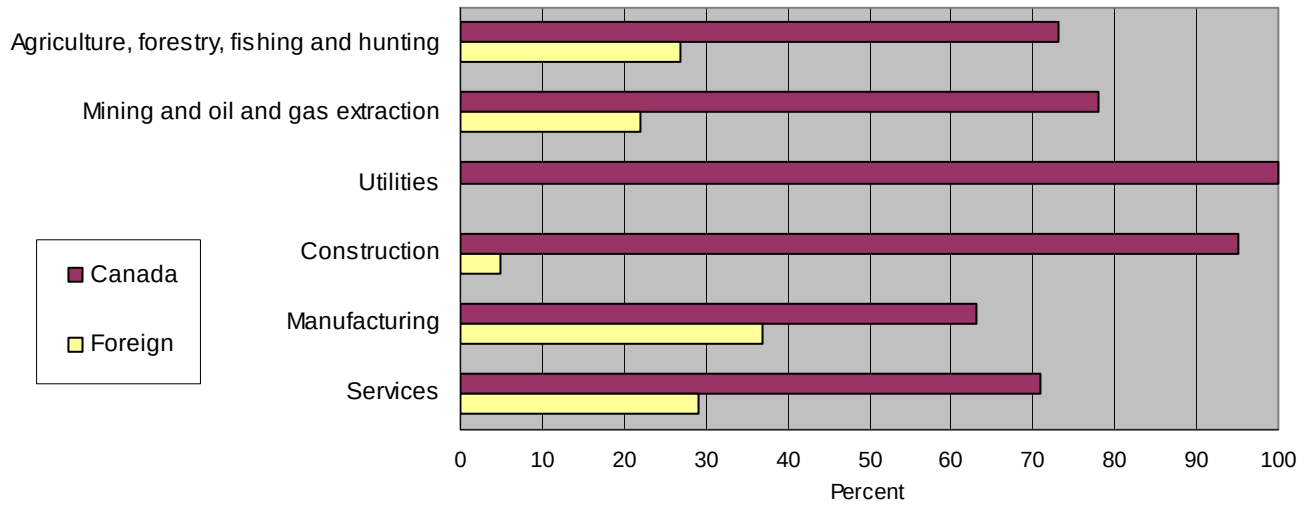
- In 2002, there were 368 foreign controlled firms out of a total 8,892 firms that performed R&D in Canada. Generally speaking, foreign companies are larger than Canadian ones and therefore also spend more on R&D. Although foreign controlled firms only represented 4% of all the firms performing R&D in Canada, their combined expenditures equalled $4,171 million or 34% of total intramural R&D for 2002.

- Although the percent of total intramural R&D performed by Canadian controlled firms has remained relatively stable over the past several years, preliminary data for 2002 indicate a slight drop (see Table 1.9). In terms of total R&D expenditures, the Manufacturing industry group is by far the largest group. However, it has the lowest concentration (63% of total intramural R&D) of Canadian controlled firms of all the industry sectors for 2002. The manufacturing sector is dominated by the following industries: Communications equipment; Pharmaceutical and medicine; Computer system design and related services; and Aerospace products and parts.

Table 1.9 Intramural R&D expenditures of Canadian-controlled companies compared to industry totals, by industry group, 1998 to 2002

Industry groups	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			percent		
Agriculture, forestry, fishing and hunting	62	62	65	72	73
Mining and oil and gas extraction	53	67	80	70	78
Utilities	100	100	100	100	100
Construction	71	81	74	88	95
Manufacturing	65	67	69	68	63
Services	68	69	72	74	71
Total	**67**	**68**	**71**	**70**	**66**

Chart - 1.4 Distribution of intramural R&D expenditures, by country of control of performers and by industry group, 2002



Source: table 1.9

By size of R&D program

- The proportion of R&D activities performed by the “large” performers, i.e., those with R&D expenditures of $1 million or more, has increased from 1998 to 2002. This group represented 87 of total intramural R&D expenditures in 1998 and has grown to 90% in 2002. (Table 1.10) There were 764 and 1,013 companies in this group for 1998 and 2002 respectively.

- Table 1.11 reviews the sources of funds for intramural R&D in accordance with the size of R&D expenditures in each company. As in prior years, the 2001 results indicate that the larger R&D performers obtained a greater proportion of their funding from foreign sources than did the smaller R&D performers. While companies performing less than $1 million tended to be mostly self-funded, the larger performers received approximately 16% of their funding from foreign sources.

Table 1.10 Total intramural R&D expenditures, by size of R&D program, 1998 to 2002

R&D size[1]	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			in millions of $		
< $ 50,000	100	98	100	102	76
$ 50,000 - 99,999	142	140	163	167	126
$ 100,000 - 199,999	239	249	286	294	225
$ 200,000 - 399,999	294	348	387	406	290
$ 400,000 - 999,999	467	516	607	668	529
> $ 999,999	8,442	9,051	10,805	12,209	11,137
Total	**9,684**	**10,401**	**12,346**	**13,847**	**12,383**

1. R&D size is based on current intramural expenditures

Table 1.11 Sources of funds for intramural R&D, by size of R&D program, 2002

R&D size[1]	Performing company	Federal government	Provincial governments	Other Canadian sources	Foreign sources	Total
			percent			
< $ 50,000	96	1	0	2	1	100
$ 50,000 - 99,999	97	1	0	1	0	100
$ 100,000 - 199,999	95	2	0	2	1	100
$ 200,000 - 399,999	93	2	0	2	2	100
$ 400,000 - 999,999	92	2	1	3	3	100
> $ 999,999	76	2	0	6	16	100
Total	**78**	**2**	**0[s]**	**5**	**14**	**100**

1. R&D size is based on current intramural expenditures

Compared to performing company revenues

- The proportion of current intramural R&D expenditures to company revenues increased from 1.6% in 1998 to 2.2% in 2002. (Table 1.12) It is apparent that the proportion of R&D expenditures to revenues decreases as R&D performers get larger. The largest companies by revenue size, those with revenue over $400 million, have had R&D/revenue ratios of less than 2% for the last five years.

- Among the major R&D performing industries, large changes in the ratio of R&D expenditures to revenues is sometimes evident (see Appendix II, Table 12). For the most part, these large fluctuations are explained by the use of administrative data and the inherent under coverage issues related to this type of methodology. Further details on the use of administrative data are given in the note on Methodology on page 39.

- Table 1.13 demonstrates that Canadian controlled firms had a slightly higher R&D/revenue ratio than foreign controlled firms. Ratios for both categories were higher in 2002 than they were in 1998.

Table 1.12 Current intramural R&D expenditures as a percent of company revenues, by company revenue size, 1998 to 2002

Revenue size	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			percent		
< $ 1,000,000	33.9	42.0	64.0	49.8	61.3
$ 1,000,000 - 9,999,999	7.4	8.3	8.7	10.8	12.3
$ 10,000,000 - 49,999,999	3.9	4.5	4.2	5.1	6.5
$ 50,000,000 - 99,999,999	3.0	3.3	3.5	3.7	6.0
$ 100,000,000 - 399,999,999	2.1	2.3	2.3	2.9	3.8
> $ 399,999,999	1.0	1.1	1.2	1.4	1.3
Total	**1.6**	**1.7**	**1.9**	**2.2**	**2.2**

Table 1.13 Current intramural R&D expenditures as a percent of company revenues, by country of control, 1998 to 2002

Country of control	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			percent		
Canada	1.7	2.0	2.3	2.6	2.6
Foreign	1.3	1.3	1.4	1.6	1.7
Total	**1.6**	**1.7**	**1.9**	**2.2**	**2.2**

By sources of funds

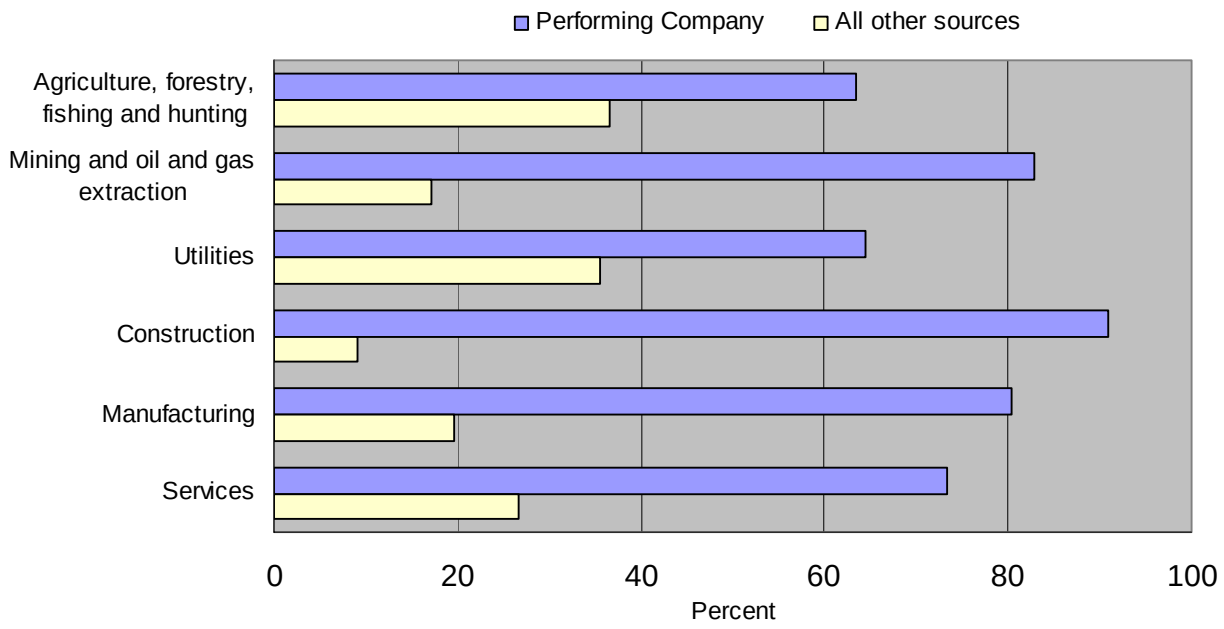
- Table 1.14 shows the proportion of intramural R&D expenditures supplied by different funders from 1998 to 2002. The most significant source of funds continues to be the performing companies themselves, with 2002 results demonstrating the highest level (78%) of self-funding in the last five years. A breakdown by major industry groups is shown in Chart 1.5 below. If you examine individual industries, (see Appendix II, Table 20) the percentage of funds originating from the performing company varies between 31% and 100%.

- The second largest source of funds for industrial R&D is still foreign sources, which financed 14% of the total intramural R&D in 2002, down from 20% in 2001. More than 77% of these funds came from related companies and about 20% from foreign companies providing R&D contracts.

- The federal government provided 2% of total intramural R&D funding in 2002. As with the self funding, individual industries vary widely in percentage of government funding. For example, the Aerospace products and parts industry received 18% of its R&D funds from the federal government while the Wholesale trade industry received only 0.2%. Taxes foregone as a result of income tax incentives for R&D are not considered direct government support and are not attributed to the federal government.

- The remaining 6% of R&D expenditures was provided by other Canadian sources including: parent, affiliated and subsidiary companies, provincial governments, contracts from other Canadian companies, and Canadian universities.

Chart - 1.5 Sources of funds for intramural R&D, by industry group, 2002



Source: appendix II, table 20

Table 1.14 Sources of funds for intramural R&D, 1998 to 2002

Sources	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			percent		
Canadian:					
Performing firm	66	67	65	72	78
Federal government	3	3	2	3	2
Provincial governments	1	1	0	0	0
Other	5	4	4	4	5
Sub-total	*74*	*75*	*71*	*80*	*86*
Foreign	**26**	**25**	**29**	**20**	**14**
Total	**100**	**100**	**100**	**100**	**100**

Source: appendix II, table 20

By province

- Research and Development establishments are the smallest entity primarily organized for R&D, i.e., with their own budgets and staff. Most companies perform their R&D in only one province; however, there are some with R&D establishments located in several provinces. Table 1.15 gives a provincial distribution of R&D establishments and their corresponding intramural R&D expenditures.

- As shown in the above mentioned table, R&D establishments are heavily concentrated in Ontario and Quebec, with 78% of all R&D establishments being located in these two provinces. These 7,177 establishments accounted for $10.4 billion or 84% of the total intramural R&D expenditures in Canada in 2002. The majority of the remaining establishments were in the western provinces of British Columbia and Alberta which totaled $1.7 billion or 14% of total intramural expenditures. All other provinces had a minor share of the total industrial R&D for 2002.

- Table 1.16 shows the distribution of intramural R&D for the dominant provinces of Quebec and Ontario, for selected industries in 2002. Ontario represents about 53% of all R&D activity in Canada, with the largest concentration being in the Communications equipment industry. This industry performed 82% of its R&D activities in Ontario. Quebec represents 29% of total Canadian industrial R&D and is most concentrated in the Aerospace products and parts industry, which conducts 67% of its R&D in this province.

Table 1.15 Provincial distribution of intramural R&D expenditures, 2002

Region	R&D units	Current expenditures	Capital expenditures	Total expenditures
	number		in millions of $	
Newfoundland and Labrador	39	16	0	17
Prince Edward Island	16	4	0	4
Nova Scotia	135	62	3	65
New Brunswick	108	30	2	32
Quebec	4,136	3,546	283	3,828
Ontario	3,041	5,953	575	6,528
Manitoba	220	132	7	138
Saskatchewan	111	78	18	97
Alberta	597	612	83	694
British Columbia	844	856	123	979
Yukon, Northwest Territories and Nunavut	2	0	0	0
Total	**9,249**	**11,289**	**1,094**	**12,383**

Source: appendix II, tables 8 and 9

Table 1.16 Distribution of intramural R&D expenditures for Quebec and Ontario, for selected industries, 2002

Selected industries	Quebec	Ontario	Other provinces	Canada
		in millions of $		
Communications equipment	236	1,640	112	1,988
Pharmaceutical and medicine	389	498	213	1,101
Computer system design and related services	217	542	173	932
Aerospace products and parts	606	285	9	900
Semiconductor and other electronic components	106	662	81	848
Scientific research and development services	227	362	227	816
Information and cultural industries	161	357	104	622
Other industries	1,887	2,183	1,105	5,175
Total	**3,828**	**6,528**	**2,026**	**12,383**

Source: appendix II, tables 10 and 11

2. Energy R&D expenditures

- According to Table 2.1 below, 2% of R&D performing firms have reported energy R&D expenditures for 2002. This figure is consistent with results from last year. When broken down by main industry group, the Mining and oil and gas extraction industry group represents the highest proportion of energy R&D performers to total R&D performers at 23%. However, the Manufacturing industry group performs over three quarters of all the energy R&D activities (see Table 2.2) due to the large number of performers in this group. The energy R&D performing firms spent $721 million, or 5.8% of all industrial R&D on energy research and development in 2002. In addition, these same companies performed $704 million in non-energy areas for total intramural expenditures of $1,425 million, or approximately 12% of total R&D for 2002. This is up slightly from the previous year.

- Table 2.3, sources of funds for energy R&D by area of technology, indicates that 75% of the energy R&D is funded by the performing companies themselves. Although the government funded only 6% of total energy R&D, certain technology areas received the majority of this funding. Renewable resources received 10% of its overall funding from the government and Nuclear energy R&D received 19% of their total funding from government sources in 2002.

- For the second year in a row, the area of technology with the largest amount of energy R&D is Fossil Fuels, which represented 29% of all intramural energy R&D expenditures in 2002.

Table 2.1 Number of energy R&D performers, by major industry group, 2002

Major industry groups	Energy R&D performers	Total R&D performers
	number	
Mining and oil and gas extraction	13	56
Manufacturing	69	3,781
Other	75	5,055
Total	**157**	**8,892**

Table 2.2 R&D expenditures of energy R&D performers, by major industry group, 2002

Major industry groups	Energy R&D performers			Non-energy R&D performers	Total
	Energy R&D expenditures	Other R&D expenditures	Total		
	in millions of $				
Mining and oil and gas extraction	135	3	138	55	193
Manufacturing	397	680	1,077	6,571	7,648
Other	189	21	210	4,332	4,542
Total	**721**	**704**	**1,425**	**10,958**	**12,383**

Table 2.3 Energy R&D expenditures, by area of technology and by source of funds, 2002

Area of technology	Intramural R&D expenditures				Payments outside Canada	Total
	Self-funded	Government funded	Other sources	Sub-total		
	in millions of $					
Renewable resources	72	10	13	95	0	95
Transportation and transmission	74	0	11	85	4	89
Conservation	109	3	9	120	0	121
Fossil fuels	163	0	46	209	27	237
Nuclear	48	19	28	95	0	95
Other	76	9	0	86	27	113
Total	**542**	**41**	**137**	**721**	**56**	**779**

3. R&D personnel

It is generally easier to get satisfactory data on R&D expenditures than on personnel engaged in R&D, mainly because of more extensive financial accounting. Although data on personnel are collected with data on expenditures, the latter are believed to be more reliable. However, because the personnel data may be compared to expenditures and especially to wages and salaries, personnel statistics should be at least a good approximation. It should be noted that prior to 1982, personnel data for all companies performing R&D are available for odd years only.

By industry of employer

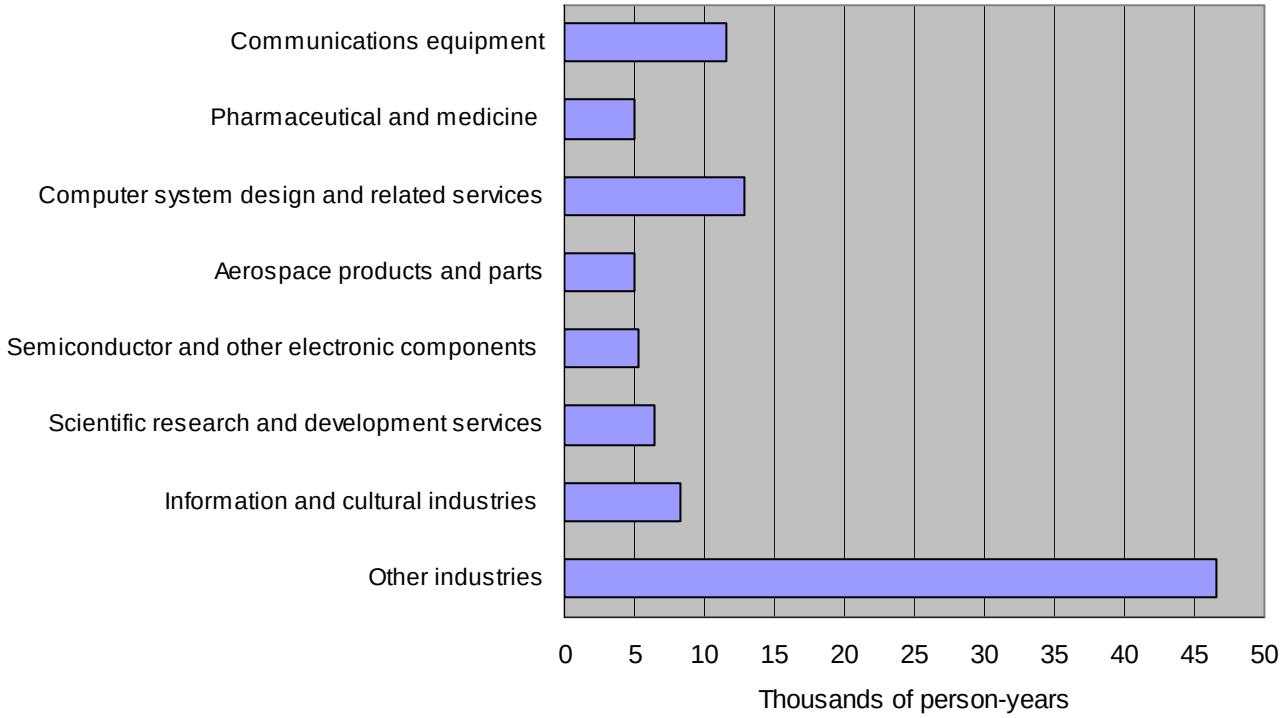
- According to Table 3.1, in 2002 54% of all industrial R&D personnel are concentrated in the seven major R&D industries – Communications equipment; Pharmaceutical and medicine; Computer system design and related services; Aerospace products and parts; Semiconductor and other electronic components; Scientific research and development services; and Information and cultural industries. Chart 3.1 demonstrates the relatively high concentration of R&D personnel in both the Communication equipment and the Computer system design and related services industries.

Table 3.1 Number of persons engaged in R&D, by selected industries, 1998 to 2002

Selected industries	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			percent of total R&D personnel		
Communications equipment	16	15	14	13	11
Pharmaceutical and medicine	3	3	4	4	5
Computer system design and related services	10	11	13	14	13
Aerospace products and parts	6	6	6	5	5
Semiconductor and other electronic components	5	5	5	5	5
Scientific research and development services	3	3	4	5	6
Information and cultural industries	4	4	5	6	8
Other industries	52	52	50	48	46
			person-years		
Total	**85,985**	**90,887**	**104,031**	**111,669**	**100,750**

Source: appendix II, table 23

Chart - 3.1 R&D personnel, by selected industries, 2002



Source: table 3.5

By occupational category

- The preliminary R&D personnel data for 2002 has 2,545 fewer firms than the revised 2001 numbers and thus data are understated. This is the result of the revised survey methodology as explained in Appendix 1. The 2001 revised R&D personnel increased by 11% in comparison to the previously released 2001 data.

- Table 3.2 shows the number of persons engaged in R&D by occupational category. The proportion of professionals (scientists and engineers) engaged in R&D was 63% of total R&D personnel in 2002. This has remained relatively stable over the five years shown. Similarly, the proportions of technicians and other personnel to total R&D personnel (25% and 12% respectively) have remained stable over the period 1998 to 2002.

- Table 3.3 shows a breakdown of the professional category of R&D personnel into the three degree levels: bachelors, masters, and doctorates. Similar to the breakdown by category, there is relative stability in the proportion of personnel by degree level. In 2002, 81% of professional personnel had a bachelor's degree, 13% a master's and 6% a doctorate. Chart 3.2 illustrates the values of both Table 3.2 and 3.3 for the year 2002.

Table 3.2 Number of persons engaged in R&D, by occupational category, 1998 to 2002

Occupation	1998[r]	1999[r]	2000[r]	2001[r]	2002[p]
			person-years		
Professionals	54,717	58,023	67,162	71,362	63,605
Technicians	22,019	22,827	26,680	28,645	25,518
Other	9,249	10,037	10,189	11,662	11,627
Total	**85,985**	**90, 887**	**104,031**	**111,669**	**100,750**

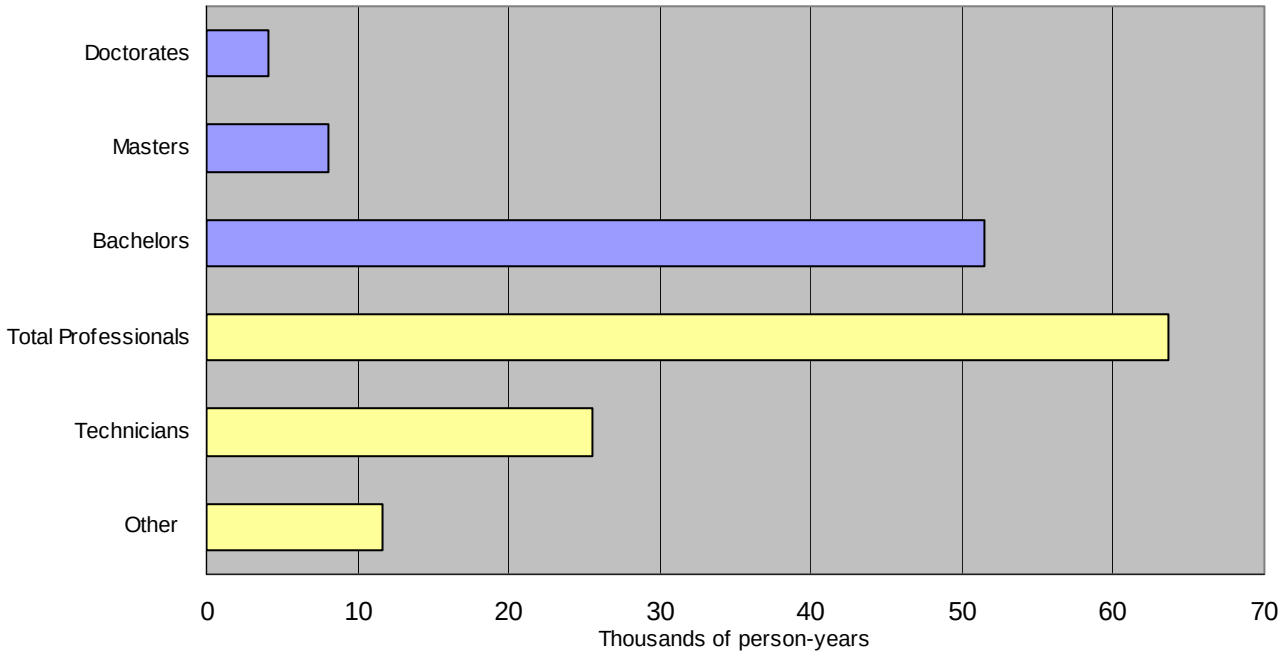
Source: appendix II, table 23

Table 3.3 Professional personnel engaged in R&D, by degree level, 2000 to 2002

Year	Bachelors	Masters	Doctorates	Total
		person-years		
2000[r]	55,014	8,147	4,001	67,162
2001[r]	58,972	8,276	4,114	71,362
2002[p]	51,489	8,068	4,048	63,605

Source: appendix II, Table 24

Chart - 3.2 R&D personnel, by occupational category and by degree level, 2002



Source: tables 3.2 and 3.3

By province

- Table 3.4 gives a provincial distribution of R&D establishments and their personnel engaged in R&D. As mentioned earlier, R&D establishments are the smallest entity primarily organized for R&D, i.e., with their own budgets and staff. Most companies perform their R&D in one province, but there are some with R&D establishments located in more than one province.

- According to this table, these R&D establishments are heavily concentrated in Quebec and Ontario, with 78% of R&D establishments being located in these two provinces. They account for 84% of the total personnel engaged in R&D for 2002. Most of the remaining establishments are in Alberta and British Columbia; 13% of the total R&D personnel are allocated to these two provinces. All other provinces have a minor share of the total personnel engaged in R&D.

- About 48% of all R&D personnel are located in the province of Ontario. As shown in Table 3.5, the dominant position of this province is particularly apparent in the Communication equipment industry: 79% of this industry's R&D personnel are located there. The province of Quebec on the other hand, is predominant in the Aerospace products and parts industry with 73% of the industry's R&D personnel.

Table 3.4 Provincial distribution of R&D personnel, by occupational category, 2002

Region	R&D establishments	Professionals	Other personnel	Total
	number	person-years		
Newfoundland and Labrador	39	140	75	215
Prince Edward Island	16	44	23	67
Nova Scotia	135	380	296	676
New Brunswick	108	264	247	511
Quebec	4,136	20,740	15,484	36,224
Ontario	3,041	32,911	15,119	48,030
Manitoba	220	628	541	1,169
Saskatchewan	111	399	421	820
Alberta	597	2,999	1,793	4,792
British Columbia	844	5,100	3,145	8,245
Yukon, Northwest Territories and Nunavut	2	0	1	1
Total	**9,249**	**63,605**	**37,145**	**100,750**

Source: appendix II, table 25

Table 3.5 Distribution of R&D personnel for Quebec and Ontario, by selected industries, 2002

Selected industries	Quebec	Ontario	Other Provinces	Canada
		person-years		
Communications equipment	1,632	9,125	751	11,508
Pharmaceutical and medicine	1,713	2,474	805	4,992
Computer system design and related services	4,064	6,599	2,173	12,836
Aerospace products and parts	3,651	1,292	38	4,981
Semiconductor and other electronic components	1,069	3,619	537	5,225
Scientific research and development services	2,460	2,117	1,858	6,435
Information and cultural industries	2,853	3,798	1,576	8,227
Other industries	18,782	19,006	8,758	46,546
Total	**36,224**	**48,030**	**16,496**	**100,750**

4. Payments for technological services

- The technological balance of payments (TBP) may be described as the summary of all transactions relating to the purchase and sale of technological services, information and rights which are recorded in a country's balance of payments. It is an indicator of the flow of proprietary technology into or from a country. Unfortunately, the operations associated with the transfer are not always recorded in the balance of payments statistics and the indicator can only be approximate.

- The statistics in Tables 4.1 and 4.2 are acquired through the survey of industrial R&D rather than from balance of payments surveys. The payments and receipts for technology, other than R&D, are therefore incomplete, since data from firms not included in the R&D survey are not available.

- In the survey of industrial R&D, respondents are reminded that payments should be recorded as R&D performed by others if they pay while the R&D is being carried out. The normal case is a levy to support a central R&D facility located abroad or a Canadian parent's support of the R&D of a foreign subsidiary. Payments for other technology may include reimbursement for R&D carried out in the past.

- For any industrialized country, there will be technology inflows and outflows. Some, such as the United States, have a net outflow of technology and hence receipts exceed payments. Other countries import more technology than they export. From Table 4.1 it is apparent that since the early 1980's, more money has been provided by foreigners for R&D performed by Canadian firms than has been paid out. In 2002, Canada continued to show a net outflow of technology ($774 million), although this has dropped by about half the amount reported in 2001.

- Table 4.2 shows that there are differences in the balance of technological services by industry. For 2002, industries such as Mining and oil and gas extraction, Petroleum and coal products, and Chemical products were all net importers of technology. On the other hand, industries such as Computer and peripheral equipment, and Communications equipment were net exporters, or had a net outflow of technology for the same year. The larger dollar amounts found in the latter industries help to contribute to the overall net outflow of technology for Canada.

Table 4.1 Foreign payments made and received for technological services[1], 1963 to 2002

Year	Payments		Receipts		Balance		
	R&D	Other	R&D	Other	R&D	Other	Total
			in millions of $				
1963	29	21	7	2	-22	-19	-41
1965	28	28	26	3	-2	-25	-27
1967	35	42	17	3	-18	-39	-57
1969	39	62	20	2	-19	-60	-79
1971	52	58	25	6	-27	-52	-79
1973	61	90	31	5	-30	-85	-115
1975	75	119	45	9	-30	-110	-140
1977	104	154	57	10	-47	-144	-191
1979	138	213	73	21	-65	-192	-257
1981	189	310	158	30	-31	-280	-311
1983	194	390	431	28	237	-362	-125
1985	258	493	518	27	260	-486	-206
1987	309	476	739	33	430	-443	-13
1988	359	502	840	53	481	-449	32
1989	441	490	819	66	378	-424	-46
1990	455	533	923	65	468	-468	0
1991	559	504	988	75	429	-429	0
1992	492	537	1,019	87	527	-450	77
1993	564	561	1,134	140	570	-421	149
1994	621	630	1,466	161	845	-469	376
1995	728	655	1,555	206	827	-449	378
1996[r]	760	637	1,662	242	902	-395	507
1997	912	698	1,720	184	838	-514	324
1998[r]	1,045	694	2,499	296	1,454	-398	1,056
1999	1,490	523	2,642	320	1,152	-203	949
2000[r]	1,375	523	3,547	339	2,172	-184	1,988
2001[r]	1,310	315	2,816	390	1,506	75	1,581
2002[p]	699	747	1,782	438	1,083	-309	774

1. Effective 1997, data is only for firms engaged in R&D over $1 million.

Table 4.2 Foreign payments made and received for technological services (R&D and other), by selected industries[1], 2002

Selected industries	Payments	Receipts	Balance
		in millions of $	
Mining and oil and gas extraction	32	2	-29
Petroleum and coal products	59	13	-46
Chemical products	109	93	-16
Computer and peripheral equipment	1	26	25
Communications equipment	16	126	110
All other manufacturing industries	819	1,043	224
Total manufacturing	**1,003**	**1,300**	**297**
Other industries	411	918	508
Total	**1,446**	**2,221**	**775**

1. Effective 1997, data is only for firms engaged in R&D over $1 million.

Appendix I

Survey methodology and reliability of the data

Survey methodology

The survey

Data on R&D in the business enterprise sector, covering commercially oriented enterprises (privately or publically owned), industrial non-profit organizations and trade associations, have been collected since 1955. Until 1969, the survey was biennial. From 1970 to 1981, all known performers or funders of industrial R&D were surveyed for odd-numbered years and a sample, including the leading performers, were surveyed for even-numbered years. From 1982 to 1991, a full survey was conducted annually.

Because of reductions in the science and technology program, for the 1992 and 1994 reference years, only the top 100 R&D performers (accounting for 64% of all industrial R&D), were surveyed. However, as a result of a cost-sharing agreement with the province of Quebec, the 1992 and 1994 industrial R&D survey results also included small firms having R&D activities in the province of Quebec.

Prior to 1997, Statistics Canada surveyed all companies that performed or funded R&D in Canada. Those spending a million dollars or more received a detailed questionnaire (the long form) and those spending less received a simpler questionnaire (the short form). Virtually all of these companies also provided information to Canada Revenue Agency (CRA) in order to claim tax benefits under the Scientific Research and Experimental Development (SR&ED) program. For the survey year 1996, Statistics Canada stopped surveying the small performers and funders of R&D in Canada, with the exception of Quebec, to reduce the reporting burden on companies and it replaced the data previously gathered by the survey by administrative data from CRA. The change was made for Quebec in 1997.

While this initiative reduced reporting burden, it resulted in a small understatement of the total value of intramural expenditure and of the total number of R&D personnel for the most recent years reported. The figures are revised each year and any understatement is eliminated in subsequent years.

The reason for the understatement is the different time for the collection of the survey and the administrative data. The survey collects data on four years, and it does so every year. The four years are: the previous year, for which the data are expected to be final; the actual survey year, for which the data are expected to be close to final; the year in which the questionnaire is mailed, for which the data are planned expenditures; and the next year, for which the data are a forecast of spending intentions. CRA collects data only on actual expenditures and it allows 18 months for the submission. This means that when survey data are ready for publication, not all of the CRA data for that year will have been received. Experience since 1997 shows that this amounts to an understatement of between 5-7% of the total value of expenditures. The figures for 2002 are published as actual expenditures in 2004, along with the preliminary figures for 2003 and the spending intentions for 2004. However, the figures for 2002 will be revised when they are published again in 2005 and 2006 to take this understatement into account. A similar understatement of 11% occurs in the personnel data.

The data for 2002 also influence the totals for the years 2003 and 2004. For these years, the survey data, which account for 90% of the total, are combined with data estimates for firms spending less than a million dollars on R&D. These estimates are arrived at by determining the change in the survey data from the current survey year (2002) and the two subsequent years (2003 and 2004). The same ratios are then applied to the current administrative data (2002) to derive estimates of the contribution of the small R&D performers for 2003 and 2004.

Trends in R&D spending are important economic signals and the trends are not seriously affected by a small understatement resulting from the CRA data. For this reason, the R&D data are published as soon as possible after the survey is conducted.

The business enterprise sector is the only sector in which data are not collected on R&D in the social sciences and humanities.

In this survey, the reporting unit is generally the company or enterprise. This unit has been used because a company, which may have several establishments or even subsidiaries, will often have a centralized research unit. In the case of a company with decentralized research units, the reporting unit may be the division, if the accounting system enables divisions to supply the required data. This procedure creates a problem when classifying data by industry. A company can only be assigned to one industry although that company may have establishments in several industries. The assignment is based on the activity from which the firm derived the greatest portion of its income. Thus, comparisons between R&D data collected at the company level and other data collected at the establishment level, such as “census value added”, may be misleading. Since industrial R&D is highly concentrated, the use of the company/enterprise as the main reporting unit also means that classification cannot be very detailed, to avoid disclosing individual company data.

One of the problems in a survey of this type is to ensure that the quality of the data is satisfactory. It cannot be expected that all firms funding R&D will be surveyed, will respond and will report correctly. There are sources of information such as federal government grant and contract lists to aid in identifying firms and editing returns. The coverage, however, is probably not complete. This is especially true for the smaller companies in the service industries. In addition, R&D is a term subject to individual interpretation which can result in inconsistencies. Thus, the data, although reasonably accurate, cannot be regarded as precise.

Different interpretations of the definition of R&D also result in discrepancies between federal government reporting of funds to industry (the business enterprise sector) for R&D and industry’s reporting of such funds. For example, a federal government department may regard a contract to industry for the building of a prototype (e.g., communications satellite) as R&D. The contractors and subcontractors, however, may only use a portion of the R&D contract and even that portion may not be reported because the contract is considered as part of the firm’s “routine” contract work. Differences may also arise for contracts awarded to industry for services or equipment required for a government in-house project which are reported by the federal sponsor as industrial R&D contracts. Therefore, the totals for R&D grants and contracts from the federal government to industry shown in this publication do not agree with those reported in **Federal Science Activities, 2003-2004**, (Catalogue no. 88-204-XIE).

The 2002 survey was mailed out in June 2003. All companies believed to be performing or funding one million dollars or more in R&D were sent a questionnaire. The mailing list of companies was made up of firms which had reported R&D in the previous survey, of firms claiming an R&D income tax incentive for 2002, of firms reported by government respondents as R&D contractors or grantees for 2002-2003, of firms reported by other companies as funders or performers of R&D, and of firms indicated in some other way, such as newspaper or journal articles or provincial directories. These larger performers and funders received “long forms”, covering four years, 2001, 2002, 2003 and 2004.

The survey response

The response for the 2002 “base year” survey is shown below.

Survey Group	Responded R&D	No R&D	Deleted[1]	Did not Respond[2]	Total
		number			
Long form	818[3]	22	20	491	1,351
Administrative data[4]	8,008	…	…	…	8,008
Total	**8,826**	**22**	**20**	**491**	**9,359**

1. *Inactive, out of business and unlocated.*
2. *Includes estimates made for 491 long form delinquents.*
3. *Includes 165 companies added from T661.*
4. *Data from Canada Revenue Agency.*

Technical notes

Statistics for even years

Data for the reference year 2002 are available for all tables. However, in the even years prior to 1982 and for 1992 and 1994, our estimation procedures did not permit the preparation of tables based on revenue size, employment size, sources of funds and country of control of companies.

Regional data on R&D expenditures and personnel are only available for 1977, 1979 and 1981 to 2002

Terminology

In this publication (i.e. Appendix II Table 19) the following terminology is used:

Performing company: the organization which carried out the R&D and submitted the return. In the case of a consolidated return, performing company could include several companies. It also includes divisions of an enterprise which send separate returns or organizations such as industrial non-profit organizations.

Related companies: includes parent, subsidiaries and other affiliated companies. In the case where a consolidated return is submitted, “related companies” would exclude companies included in the consolidation.

R&D contracts for other companies: R&D contract work performed by reporting company for other companies.

Federal grants: federal R&D grants and the R&D portion of any other federal grants; it excludes funds or tax credits for R&D tax incentives.

Federal contracts: federal R&D contracts and the R&D portion of any other federal contracts.

Provincial sources: provincial R&D grants and contracts, and the R&D portion of any provincial grants and contracts; it excludes funds or tax credits for R&D tax incentives.

Other Canadian sources: includes funds from universities and from levels of government other than federal and provincial.

Intramural expenditures: expenditures for R&D work performed within the reporting company, including work financed by others.

Current intramural expenditures: labour costs, fringe benefits and other current costs for R&D, including non-capital purchases of materials, supplies and equipment but excluding capital depreciation. Current intramural expenditures also include contracts for services required to carry out R&D (e.g. contracts awarded for drilling needed for heavy oil R&D).

Capital expenditures: expenditures on fixed assets used in the R&D program, classified into land, buildings, and equipment.

Technological payments: payments made for R&D and other technology.

Technological receipts: payments received for R&D and other technology.

Other technology: technology acquired through patents (sale/purchase, licensing), "know-how" (unpatented), inventions, trademarks (including franchising), patterns, design, and R&D technical assistance.

Revenues: revenues resulting from the sale of products and services (after deducting sales and excise taxes), and other revenues such as those generated from investment and rentals.

Non-commercial firms: R&D performers without a directly affiliated Canadian commercial base. Includes industrial non-profit organizations and trade associations, R&D establishments set up by consortia, and R&D establishments set up by non-residents without associated commercial establishments and funded principally from abroad.

R&D personnel: calculated in full-time equivalent (FTE). R&D may be carried out by persons who work solely on R&D projects or by persons who devote only part of their time to R&D, and the balance to other activities such as testing, quality control and production engineering. To arrive at the total effort devoted to R&D in terms of person-years, it is necessary to estimate the full-time equivalent (FTE) of these persons working only part-time in R&D.

FTE = number of persons who work solely on R&D projects + estimate of time of persons working only part of their time on R&D.

Example calculation:

If out of five scientists engaged in R&D work, one works solely on R&D projects and the remaining four devote only one quarter of their working time to R&D, then: FTE = 1 + 1/4 + 1/4 + 1/4 + 1/4 = 2 scientists.

Federal government funds for industrial R&D: Federal support consists of grants and contracts for R&D to be performed by business enterprises. Taxes foregone as a result of income tax incentives for R&D are not considered direct government support and are not attributed to the federal government.

Industrial classification

The natural classification to use within the business enterprise sector is the North American Industry Classification System (NAICS). There are, however, problems with its use. A major problem is caused by companies with establishments in more than one industry (e.g., companies which both refine petroleum and extract oil). Another is caused by the concentration of the R&D activity among a few companies. In order to prevent disclosure of individual respondents many industries must be grouped together to provide sufficient observations for publication. A third problem is that the classification, chosen to represent general industrial activity, may not be entirely suitable for identifying companies chosen only for their involvement in R&D.

There are some restrictions on the application of the NAICS, for example, industrial non-profit organizations will be assigned to the industry they support.

The R&D activities of other sectors such as the federal government, provincial governments, higher education, and private non-profit organizations are covered in other reports.

Definitions

Research and development

Research and development (R&D) is systematic investigation carried out in the natural and engineering sciences by means of experiment or analysis to achieve a scientific or commercial advance.

Research is original investigation undertaken on a systematic basis to gain new knowledge.

Development is the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes. If successful, development will usually result in devices or processes which represent an improvement in the “state of the art” and are likely to be patentable.

Example:

The investigation of electrical conduction in crystals was research. The application of this knowledge to the creation of a new amplifying device - the transistor - was development. The application of the device to the construction of new electrical circuits for television receivers was development. The formulation of new plastic cases for a television receiver is design, not development.

Research and development may be carried out either by a permanent R&D unit (e.g., R&D division) or by a unit generally engaged in any non-R&D activity such as engineering or production. In the first case, the R&D unit may spend part of its time on routine testing or trouble shooting or on some other activities which should not be included in R&D. In the second, only the R&D portion of such units’ total activity should be considered.

Research and development should be considered to be “Scientific Research and Experimental Development” as defined in Section 37, Regulation 2900 of the Income Tax Act; this section specifically excludes the following:

(i) market research, sales promotion,

(ii) quality control or routine analysis and testing of materials, devices or products,

(iii) research in the social sciences or the humanities,

(iv) prospecting, exploring or drilling for or producing minerals, petroleum or natural gas,

(v) the commercial production of a new or improved material, device or product or the commercial use of a new or improved process,

(vi) style changes, or routine data collection,

Note:

Although the definition of “Scientific Research and Experimental Development” is considered to be the same as R&D, certain expenditures for scientific research cannot be claimed for income tax purposes (e.g., land, building). All expenditures attributable to R&D are included in this report.

Interpretation of R&D

Generally speaking, industrial R&D is intended to result in an invention which may subsequently become a technological innovation. An essential requirement is that the outcome of the work is uncertain, i.e., that the possibility of obtaining a given technical objective cannot be known in advance on the basis of current knowledge or experience. Hence much of the work done by scientists and engineers is not R&D, since they are primarily engaged in “routine” production, engineering, quality control or testing. Although they apply scientific or engineering principles their work is not directed towards the discovery of new knowledge or the development of new products and processes. However, work elements which are not considered R&D by themselves but which directly support R&D projects, should be included with R&D in these cases. Examples of such work elements are design and engineering, shop work, computer programming, and secretarial work.

If the primary objective is to make further technical improvements to the product or process, then the work comes within the definition of R&D. If however, the product, process or approach is substantially set and the primary objective is to develop markets, to do pre-production planning or to get a production or control system working smoothly, then the activity can no longer be considered as part of R&D even though it could be regarded as an important part of the total innovation process. Thus, the design, construction and testing of prototypes, models and pilot plants are part of R&D. But, when necessary modifications have been made and testing has been satisfactorily completed, the boundary of R&D has been reached. Hence, the costs of tooling (design and try-out), construction drawings and manufacturing blueprints, and production start-up are not included in development costs.

Pilot plants may be included in development only if the main purpose is to acquire experience and compile data. As soon as they begin operating as normal production units, their costs can no longer be attributed to R&D. Similarly, once the original prototype has been found satisfactory, the cost of other “prototypes” built to meet a special need or fill a very small order are not to be considered as part of R&D.

Specific cases and their treatment		
Activity	**Treatment**	**Remarks**
Economic research, market research, management studies	Exclude	All activities in the social sciences.
Quality control, routine testing, style changes, minor adaptation of a product to meet a customer's specific requirements	Exclude	Even if carried out by staff normally engaged in R&D.
Prospecting, exploratory drilling, development of mines, oil or gas wells	Exclude	Except for R&D projects concerned with new equipment or techniques in these activities, such as in-situ and tertiary recovery research.
Engineering	Exclude	Engineering unless it is in direct support of R&D.
Design and drawing	Exclude	Design and drawing unless it is in direct support of R&D.
Prototypes, pilot plants	Include	As long as the primary objective is to make further improvements.
Contracts for R&D	Include	All contracts for R&D. For contracts which include other work, report only the R&D costs.
Tooling up, trial production, trouble shooting	Exclude	Although R&D may be required as a result of these steps.
Patent and licence work	Exclude	All administrative and legal work connected with patents and licences.

Reliability of the data

All the possible sources of error are examined below. Definitions have been taken from **A Compendium of Methods of Error Evaluation in Censuses and Surveys**, Statistics Canada, Catalogue No. 13-564.

Coverage

"Coverage errors are introduced whenever the sampling frame...does not adequately represent the target population at the time of the survey."

Coverage is a minor source of error. Surveys are of all known and suspected, large R&D performers and funders (R&D ≥ $1,000,000).

Administrative data are used for the small R&D performers or funders. Companies have up to 18 months after their fiscal year end to claim a tax credit for their R&D expenditures; however, we estimate under reporting to be less than 8%.

Response

"A response error occurs whenever a characteristic is misreported in a census or a survey."

As a result of a reconciliation of federal and industrial accounts of government grants and contracts, we think that industrial R&D performance estimates may be slightly low. This is caused by the non-reporting of industrial R&D funded by contract. Such work is sometimes not distinguishable from non-R&D contract work.

The accuracy of the company's estimates of future expenditures have also been a problem in the past, particularly in the wells and petroleum products industries.

Non-response

"Non-response occurs when information required for a survey unit is missing. This could happen because the unit cannot be contacted, because the unit is unable to provide the information requested, or because the unit refuses to cooperate in the survey."

Non-response is a potential problem in four areas. One is the estimate of R&D expenditures two years past the base year. If no estimate is made, editors make one - based usually on the expenditure of the preceding year or a slight increase in expenditures.

The second involves the administrative data used for the smaller R&D performers. These represent 10% of all R&D performed by businesses. Certain information is not asked of them. However, the missing data are imputed from the replies of the larger performers in the same industry.

The third concerns companies inadvertently not included in the survey. A number of sources are used to create the mailing lists and it is unlikely that major performers would be overlooked.

Failure of surveyed companies to reply is the fourth type of non-response. We believe non-response error to be minor and may result in a minor under-estimation of R&D expenditures.

Coding

"A coding operation in a survey or census is defined as the operation where data on questionnaires or source documents are transformed into a format which is suitable for input to the data capture operation. This often involves the assignment of codes for 'write-in' entries but may also be a fairly straightforward transcription operation."

Uncorrected coding errors are unlikely because of the examination of numerous tables and listings prepared for data analysis before publication tables are created.

Data capture

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

All data capture for science statistics is through manual intervention: key-edit or typed entry 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.

Edit and imputation

"The edit procedure usually consists of: (i) checking each field of every record to ascertain whether it contains a valid code or entry; (ii) checking codes or entries in certain predetermined combinations of fields to ascertain whether codes or entries are consistent with one another... The imputation procedure consists of changing values in some of the fields in records which failed the edit rules with a view to ensuring that the resultant data records satisfy all edit rules".

Although there are a number of edits, all cases of failed edit checks are corrected after consideration by editors. Automatic imputations are made only for the smaller R&D performers and funders.

Sampling

"Sampling error occurs whenever survey results are based on a sample of units from a survey frame... Obviously there is no sampling error in complete enumeration surveys."

Although a complete enumeration is carried out of known and suspected R&D performers and funders, records received from the administrative data do not provide as much information as do those completing the long form. Certain data are imputed for records from the administative file based on the patterns of long form respondents in the same industry. Thus, as a result of the 2002 survey, the 2002 business enterprise sector R&D expenditures would be based on full enumeration but about 10% of the expenditures for 2003 and 2004 would have been imputed.

Appendix II

Tables 1 to 28

Table 1.

GERD, by performing sector, 1963 to 2004

Year	Federal government	Provincial governments	Business enterprises[1]	Higher education	Private non-profit organizations	Total
			in millions of $			
1963	175	17	176	86	4	458
1964	195	18	229	109	4	555
1965	221	21	285	130	5	662
1966	241	24	313	167	5	750
1967	282	26	333	206	6	853
1968	309	27	339	229	6	910
1969	315	30	369	266	6	986
1970	327	30	408	295	9	1,069
1971	383	43	413	436	10	1,285
1972	414	50	462	434	12	1,372
1973	450	55	503	449	13	1,470
1974	508	68	613	485	15	1,689
1975	545	72	700	568	16	1,901
1976	593	82	755	624	17	2,071
1977	638	93	857	713	21	2,322
1978	711	98	1,006	769	25	2,609
1979	717	113	1,266	921	27	3,044
1980	779	140	1,571	1,055	30	3,575
1981	916	162	2,124	1,177	36	4,415
1982	1,103	194	2,489	1,373	39	5,198
1983	1,219	201	2,602	1,452	43	5,517
1984	1,389	206	3,022	1,604	52	6,273
1985	1,356	213	3,635	1,722	59	6,985
1986	1,407	217	4,022	1,839	61	7,546
1987	1,383	228	4,341	1,934	64	7,950
1988	1,429	242	4,623	2,669	82	9,045
1989	1,533	272	4,779	2,844	89	9,517
1990	1,654	302	5,169	3,033	102	10,260
1991[r]	1,685	328	5,355	3,292	110	10,770
1992	1,716	293	5,742	3,519	68	11,338
1993	1,757	269	6,424	3,660	74	12,184
1994[r]	1,753	260	7,567	3,675	86	13,341
1995	1,727	254	7,991	3,691	91	13,754
1996[r]	1,792	242	7,996	3,697	89	13,816
1997[r]	1,720	214	8,741	3,879	82	14,636
1998[r]	1,743	216	9,683	4,370	77	16,089
1999[r]	1,859	233	10,401	5,082	63	17,638
2000[r]	2,080	255	12,346	5,793	57	20,531
2001[r]	2,103	307	13,847	6,424	52	22,733
2002[r]	2,190	315	12,383	7,429	53	22,370
2003[p]	2,239	322	12,343	8,321	68	23,293
2004[p]	2,234	330	12,535	9,319	70	24,488

1. *Excludes R&D in the social sciences and humanities.*

Table 2.

BERD compared to GERD and GDP, 1981 to 2004

Year	BERD[1]	BERD/GERD[2]	GDP[3]	BERD/GDP	GDP Implicit price index[4]	BERD in 1997 dollars
	in millions of $	%	in millions of $	%		in millions of $
1981	2,124	48.12	360,471	0.59	60.1	3,535
1982	2,489	47.87	379,859	0.66	65.1	3,823
1983	2,602	47.17	411,386	0.63	68.7	3,788
1984	3,022	48.18	449,582	0.67	70.9	4,263
1985	3,633	52.01	485,714	0.75	73.2	4,963
1986	4,022	53.30	512,541	0.78	75.4	5,335
1987	4,340	54.59	558,949	0.78	78.8	5,508
1988	4,623	51.12	613,094	0.75	82.4	5,611
1989	4,779	50.22	657,728	0.73	86.1	5,551
1990	5,169	50.38	679,921	0.76	88.9	5,815
1991[r]	5,355	49.72	685,367	0.78	91.5	5,852
1992	5,742	50.65	700,480	0.82	92.7	6,194
1993	6,424	52.72	727,184	0.88	94.0	6,834
1994	7,567	56.72	770,873	0.98	95.1	7,957
1995	7,991	58.10	810,426	0.99	97.2	8,221
1996[r]	7,996	57.87	836,864	0.96	98.8	8,093
1997[r]	8,741	59.72	882,733	0.99	100.0	8,741
1998[r]	9,684	60.19	914,973	1.06	99.6	9,722
1999[r]	10,401	58.97	982,441	1.06	101.3	10,268
2000[r]	12,346	60.14	1,076,577	1.15	105.5	11,703
2001[r]	13,847	60.91	1,108,200	1.25	106.7	12,977
2002[p]	12,383	55.35	1,157,968	1.07	107.8	11,487
2003[p]	12,343	52.99	1,218,772	1.01	111.2	11,100
2004[i]	12,535	51.19	..	..	..	..

1. *Excludes R&D in the social sciences and humanities.*
2. *Source: Table 1 for GERD data.*
3. *Source: CANSIM Table 380-0017*
4. *Source: CANSIM Table 380-0056*

Table 3.

Total intramural R&D expenditures, by industry, 2000 to 2004

Industries	2000 r	2001 r	2002 p	2003 p	2004 i
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	51	66	71	73	71
Forestry and logging	18	15	16	17	18
Fishing, hunting and trapping	8	7	4	3	3
Total agriculture, forestry, fishing and hunting	**77**	**89**	**90**	**94**	**93**
Mining and oil and gas extraction					
Oil and gas extraction	129	164	162	166	161
Mining	53	50	31	31	31
Total mining and oil and gas extraction	**182**	**213**	**193**	**198**	**192**
Utilities					
Electric power	181	154	157	154	154
Other utilities	6	6	3	3	3
Total utilities	**187**	**161**	**160**	**157**	**156**
Construction	**45**	**48**	**33**	**31**	**31**
Manufacturing					
Food	75	68	63	61	61
Beverage and tobacco	23	22	27	28	26
Textile	46	47	33	35	36
Wood products	42	43	39	37	40
Paper	154	266	282	294	296
Printing	11	16	11	11	11
Petroleum and coal products	41	54	87	76	73
Pharmaceutical and medicine	766	884	1,101	1,151	1,208
Other chemicals	269	270	250	229	231
Plastic products	69	66	55	54	58
Rubber products	32	22	13	13	13
Non-metallic mineral products	19	19	8	8	8
Primary metal (ferrous)	26	31	23	22	23
Primary metal (non-ferrous)	140	159	179	179	181
Fabricated metal products	93	104	86	88	90
Machinery	405	425	378	373	393
Computer and peripheral equipment	207	202	197	195	200
Communications equipment	3,160	3,186	1,988	1,989	1,977
Semiconductor and other electronic components	826	890	848	787	849
Navigational, measuring, medical and control instruments	411	423	400	378	356
Other computer and electronic products	20	21	18	18	18
Electrical equipment, appliance and components	210	287	167	143	140
Motor vehicle and parts	380	351	350	307	313
Aerospace products and parts	883	946	900	883	898
All other transportation equipment	23	25	14	14	14
Furniture and related products	9	13	14	15	16
Other manufacturing industries	120	134	115	119	111
Total manufacturing	**8,460**	**8,974**	**7,648**	**7,507**	**7,638**
Services					
Wholesale trade	734	612	552	595	614
Retail trade	27	43	29	29	30
Transportation and warehousing	34	32	28	27	27
Information and cultural industries	311	561	622	589	585
Finance, insurance and real estate	142	164	191	192	159
Architectural, engineering and related services	412	530	454	539	542
Computer system design and related services	785	1,080	932	885	891
Management, scientific and technical consulting services	63	81	75	64	78
Scientific research and development	399	711	816	849	884
Health care and social assistance	306	324	366	405	435
All other services	184	222	193	183	178
Total services	**3,396**	**4,361**	**4,258**	**4,356**	**4,424**
Total all industries	**12,346**	**13,847**	**12,383**	**12,343**	**12,535**

Table 4.

Current intramural R&D expenditures, by industry, 2000 to 2004

Industries	2000[r]	2001[r]	2002[p]	2003[p]	2004[i]
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	46	59	68	68	65
Forestry and logging	17	15	15	17	17
Fishing, hunting and trapping	7	7	4	3	3
Total agriculture, forestry, fishing and hunting	**70**	**80**	**86**	**89**	**86**
Mining and oil and gas extraction					
Oil and gas extraction	110	129	104	109	105
Mining	42	45	30	30	30
Total mining and oil and gas extraction	**153**	**174**	**135**	**139**	**135**
Utilities					
Electric power	159	147	148	147	146
Other utilities	5	6	2	2	3
Total utilities	**165**	**153**	**150**	**149**	**149**
Construction	**43**	**45**	**32**	**30**	**31**
Manufacturing					
Food	71	66	61	59	59
Beverage and tobacco	20	21	26	27	25
Textile	44	45	33	35	36
Wood products	41	43	38	36	38
Paper	145	261	277	289	291
Printing	11	16	11	11	11
Petroleum and coal products	38	43	73	56	60
Pharmaceutical and medicine	668	792	973	1,056	1,104
Other chemicals	226	228	206	198	201
Plastic products	63	61	54	53	55
Rubber products	30	20	13	13	13
Non-metallic mineral products	18	18	8	8	8
Primary metal (ferrous)	25	27	21	21	21
Primary metal (non-ferrous)	133	151	159	167	169
Fabricated metal products	88	102	85	86	88
Machinery	384	404	362	357	375
Computer and peripheral equipment	190	184	177	175	180
Communications equipment	2,869	2,915	1,877	1,881	1,881
Semiconductor and other electronic components	642	703	716	707	764
Navigational, measuring, medical and control instruments	396	403	390	369	345
Other computer and electronic products	19	19	17	16	16
Electrical equipment, appliance and components	195	251	154	127	120
Motor vehicle and parts	353	306	317	276	281
Aerospace products and parts	861	928	880	857	873
All other transportation equipment	22	25	14	13	14
Furniture and related products	9	13	13	14	15
Other manufacturing industries	106	116	108	104	105
Total manufacturing	**7,667**	**8,159**	**7,060**	**7,009**	**7,146**
Services					
Wholesale trade	694	544	518	554	578
Retail trade	25	39	27	28	28
Transportation and warehousing	31	32	26	24	25
Information and cultural industries	272	458	533	520	526
Finance, insurance and real estate	132	148	185	186	154
Architectural, engineering and related services	355	424	383	454	454
Computer system design and related services	706	985	857	841	847
Management, scientific and technical consulting services	53	71	61	57	67
Scientific research and development	340	589	730	772	801
Health care and social assistance	280	280	327	355	379
All other services	166	198	178	166	162
Total services	**3,055**	**3,767**	**3,825**	**3,957**	**4,021**
Total all industries	**11,152**	**12,377**	**11,289**	**11,374**	**11,567**

Table 5.

Capital R&D expenditures, by industry, 2000 to 2004

Industries	2000[r]	2001[r]	2002[p]	2003[p]	2004[i]
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	5	8	3	5	6
Forestry and logging	0	1	1	0	0
Fishing, hunting and trapping	1	0	0	0	0
Total agriculture, forestry, fishing and hunting	**7**	**9**	**4**	**5**	**7**
Mining and oil and gas extraction					
Oil and gas extraction	19	35	58	57	57
Mining	11	5	0	2	1
Total mining and oil and gas extraction	**29**	**40**	**58**	**59**	**57**
Utilities					
Electric power	22	7	9	7	7
Other utilities	1	0	0	0	0
Total utilities	**23**	**7**	**9**	**7**	**8**
Construction	**2**	**4**	**1**	**1**	**1**
Manufacturing					
Food	4	2	2	2	2
Beverage and tobacco	3	2	1	1	1
Textile	2	2	1	1	1
Wood products	1	1	1	2	2
Paper	9	5	5	5	6
Printing	0	0	0	0	0
Petroleum and coal products	2	11	15	19	13
Pharmaceutical and medicine	98	92	128	96	104
Other chemicals	43	42	44	31	31
Plastic products	6	5	2	1	2
Rubber products	2	2	0	0	0
Non-metallic mineral products	1	1	0	0	0
Primary metal (ferrous)	1	4	2	2	2
Primary metal (non-ferrous)	7	7	21	12	12
Fabricated metal products	5	3	2	2	2
Machinery	21	20	16	17	18
Computer and peripheral equipment	17	17	20	20	20
Communications equipment	292	271	111	109	97
Semiconductor and other electronic components	184	187	132	80	85
Navigational, measuring, medical and control instruments	15	20	11	9	10
Other computer and electronic products	1	2	2	2	2
Electrical equipment, appliance and components	15	36	13	16	20
Motor vehicle and parts	28	45	33	31	32
Aerospace products and parts	22	19	19	26	26
All other transportation equipment	0	0	0	0	0
Furniture and related products	0	0	1	1	1
Other manufacturing industries	14	18	7	15	6
Total manufacturing	**793**	**816**	**588**	**498**	**493**
Services					
Wholesale trade	39	68	34	41	36
Retail trade	2	4	1	1	1
Transportation and warehousing	2	1	3	2	2
Information and cultural industries	38	103	89	69	60
Finance, insurance and real estate	11	16	7	6	5
Architectural, engineering and related services	57	106	71	86	88
Computer system design and related services	79	95	75	44	44
Management, scientific and technical consulting services	11	9	13	8	11
Scientific research and development	59	122	86	77	83
Health care and social assistance	26	45	39	49	56
All other services	18	24	16	17	17
Total services	**341**	**594**	**434**	**399**	**403**
Total all industries	**1,194**	**1,470**	**1,094**	**969**	**968**

Table 6.

Current intramural R&D expenditures, by industry and by type of expenditure, 2002

Industries	Current expenditures		
	Wages and salaries	Other costs	Total
	in millions of $		
Agriculture, forestry, fishing and hunting			
Agriculture	28	40	68
Forestry and logging	10	5	15
Fishing, hunting and trapping	2	1	4
Total agriculture, forestry, fishing and hunting	**40**	**46**	**86**
Mining and oil and gas extraction			
Oil and gas extraction	30	75	104
Mining	12	19	30
Total mining and oil and gas extraction	**41**	**93**	**135**
Utilities			
Electric power	66	82	148
Other utilities	2	1	2
Total utilities	**68**	**82**	**150**
Construction	**22**	**11**	**32**
Manufacturing			
Food	36	25	61
Beverage and tobacco	14	11	26
Textile	20	13	33
Wood products	22	16	38
Paper	79	198	277
Printing	9	2	11
Petroleum and coal products	24	49	73
Pharmaceutical and medicine	337	636	973
Other chemicals	106	100	206
Plastic products	33	21	54
Rubber products	7	6	13
Non-metallic mineral products	6	2	8
Primary metal (ferrous)	14	6	21
Primary metal (non-ferrous)	83	75	159
Fabricated metal products	63	22	85
Machinery	225	137	362
Computer and peripheral equipment	114	63	177
Communications equipment	1,140	738	1,877
Semiconductor and other electronic components	467	249	716
Navigational, measuring, medical and control instruments	242	148	390
Other computer and electronic products	11	6	17
Electrical equipment, appliance and components	91	62	154
Motor vehicle and parts	146	171	317
Aerospace products and parts	372	508	880
All other transportation equipment	9	4	14
Furniture and related products	10	4	13
Other manufacturing industries	68	40	108
Total manufacturing	**3,746**	**3,315**	**7,060**
Services			
Wholesale trade	253	265	518
Retail trade	24	4	27
Transportation and warehousing	19	7	26
Information and cultural industries	404	129	533
Finance, insurance and real estate	126	58	185
Architectural, engineering and related services	261	122	383
Computer system design and related services	672	185	857
Management, scientific and technical consulting services	48	14	61
Scientific research and development	359	372	730
Health care and social assistance	157	170	327
All other services	133	45	178
Total services	**2,455**	**1,370**	**3,825**
Total all industries	**6,372**	**4,917**	**11,289**

Table 7.

Capital intramural R&D expenditures, by industry and by type of expenditure, 2002

Industries	Capital expenditures			
	Land	Buildings	Equipment	Total
	in millions of $			
Agriculture, forestry, fishing and hunting				
Agriculture	0	0	3	3
Forestry and logging	0	0	1	1
Fishing, hunting and trapping	0	0	0	0
Total agriculture, forestry, fishing and hunting	**0**	**0**	**4**	**4**
Mining and oil and gas extraction				
Oil and gas extraction	0	0	58	58
Mining	0	0	0	0
Total mining and oil and gas extraction	**0**	**0**	**58**	**58**
Utilities				
Electric power	1	2	7	9
Other utilities	0	0	0	0
Total utilities	**1**	**2**	**7**	**9**
Construction	**0**	**0**	**1**	**1**
Manufacturing				
Food	0	0	2	2
Beverage and tobacco	0	0	1	1
Textile	0	0	1	1
Wood products	0	0	1	1
Paper	0	1	5	5
Printing	0	0	0	0
Petroleum and coal products	0	0	15	15
Pharmaceutical and medicine	1	49	78	128
Other chemicals	0	0	44	44
Plastic products	0	0	1	2
Rubber products	0	0	0	0
Non-metallic mineral products	0	0	0	0
Primary metal (ferrous)	0	0	2	2
Primary metal (non-ferrous)	0	0	21	21
Fabricated metal products	0	0	2	2
Machinery	0	1	14	16
Computer and peripheral equipment	0	0	20	20
Communications equipment	0	1	110	111
Semiconductor and other electronic components	0	3	129	132
Navigational, measuring, medical and control instruments	0	0	11	11
Other computer and electronic products	0	0	2	2
Electrical equipment, appliance and components	0	0	13	13
Motor vehicle and parts	0	2	31	33
Aerospace products and parts	0	0	19	19
All other transportation equipment	0	0	0	0
Furniture and related products	0	0	1	1
Other manufacturing industries	0	1	6	7
Total manufacturing	**1**	**59**	**527**	**588**
Services				
Wholesale trade	0	4	30	34
Retail trade	0	0	1	1
Transportation and warehousing	0	0	3	3
Information and cultural industries	0	0	89	89
Finance, insurance and real estate	0	0	6	7
Architectural, engineering and related services	0	35	36	71
Computer system design and related services	0	2	73	75
Management, scientific and technical consulting services	0	5	9	13
Scientific research and development	0	9	76	86
Health care and social assistance	0	16	23	39
All other services	0	0	15	16
Total services	**0**	**71**	**362**	**434**
Total all industries	**2**	**133**	**959**	**1,094**

Table 8.

Total intramural R&D expenditures, by province, 2000 to 2002

Province	2000[r]	2001[r]	2002[p]
		in millions of $	
Newfoundland and Labrador	20	20	17
Prince Edward Island	5	5	4
Nova Scotia	67	79	65
New Brunswick	41	39	32
Quebec	3,586	4,061	3,828
Ontario	6,854	7,608	6,528
Manitoba	133	179	138
Saskatchewan	76	85	97
Alberta	593	704	694
British Columbia	971	1,065	979
Yukon, Northwest Territories and Nunavut	0	1	0
Total	**12,346**	**13,847**	**12,383**

Table 9.

Current intramural R&D expenditures, by province, 2000 to 2002

Province	2000[r]	2001[r]	2002[p]
		in millions of $	
Newfoundland and Labrador	20	19	16
Prince Edward Island	5	5	4
Nova Scotia	63	75	62
New Brunswick	38	37	30
Quebec	3,273	3,660	3,546
Ontario	6,180	6,780	5,953
Manitoba	127	170	132
Saskatchewan	65	77	78
Alberta	543	625	612
British Columbia	839	928	856
Yukon, Northwest Territories and Nunavut	0	1	0
Total	**11,152**	**12,377**	**11,289**

Table 10.

Total intramural R&D expenditures for Quebec, by selected industry, 2000 to 2002

Selected industries	2000[r]	2001[r]	2002[p]
		in millions of $	
Agriculture, forestry, fishing and hunting	**23**	**27**	**34**
Mining and oil and gas extraction	**x**	**x**	**x**
Utilities	**x**	**x**	**x**
Construction	**20**	**20**	**15**
Manufacturing			
Food	24	23	22
Beverage and tobacco	4	5	14
Textile	33	35	24
Wood products	20	23	22
Paper	101	157	180
Printing	6	9	5
Pharmaceutical and medicine	313	348	389
Other chemicals	53	56	54
Plastic products	17	19	15
Rubber products	5	4	2
Non-metallic mineral products	7	6	4
Primary metals	98	103	98
Fabricated metal products	30	33	34
Machinery	106	114	106
Computer and peripheral equipment	35	33	37
Communications equipment	257	279	236
Semiconductor and other electronic components	112	154	106
Navigational, measuring, medical and control instruments	177	192	161
Other computer and electronic products	2	3	2
Electrical equipment, appliance and components	28	37	38
Motor vehicle and parts	22	23	20
Aerospace products and parts	562	634	606
All other transportation equipment	10	10	9
Furniture and related products	5	7	10
Other manufacturing industries	53	59	54
Total manufacturing	**2,080**	**2,366**	**2,249**
Services			
Wholesale trade	349	193	166
Retail trade	7	8	9
Transportation and warehousing	14	12	11
Information and cultural industries	118	186	161
Finance, insurance and real estate	10	15	15
Architectural, engineering and related services	227	287	245
Computer system design and related services	200	249	217
Management, scientific and technical consulting services	21	37	22
Scientific research and development services	125	222	227
Health care and social assistance	219	243	267
All other services	67	86	83
Total services	**1,358**	**1,538**	**1,423**
Total all industries	**3,586**	**4,061**	**3,828**

Table 11.

Total intramural R&D expenditures for Ontario, by selected industry, 2000 to 2002

Selected industries	2000[r]	2001[r]	2002[p]
		in millions of $	
Agriculture, forestry, fishing and hunting	**18**	**23**	**23**
Mining and oil and gas extraction	**x**	**x**	**11**
Utilities	**x**	**x**	**35**
Construction	**11**	**19**	**12**
Manufacturing			
Food	37	31	30
Beverage and tobacco	14	13	10
Textile	11	8	8
Wood products	4	3	2
Paper	29	29	54
Printing	4	6	4
Pharmaceutical and medicine	328	374	498
Other chemicals	181	183	168
Plastic products	46	41	37
Rubber products	26	18	11
Non-metallic mineral products	9	11	2
Primary metals	64	79	95
Fabricated metal products	52	58	41
Machinery	247	262	240
Computer and peripheral equipment	103	91	83
Communications equipment	x	x	1,640
Semiconductor and other electronic components	550	582	662
Navigational, measuring, medical and control instruments	174	167	184
Other computer and electronic products	15	15	14
Electrical equipment, appliance and components	145	195	86
Motor vehicle and parts	248	261	304
Aerospace products and parts	317	301	285
All other transportation equipment	10	5	2
Furniture and related products	4	5	4
Other manufacturing industries	x	x	72
Total manufacturing	**5,370**	**5,503**	**4,538**
Services			
Wholesale trade	303	336	253
Retail trade	16	28	15
Transportation and warehousing	4	6	5
Information and cultural industries	81	259	357
Finance, insurance and real estate	110	129	155
Architectural, engineering and related services	102	146	112
Computer system design and related services	485	691	542
Management, scientific and technical consulting services	22	21	24
Scientific research and development services	158	298	362
Health care and social assistance	20	24	24
All other services	58	63	59
Total services	**1,360**	**2,001**	**1,909**
Total all industries	**6,854**	**7,608**	**6,528**

Table 12.

Current intramural R&D expenditures as a percent of performing company revenues, by industry, 2000 to 2002

Industries	2000[r]	2001[r]	2002[p]
	percent of company revenues		
Agriculture, forestry, fishing and hunting			
Agriculture	4.6	4.6	7.2
Forestry and logging	0.2	0.2	0.2
Fishing, hunting and trapping	15.3	12.1	27.1
Total agriculture, forestry, fishing and hunting	**1.1**	**1.7**	**2.4**
Mining and oil and gas extraction			
Oil and gas extraction	0.4	0.4	0.3
Mining	0.4	0.6	0.7
Total mining and oil and gas extraction	**0.4**	**0.4**	**0.3**
Utilities			
Electric power	0.8	0.5	0.5
Other utilities	0.3	5.1	3.8
Total utilities	**0.7**	**0.5**	**0.5**
Construction	**2.9**	**4.3**	**3.8**
Manufacturing			
Food	0.3	0.3	0.3
Beverage and tobacco	0.2	0.2	0.3
Textile	1.5	1.5	1.6
Wood products	0.2	0.3	1.1
Paper	0.4	0.9	0.9
Printing	1.3	0.7	1.6
Petroleum and coal products	0.1	0.1	0.2
Pharmaceutical and medicine	7.8	9.2	10.8
Other chemicals	0.8	1.0	1.0
Plastic products	1.1	0.8	1.3
Rubber products	1.1	0.4	1.5
Non-metallic mineral products	1.3	0.8	0.5
Primary metal (ferrous)	0.2	0.4	0.3
Primary metal (non-ferrous)	1.0	1.2	1.3
Fabricated metal products	1.3	1.5	2.0
Machinery	2.9	3.2	4.0
Computer and peripheral equipment	4.2	5.5	6.1
Communications equipment	14.6	12.4	29.4
Semiconductor and other electronic components	5.3	6.7	7.2
Navigational, measuring, medical and control instruments	9.4	9.0	9.8
Other computer and electronic products	8.7	11.0	8.0
Electrical equipment, appliance and components	2.4	2.7	2.2
Motor vehicle and parts	0.3	0.3	0.3
Aerospace products and parts	6.5	5.6	5.5
All other transportation equipment	1.2	1.3	1.0
Furniture and related products	0.8	0.8	1.1
Other manufacturing industries	2.7	3.4	3.8
Total manufacturing	**2.0**	**2.2**	**2.2**
Services			
Wholesale trade	2.6	2.7	2.5
Retail trade	0.5	3.4	2.5
Transportation and warehousing	0.2	0.2	0.2
Information and cultural industries	1.5	2.4	1.9
Finance, insurance and real estate	0.3	0.3	0.5
Architectural, engineering and related services	8.0	11.1	16.0
Computer system design and related services	10.2	12.3	10.6
Management, scientific and technical consulting services	12.0	11.2	9.3
Scientific research and development	47.2	64.6	24.0
Health care and social assistance	31.5	25.9	36.7
All other services	1.1	1.9	3.5
Total services	**2.2**	**2.9**	**3.1**
Total all industries	**1.9**	**2.2**	**2.2**

Table 13.

Current intramural R&D expenditures as a percent of performing company revenues, by industry and by country of control, 2002

Industries	Country of control		
	Canada	Foreign	Total
	percent of company revenues		
Agriculture, forestry, fishing and hunting			
Agriculture	6.1	10.8	7.2
Forestry and logging	0.2	0.0	0.2
Fishing, hunting and trapping	96.2	1.2	27.1
Total agriculture, forestry, fishing and hunting	**1.8**	**10.4**	**2.4**
Mining and oil and gas extraction			
Oil and gas extraction	0.2	0.3	0.3
Mining	0.8	0.7	0.7
Total mining and oil and gas extraction	**0.3**	**0.3**	**0.3**
Utilities			
Electric power	0.5	0.0	0.5
Other utilities	3.8	0.0	3.8
Total utilities	**0.5**	**0.0**	**0.5**
Construction	**3.7**	**125.0**	**3.8**
Manufacturing			
Food	0.3	0.2	0.3
Beverage and tobacco	0.5	0.1	0.3
Textile	1.4	2.1	1.6
Wood products	1.1	0.0	1.1
Paper	0.9	1.1	0.9
Printing	1.6	0.0	1.6
Petroleum and coal products	0.2	0.2	0.2
Pharmaceutical and medicine	19.0	9.1	10.8
Other chemicals	1.5	0.8	1.0
Plastic products	1.6	0.7	1.3
Rubber products	3.4	1.1	1.5
Non-metallic mineral products	1.4	0.1	0.5
Primary metal (ferrous)	0.3	0.3	0.3
Primary metal (non-ferrous)	1.3	1.5	1.3
Fabricated metal products	2.4	0.7	2.0
Machinery	4.1	3.6	4.0
Computer and peripheral equipment	8.4	5.0	6.1
Communications equipment	43.1	9.2	29.4
Semiconductor and other electronic components	16.7	3.1	7.2
Navigational, measuring, medical and control instruments	10.7	8.0	9.8
Other computer and electronic products	9.4	0.4	8.0
Electrical equipment, appliance and components	3.4	1.6	2.2
Motor vehicle and parts	1.3	0.3	0.3
Aerospace products and parts	3.0	14.1	5.5
All other transportation equipment	1.8	0.5	1.0
Furniture and related products	1.1	0.0	1.1
Other manufacturing industries	3.8	3.4	3.8
Total manufacturing	**3.7**	**1.3**	**2.2**
Services			
Wholesale trade	1.5	3.7	2.5
Retail trade	2.8	1.0	2.5
Transportation and warehousing	0.2	0.2	0.2
Information and cultural industries	1.5	29.8	1.9
Finance, insurance and real estate	0.5	46.1	0.5
Architectural, engineering and related services	11.2	27.0	16.0
Computer system design and related services	10.0	13.5	10.6
Management, scientific and technical consulting services	9.1	53.6	9.3
Scientific research and development	21.5	38.8	24.0
Health care and social assistance	29.8	100.4	36.7
All other services	3.1	8.5	3.5
Total services	**2.5**	**6.2**	**3.1**
Total all industries	**2.6**	**1.7**	**2.2**

Table 14.

Current intramural R&D expenditures as a percent of performing company revenues, by country of control, 2000 to 2002

Country of control	2000[r]	2001[r]	2002[p]
	percent of company revenues		
Canada	2.3	2.6	2.6
United States	1.3	1.5	1.6
Other foreign	1.5	1.7	1.8
Total	**1.9**	**2.2**	**2.2**

TABLE 15.

Current intramural R&D expenditures as a percent of performing company revenues, by employment size, 2000 to 2002

Employment size	2000[r]	2001[r]	2002[p]
		percent of company revenues	
1 to 49	4.9	4.9	5.0
50 to 99	5.4	6.1	10.2
100 to 199	4.5	5.0	6.7
200 to 499	2.4	3.4	4.8
500 to 999	2.3	2.8	3.5
1000 to 1999	2.0	2.4	2.8
2000 to 4999	0.9	1.2	1.2
Greater than 4999	1.4	1.5	1.2
Total	**1.9**	**2.2**	**2.2**

Table 16.

Total intramural R&D expenditures, by country of control, 2000 to 2002

Country of control	2000[r]	2001[r]	2002[p]
		in millions of $	
Canada	8,724	9,743	8,212
United States	2,491	2,853	2,905
Other foreign	1,131	1,251	1,266
Total	**12,346**	**13,847**	**12,383**

Table 17.

Total intramural R&D expenditures, by employment size, 2000 to 2002

Employment size	2000[r]	2001[r]	2002[p]
		in millions of $	
Non-Commercial Enterprise	157	177	163
1 to 49	1,452	1,700	1,489
50 to 99	772	1,074	1,042
100 to 199	1,100	1,287	1,109
200 to 499	1,018	1,155	1,201
500 to 999	1,136	1,299	1,165
1000 to 1999	1,487	1,602	1,815
2000 to 4999	1,075	1,080	1,120
Greater than 4999	4,150	4,473	3,279
Total	**12,346**	**13,847**	**12,383**

Table 18.

Total intramural R&D expenditures of Canadian-controlled firms as a percent of all intramural R&D expenditures, by industry, 2000 to 2002

Industries	2000[r]	2001[r]	2002[p]
		percent	
Agriculture, forestry, fishing and hunting			
Agriculture	53	63	66
Forestry and logging	x	100	100
Fishing, hunting and trapping	100	x	x
Total agriculture, forestry, fishing and hunting	**65**	**72**	**73**
Mining and oil and gas extraction			
Oil and gas extraction	83	70	81
Mining	75	71	66
Total mining and oil and gas extraction	**80**	**70**	**78**
Utilities			
Electric power	100	100	100
Other utilities	100	100	100
Total utilities	**100**	**100**	**100**
Construction	**x**	**x**	**x**
Manufacturing			
Food	75	78	78
Beverage and tobacco	64	75	78
Textile	71	61	57
Wood products	94	x	100
Paper	81	87	62
Printing	x	x	100
Petroleum and coal products	x	x	18
Pharmaceutical and medicine	24	25	31
Other chemicals	36	40	39
Plastic products	85	86	85
Rubber products	35	46	x
Non-metallic mineral products	89	89	x
Primary metal (ferrous)	81	83	83
Primary metal (non-ferrous)	x	x	x
Fabricated metal products	91	92	93
Machinery	75	78	75
Computer and peripheral equipment	74	49	49
Communications equipment	89	90	88
Semiconductor and other electronic components	x	x	69
Navigational, measuring, medical and control instruments	72	76	72
Other computer and electronic products	100	100	x
Electrical equipment, appliance and components	45	38	53
Motor vehicle and parts	51	37	27
Aerospace products and parts	48	43	41
All other transportation equipment	71	45	67
Furniture and related products	100	100	100
Other manufacturing industries	87	90	88
Total manufacturing	**69**	**68**	**63**
Services			
Wholesale trade	59	50	33
Retail trade	x	x	x
Transportation and warehousing	x	x	x
Information and cultural industries	73	87	79
Finance, insurance and real estate	x	x	x
Architectural, engineering and related services	53	53	56
Computer system design and related services	83	79	78
Management, scientific and technical consulting services	x	x	x
Scientific research and development	84	80	79
Health care and social assistance	x	x	x
All other services	x	87	84
Total services	**72**	**74**	**71**
Total all industries	**71**	**70**	**66**

Table 19.

Sources of funds for intramural R&D, 1981 to 2002

Year	Business enterprises			Federal sources		Provincial sources	Other Canadian sources	Foreign sources	Total
	Canadian performing companies	Related companies	R&D contracts for other companies	Grants	Contracts				
				in millions of $					
1981	1,543	123	70	132	58	37	3	158	2,124
1982	1,698	142	69	177	89	44	4	266	2,489
1983	1,608	158	76	175	106	46	3	431	2,602
1984	1,829	212	71	183	152	52	7	516	3,022
1985	2,323	241	97	215	168	60	12	518	3,633
1986	2,610	257	112	251	160	63	18	551	4,022
1987	2,714	255	125	287	155	60	9	734	4,340
1988	2,855	285	123	272	181	63	5	840	4,623
1989	2,981	325	164	239	177	69	6	819	4,779
1990	3,280	304	167	215	176	93	13	923	5,169
1991 r	3,388	275	162	204	212	114	11	988	5,355
1992	3,639	266	188	261	271	86	12	1,019	5,742
1993	4,073	347	242	266	250	105	7	1,134	6,424
1994	4,922	337	266	267	200	99	10	1,466	7,567
1995	5,383	286	259	259	152	87	10	1,555	7,991
1996 r	5,450	297	186	185	107	102	8	1,662	7,996
1997 r	6,126	268	156	253	103	77	8	1,750	8,741
1998 r	6,397	294	167	179	84	56	8	2,499	9,684
1999 r	6,969	201	214	241	68	58	8	2,642	10,401
2000 r	8,020	306	182	165	74	45	8	3,547	12,346
2001 r	10,009	334	164	343	116	51	14	2,816	13,847
2002 p	9,624	428	206	192	79	52	18	1,782	12,383

Table 20.

Sources of funds for intramural R&D, by industry, 2002

Industries	Canadian performing companies	Federal government and other Canadian sources	Foreign sources	Total
		in millions of $		
Agriculture, forestry, fishing and hunting				
Agriculture	49	x	x	71
Forestry and logging	5	x	x	16
Fishing, hunting and trapping	3	1	0	4
Total agriculture, forestry, fishing and hunting	**57**	**22**	**11**	**90**
Mining and oil and gas extraction				
Oil and gas extraction	131	x	x	162
Mining	30	x	x	31
Total mining and oil and gas extraction	**160**	**x**	**x**	**193**
Utilities				
Electric power	101	50	7	157
Other utilities	2	0	0	3
Total utilities	**103**	**50**	**7**	**160**
Construction	**30**	**3**	**0**	**33**
Manufacturing				
Food	62	1	0	63
Beverage and tobacco	26	x	x	27
Textile	33	0	0	33
Wood products	15	x	x	39
Paper	233	x	x	282
Printing	11	0	0	11
Petroleum and coal products	72	x	x	87
Pharmaceutical and medicine	658	93	350	1,101
Other chemicals	131	26	93	250
Plastic products	55	0	0	55
Rubber products	11	x	x	13
Non-metallic mineral products	8	0	0	8
Primary metal (ferrous)	23	0	0	23
Primary metal (non-ferrous)	153	x	x	179
Fabricated metal products	85	1	0	86
Machinery	355	19	3	378
Computer and peripheral equipment	163	x	x	197
Communications equipment	1,878	21	90	1,988
Semiconductor and other electronic components	444	x	x	848
Navigational, measuring, medical and control instruments	340	40	21	400
Other computer and electronic products	18	0	0	18
Electrical equipment, appliance and components	154	9	3	167
Motor vehicle and parts	333	9	9	350
Aerospace products and parts	775	80	45	900
All other transportation equipment	14	0	0	14
Furniture and related products	14	0	0	14
Other manufacturing industries	87	x	x	115
Total manufacturing	**6,150**	**486**	**1,013**	**7,648**
Services				
Wholesale trade	344	36	172	552
Retail trade	25	x	x	29
Transportation and warehousing	27	x	x	28
Information and cultural industries	502	70	50	622
Finance, insurance and real estate	174	x	x	191
Architectural, engineering and related services	375	62	17	454
Computer system design and related services	787	45	99	932
Management, scientific and technical consulting services	53	10	12	75
Scientific research and development services	495	57	264	816
Health care and social assistance	180	69	117	366
All other services	162	14	18	193
Total services	**3,124**	**382**	**752**	**4,258**
Total all industries	**9,624**	**976**	**1,782**	**12,383**

Table 21.

Sources of funds for intramural R&D, by country of control of performer, 2002

Country of control	Canadian performing companies	Federal government	Provincial governments	Other Canadian sources	Foreign sources	Total
			in millions of $			
Canada	6,991	177	46	462	537	8,212
United States	1,823	66	3	155	858	2,905
Other foreign	811	28	4	35	388	1,266
Total	**9,624**	**271**	**52**	**652**	**1,782**	**12,383**

Table 22.

Sources of funds for intramural R&D, by employment size, 2002

Employment size	Canadian performing companies	Federal government	Provincial governments	Other Canadian sources	Foreign sources	Total
			in millions of $			
Non-Commercial Enterprise	2	27	25	97	13	163
1 to 49	1,271	40	10	68	99	1,489
50 to 99	720	21	4	52	244	1,042
100 to 199	873	19	3	83	131	1,109
200 to 499	872	11	5	59	254	1,201
500 to 999	758	52	3	75	276	1,165
1000 to 1999	1,256	46	2	168	344	1,815
2000 to 4999	978	9	0	7	125	1,120
Greater than 4999	2,894	45	0	42	297	3,279
Total	**9,624**	**271**	**52**	**652**	**1,782**	**12,383**

Table 23.

Number of persons engaged in R&D, by industry and by occupational category, 2002

Industries	Professionals	Technicians	Other	Total
			person-years	
Agriculture, forestry, fishing and hunting				
Agriculture	205	204	172	581
Forestry and logging	101	51	16	168
Fishing, hunting and trapping	22	29	12	63
Total agriculture, forestry, fishing and hunting	**328**	**284**	**200**	**812**
Mining and oil and gas extraction				
Oil and gas extraction	210	121	57	388
Mining	106	64	48	218
Total mining and oil and gas extraction	**316**	**185**	**105**	**606**
Utilities				
Electric power	467	188	165	820
Other utilities	25	17	10	52
Total utilities	**492**	**205**	**175**	**872**
Construction	**287**	**210**	**100**	**597**
Manufacturing				
Food	406	274	130	810
Beverage and tobacco	90	46	113	249
Textile	142	207	79	428
Wood products	151	149	135	435
Paper	384	343	474	1,201
Printing	67	107	22	196
Petroleum and coal products	122	86	16	224
Pharmaceutical and medicine	2,617	1,404	971	4,992
Other chemicals	1,025	687	259	1,971
Plastic products	299	358	126	783
Rubber products	64	61	28	153
Non-metallic mineral products	62	68	30	160
Primary metal (ferrous)	172	92	54	318
Primary metal (non-ferrous)	437	310	118	865
Fabricated metal products	635	648	223	1,506
Machinery	2,206	1,426	625	4,257
Computer and peripheral equipment	1,382	354	91	1,827
Communications equipment	10,176	807	525	11,508
Semiconductor and other electronic components	3,980	853	392	5,225
Navigational, measuring, medical and control instruments	2,810	997	220	4,027
Other computer and electronic products	170	51	33	254
Electrical equipment, appliance and components	834	680	202	1,716
Motor vehicle and parts	1,537	665	312	2,514
Aerospace products and parts	2,621	1,124	1,236	4,981
All other transportation equipment	119	80	33	232
Furniture and related products	97	118	47	262
Other manufacturing industries	598	609	178	1,385
Total manufacturing	**33,203**	**12,604**	**6,672**	**52,479**
Services				
Wholesale trade	2,643	985	458	4,086
Retail trade	288	206	82	576
Transportation and warehousing	204	119	29	352
Information and cultural industries	4,755	2,219	1,253	8,227
Finance, insurance and real estate	1,032	483	77	1,592
Architectural, engineering and related services	3,504	696	452	4,652
Computer system design and related services	8,925	3,238	673	12,836
Management, scientific and technical consulting services	776	305	78	1,159
Scientific research and development	4,288	1,648	499	6,435
Health care and social assistance	1,238	1,256	462	2,956
All other services	1,326	875	312	2,513
Total services	**28,979**	**12,030**	**4,375**	**45,384**
Total all industries	**63,605**	**25,518**	**11,627**	**100,750**

Table 24.

Professional personnel engaged in R&D, by industry and by degree level, 2002

Industries	Bachelors	Masters	Doctorates	Total
		person-years		
Agriculture, forestry, fishing and hunting				
Agriculture	144	24	37	205
Forestry and logging	75	22	4	101
Fishing, hunting and trapping	21	1	0	22
Total agriculture, forestry, fishing and hunting	**240**	**47**	**41**	**328**
Mining and oil and gas extraction				
Oil and gas extraction	152	25	33	210
Mining	65	15	26	106
Total mining and oil and gas extraction	**217**	**40**	**59**	**316**
Utilities				
Electric power	194	137	136	467
Other utilities	25	0	0	25
Total utilities	**219**	**137**	**136**	**492**
Construction	**268**	**8**	**11**	**287**
Manufacturing				
Food	346	31	29	406
Beverage and tobacco	71	12	7	90
Textile	134	7	1	142
Wood products	99	18	34	151
Paper	199	76	109	384
Printing	64	1	2	67
Petroleum and coal products	67	12	43	122
Pharmaceutical and medicine	1,525	553	539	2,617
Other chemicals	780	102	143	1,025
Plastic products	289	6	4	299
Rubber products	57	2	5	64
Non-metallic mineral products	60	1	1	62
Primary metal (ferrous)	129	29	14	172
Primary metal (non-ferrous)	244	87	106	437
Fabricated metal products	602	30	3	635
Machinery	1,828	283	95	2,206
Computer and peripheral equipment	1,150	149	83	1,382
Communications equipment	8,123	1,647	406	10,176
Semiconductor and other electronic components	3,011	825	144	3,980
Navigational, measuring, medical and control instruments	2,306	368	136	2,810
Other computer and electronic products	143	14	13	170
Electrical equipment, appliance and components	650	121	63	834
Motor vehicle and parts	1,352	120	65	1,537
Aerospace products and parts	2,026	499	96	2,621
All other transportation equipment	111	4	4	119
Furniture and related products	96	0	1	97
Other manufacturing industries	460	70	68	598
Total manufacturing	**25,922**	**5,067**	**2,214**	**33,203**
Services				
Wholesale trade	2,096	313	234	2,643
Retail trade	270	11	7	288
Transportation and warehousing	175	17	12	204
Information and cultural industries	4,170	445	140	4,755
Finance, insurance and real estate	882	124	26	1,032
Architectural, engineering and related services	2,939	397	168	3,504
Computer system design and related services	8,148	623	154	8,925
Management, scientific and technical consulting services	705	49	22	776
Scientific research and development	3,316	485	487	4,288
Health care and social assistance	721	244	273	1,238
All other services	1,201	61	64	1,326
Total services	**24,623**	**2,769**	**1,587**	**28,979**
Total all industries	**51,489**	**8,068**	**4,048**	**63,605**

Table 25.

Number of persons engaged in R&D, by province and by occupational category, 2002

Province	Professionals	Other	Total
		person-years	
Newfoundland and Labrador	140	75	215
Prince Edward Island	44	23	67
Nova Scotia	380	296	676
New Brunswick	264	247	511
Quebec	20,740	15,484	36,224
Ontario	32,911	15,119	48,030
Manitoba	628	541	1,169
Saskatchewan	399	421	820
Alberta	2,999	1,793	4,792
British Columbia	5,100	3,145	8,245
Yukon, Northwest Territories and Nunavut	0	1	1
Total	**63,605**	**37,145**	**100,750**

Table 26.

Number of persons engaged in R&D, by industry group and by region, 2002

Industry group	Quebec	Ontario	Alberta	British Columbia	Other provinces [1]	Total
			person-years			
Agriculture, forestry, fishing and hunting	385	192	43	135	57	812
Mining and oil and gas extraction	17	83	389	65	52	606
Utilities	691	94	2	45	40	872
Construction	304	153	19	56	65	597
Manufacturing	17,088	29,262	1,491	2,996	1,642	52,479
Services	17,739	18,246	2,848	4,948	1,603	45,384
Total	**36,224**	**48,030**	**4,792**	**8,245**	**3,459**	**100,750**

1. *Includes the Yukon, Northwest Territories and Nunavut.*

Table 27.

Number of R&D performers, by industry and by country of control, 2002

Industries	Country of control			Total
	Canada	U.S.	Other foreign	
	number			
Agriculture, forestry, fishing and hunting				
Agriculture	204	1	2	207
Forestry and logging	32	0	0	32
Fishing, hunting and trapping	22	0	1	23
Total agriculture, forestry, fishing and hunting	**258**	**1**	**3**	**262**
Mining and oil and gas extraction				
Oil and gas extraction	30	3	1	34
Mining	16	3	3	22
Total mining and oil and gas extraction	**46**	**6**	**4**	**56**
Utilities				
Electric power	10	0	0	10
Other utilities	21	0	0	21
Total utilities	**31**	**0**	**0**	**31**
Construction	**234**	**1**	**0**	**235**
Manufacturing				
Food	226	9	4	239
Beverage and tobacco	18	0	4	22
Textile	81	5	3	89
Wood products	119	0	0	119
Paper	50	7	3	60
Printing	70	0	0	70
Petroleum and coal products	11	1	3	15
Pharmaceutical and medicine	71	12	8	91
Other chemicals	201	20	13	234
Plastic products	199	2	5	206
Rubber products	35	4	1	40
Non-metallic mineral products	73	0	2	75
Primary metal (ferrous)	30	0	5	35
Primary metal (non-ferrous)	38	0	1	39
Fabricated metal products	434	4	4	442
Machinery	682	6	11	699
Computer and peripheral equipment	62	7	0	69
Communications equipment	105	9	1	115
Semiconductor and other electronic components	117	6	0	123
Navigational, measuring, medical and control instruments	195	6	10	211
Other computer and electronic products	27	1	0	28
Electrical equipment, appliance and components	147	9	8	164
Motor vehicle and parts	99	9	9	117
Aerospace products and parts	34	4	2	40
All other transportation equipment	45	3	2	50
Furniture and related products	106	0	0	106
Other manufacturing industries	274	6	3	283
Total manufacturing	**3,549**	**130**	**102**	**3,781**
Services				
Wholesale trade	618	20	25	663
Retail trade	157	1	2	160
Transportation and warehousing	51	2	0	53
Information and cultural industries	330	5	3	338
Finance, insurance and real estate	81	0	2	83
Architectural, engineering and related services	474	4	6	484
Computer system design and related services	1,310	19	6	1,335
Management, scientific and technical consulting services	303	1	1	305
Scientific research and development	470	9	7	486
Health care and social assistance	70	1	1	72
All other services	542	2	4	548
Total services	**4,406**	**64**	**57**	**4,527**
Total all industries	**8,524**	**202**	**166**	**8,892**

Table 28.

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
AGRICULTURE, FORESTRY, FISHING AND HUNTING		
AGRICULTURE		
Soybean Farming	111110	1
Oilseed (except Soybean) Farming	111120	0
Dry Pea and Bean Farming	111130	1
Wheat Farming	111140	0
Corn Farming	111150	1
Rice Farming	111160	0
Other Grain Farming	111190	2
Potato Farming	111211	14
Other Vegetable (except Potato) and Melon Farming	111219	38
Orange Groves	111310	0
Citrus (except Orange) Groves	111320	0
Non-Citrus Fruit and Tree Nut Farming	111330	13
Mushroom Production	111411	5
Other Food Crops Grown Under Cover	111419	12
Nursery and Tree Production	111421	11
Floriculture Production	111422	28
Tobacco Farming	111910	5
Cotton Farming	111920	0
Sugar-Cane Farming	111930	0
Hay Farming	111940	3
Fruit and Vegetable Combination Farming	111993	0
All Other Miscellaneous Crop Farming	111999	15
Beef Cattle Ranching and Farming, including Feedlots	112110	9
Dairy Cattle and Milk Production	112120	4
Hog and Pig Farming	112210	14
Chicken Egg Production	112310	1
Broiler and Other Meat-Type Chicken Production	112320	3
Turkey Production	112330	0
Poultry Hatcheries	112340	1
Combination Poultry and Egg Production	112391	0
All Other Poultry Production	112399	0
Sheep Farming	112410	0
Goat Farming	112420	0
Apiculture	112910	0
Horse and Other Equine Production	112920	0
Fur-Bearing Animal and Rabbit Production	112930	0
Animal Combination Farming	112991	6
All Other Miscellaneous Animal Production	112999	1
Support Activities for Crop Production	115110	10
Support Activities for Animal Production	115210	9
FORESTRY AND LOGGING		
Timber Tract Operations	113110	2
Forest Nurseries and Gathering of Forest Products	113210	2
Logging (except Contract)	113311	5
Contract Logging	113312	9
Support Activities for Forestry	115310	14
FISHING, HUNTING AND TRAPPING		
Salt Water Fishing	114113	4
Inland Fishing	114114	0
Hunting and Trapping	114210	0
Animal Aquaculture	112510	19
MINING AND OIL AND GAS EXTRACTION		
OIL AND GAS EXTRACTION		
Conventional Oil and Gas Extraction	211113	10
Non-Conventional Oil Extraction	211114	2
Oil and Gas Contract Drilling	213111	3
Services to Oil and Gas Extraction	213118	19
MINING		
Bituminous Coal Mining	212114	0
Subbituminous Coal Mining	212115	0
Lignite Coal Mining	212116	0
Iron Ore Mining	212210	1
Gold and Silver Ore Mining	212220	1
Lead-Zinc Ore Mining	212231	0
Nickel-Copper Ore Mining	212232	1
Copper-Zinc Ore Mining	212233	2
Uranium Ore Mining	212291	1
All Other Metal Ore Mining	212299	1
Granite Mining and Quarrying	212314	1
Limestone Mining and Quarrying	212315	2
Marble Mining and Quarrying	212316	0
Sandstone Mining and Quarrying	212317	0
Sand and Gravel Mining and Quarrying	212323	0
Shale, Clay and Refractory Mineral Mining and Quarrying	212326	0
Diamond Mines	212392	0
Salt Mines	212393	0
Asbestos Mining	212394	0
Gypsum Mining	212395	0
Potash Mining	212396	2
Peat Extraction	212397	4
All Other Non-Metallic Mineral Mining and Quarrying	212398	0
Contract Drilling (except Oil and Gas)	213117	3
Other Support Activities for Mining	213119	3
UTILITIES		
ELECTRIC POWER		
Hydro-Electric Power Generation	221111	7
Fossil-Fuel Electric Power Generation	221112	1
Nuclear Electric Power Generation	221113	1
Other Electric Power Generation	221119	0
Electric Bulk Power Transmission and Control	221121	1
Electric Power Distribution	221122	0
OTHER UTILITIES		
Natural Gas Distribution	221210	0
Water Supply and Irrigation Systems	221310	1
Sewage Treatment Facilities	221320	2
Steam and Air-Conditioning Supply	221330	1
Waste Collection	562110	2
Waste Treatment and Disposal	562210	4
Remediation Services	562910	6
Material Recovery Facilities	562920	1
All Other Waste Management Services	562990	4
CONSTRUCTION		
Residential Building Construction	236110	17
Industrial Building and Structure Construction	236210	7
Commercial and Institutional Building Construction	236220	8
Water and Sewer Line and Related Structures Construction	237110	2
Oil and Gas Pipeline and Related Structures Construction	237120	2
Power and Communication Line and Related Structures Construction	237130	2
Land Subdivision	237210	8
Highway, Street and Bridge Construction	237310	17
Other Heavy and Civil Engineering Construction	237990	6
Poured Concrete Foundation and Structure Contractors	238110	6
Structural Steel and Precast Concrete Contractors	238120	3
Framing Contractors	238130	2
Masonry Contractors	238140	3
Glass and Glazing Contractors	238150	1
Roofing Contractors	238160	0
Siding Contractors	238170	2
Other Foundation, Structure and Building Exterior Contractors	238190	3
Electrical Contractors	238210	47
Plumbing, Heating and Air-Conditioning Contractors	238220	45

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
Elevator and Escalator Installation Contractors	238291	1
All Other Building Equipment Contractors	238299	10
Drywall and Insulation Contractors	238310	1
Painting and Wall Covering Contractors	238320	5
Flooring Contractors	238330	2
Tile and Terrazzo Contractors	238340	1
Finish Carpentry Contractors	238350	9
Other Building Finishing Contractors	238390	3
Site Preparation Contractors	238910	15
All Other Specialty Trade Contractors	238990	7
MANUFACTURING		
FOOD		
Dog and Cat Food Manufacturing	311111	4
Other Animal Food Manufacturing	311119	21
Flour Milling	311211	4
Rice Milling and Malt Manufacturing	311214	3
Wet Corn Milling	311221	0
Oilseed Processing	311224	2
Fat and Oil Refining and Blending	311225	1
Breakfast Cereal Manufacturing	311230	3
Sugar Manufacturing	311310	2
Chocolate and Confectionery Manufacturing from Cacao Beans	311320	1
Confectionery Manufacturing from Purchased Chocolate	311330	3
Non-Chocolate Confectionery Manufacturing	311340	6
Frozen Food Manufacturing	311410	13
Fruit and Vegetable Canning, Pickling and Drying	311420	26
Fluid Milk Manufacturing	311511	6
Butter, Cheese, and Dry and Condensed Dairy Products Manufacturing	311515	22
Ice Cream and Frozen Dessert Manufacturing	311520	4
Animal (except Poultry) Slaughtering	311611	6
Rendering and Meat Processing from Carcasses	311614	16
Poultry Processing	311615	11
Seafood Product Preparation and Packaging	311710	13
Retail Bakeries	311811	5
Commercial Bakeries and Frozen Bakery Product Manufacturing	311814	16
Cookie and Cracker Manufacturing	311821	4
Flour Mixes and Dough Manufacturing from Purchased Flour	311822	7
Dry Pasta Manufacturing	311823	1
Tortilla Manufacturing	311830	1
Roasted Nut and Peanut Butter Manufacturing	311911	1
Other Snack Food Manufacturing	311919	3
Coffee and Tea Manufacturing	311920	4
Flavouring Syrup and Concentrate Manufacturing	311930	1
Seasoning and Dressing Manufacturing	311940	9
All Other Food Manufacturing	311990	20
BEVERAGES AND TOBACCO		
Soft Drink and Ice Manufacturing	312110	3
Breweries	312120	7
Wineries	312130	6
Distilleries	312140	3
Tobacco Stemming and Redrying	312210	0
Tobacco Product Manufacturing	312220	3
TEXTILE		
Fibre, Yarn and Thread Mills	313110	7
Broad-Woven Fabric Mills	313210	13
Narrow Fabric Mills and Schiffli Machine Embroidery	313220	5
Nonwoven Fabric Mills	313230	4
Knit Fabric Mills	313240	21
Textile and Fabric Finishing	313310	13
Fabric Coating	313320	3
Carpet and Rug Mills	314110	4
Curtain and Linen Mills	314120	1
Textile Bag and Canvas Mills	314910	9
All Other Textile Product Mills	314990	9
WOOD PRODUCTS		
Sawmills (except Shingle and Shake Mills)	321111	35
Shingle and Shake Mills	321112	2
Wood Preservation	321114	4
Hardwood Veneer and Plywood Mills	321211	8
Softwood Veneer and Plywood Mills	321212	4
Structural Wood Product Manufacturing	321215	6
Particle Board and Fibreboard Mills	321216	4
Waferboard Mills	321217	0
Wood Window and Door Manufacturing	321911	15
Other Millwork	321919	24
Wood Container and Pallet Manufacturing	321920	6
Manufactured (Mobile) Home Manufacturing	321991	0
Prefabricated Wood Building Manufacturing	321992	1
All Other Miscellaneous Wood Product Manufacturing	321999	10
PAPER		
Mechanical Pulp Mills	322111	1
Chemical Pulp Mills	322112	6
Paper (except Newsprint) Mills	322121	6
Newsprint Mills	322122	4
Paperboard Mills	322130	1
Corrugated and Solid Fibre Box Manufacturing	322211	4
Folding Paperboard Box Manufacturing	322212	5
Other Paperboard Container Manufacturing	322219	4
Paper Bag and Coated and Treated Paper Manufacturing	322220	19
Stationery Product Manufacturing	322230	2
Sanitary Paper Product Manufacturing	322291	2
All Other Converted Paper Product Manufacturing	322299	6
PRINTING		
Commercial Screen Printing	323113	1
Quick Printing	323114	0
Digital Printing	323115	2
Manifold Business Forms Printing	323116	2
Other Printing	323119	46
Support Activities for Printing	323120	19
PETROLEUM AND COAL PRODUCTS		
Petroleum Refineries	324110	6
Asphalt Paving Mixture and Block Manufacturing	324121	4
Asphalt Shingle and Coating Material Manufacturing	324122	1
Other Petroleum and Coal Products Manufacturing	324190	4
PHARMACEUTICAL AND MEDICINE		
Pharmaceutical and Medicine Manufacturing	325410	91
OTHER CHEMICAL		
Petrochemical Manufacturing	325110	0
Industrial Gas Manufacturing	325120	2
Synthetic Dye and Pigment Manufacturing	325130	5
Alkali and Chlorine Manufacturing	325181	1
All Other Basic Inorganic Chemical Manufacturing	325189	13
Other Basic Organic Chemical Manufacturing	325190	11
Resin and Synthetic Rubber Manufacturing	325210	16
Artificial and Synthetic Fibres and Filaments Manufacturing	325220	5
Chemical Fertilizer (except Potash) Manufacturing	325313	1
Mixed Fertilizer Manufacturing	325314	2
Pesticide and Other Agricultural Chemical Manufacturing	325320	5
Paint and Coating Manufacturing	325510	33
Adhesive Manufacturing	325520	17
Soap and Cleaning Compound Manufacturing	325610	37
Toilet Preparation Manufacturing	325620	26
Printing Ink Manufacturing	325910	10
Explosives Manufacturing	325920	2

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
Custom Compounding of Purchased Resins	325991	5
All Other Miscellaneous Chemical Product Manufacturing	325999	43
PLASTIC PRODUCT		
Plastic Bag Manufacturing	326111	13
Plastic Film and Sheet Manufacturing	326114	12
Unlaminated Plastic Profile Shape Manufacturing	326121	12
Plastic Pipe and Pipe Fitting Manufacturing	326122	4
Laminated Plastic Plate, Sheet and Shape Manufacturing	326130	7
Polystyrene Foam Product Manufacturing	326140	10
Urethane and Other Foam Product (except Polystyrene) Manufacturing	326150	8
Plastic Bottle Manufacturing	326160	6
Plastic Plumbing Fixture Manufacturing	326191	9
Motor Vehicle Plastic Parts Manufacturing	326193	18
All Other Plastic Product Manufacturing	326198	107
RUBBER PRODUCT		
Tire Manufacturing	326210	3
Rubber and Plastic Hose and Belting Manufacturing	326220	5
Other Rubber Product Manufacturing	326290	32
NON-METALLIC MINERAL PRODUCTS		
Pottery, Ceramics and Plumbing Fixture Manufacturing	327110	1
Clay Building Material and Refractory Manufacturing	327120	3
Glass Manufacturing	327214	5
Glass Product Manufacturing from Purchased Glass	327215	19
Cement Manufacturing	327310	0
Ready-Mix Concrete Manufacturing	327320	5
Concrete Pipe, Brick and Block Manufacturing	327330	9
Other Concrete Product Manufacturing	327390	11
Lime Manufacturing	327410	0
Gypsum Product Manufacturing	327420	2
Abrasive Product Manufacturing	327910	4
All Other Non-Metallic Mineral Product Manufacturing	327990	16
PRIMARY METAL (FERROUS)		
Iron and Steel Mills and Ferro-Alloy Manufacturing	331110	9
Iron and Steel Pipes and Tubes Manufacturing from Purchased Steel	331210	8
Cold-Rolled Steel Shape Manufacturing	331221	0
Steel Wire Drawing	331222	2
Iron Foundries	331511	6
Steel Foundries	331514	10
PRIMARY METAL (NON-FERROUS)		
Primary Production of Alumina and Aluminum	331313	3
Aluminum Rolling, Drawing, Extruding and Alloying	331317	10
Non-Ferrous Metal (except Aluminum) Smelting and Refining	331410	5
Copper Rolling, Drawing, Extruding and Alloying	331420	4
Non-Ferrous Metal (except Copper and Aluminum) Rolling, Drawing, Extruding and Alloying	331490	5
Non-Ferrous Die-Casting Foundries	331523	5
Non-Ferrous Foundries (except Die-Casting)	331529	7
FABRICATED METAL PRODUCT		
Forging	332113	15
Stamping	332118	21
Cutlery and Hand Tool Manufacturing	332210	25
Prefabricated Metal Building and Component Manufacturing	332311	7
Concrete Reinforcing Bar Manufacturing	332314	0
Other Plate Work and Fabricated Structural Product Manufacturing	332319	21
Metal Window and Door Manufacturing	332321	33
Other Ornamental and Architectural Metal Products Manufacturing	332329	30
Power Boiler and Heat Exchanger Manufacturing	332410	7
Metal Tank (Heavy Gauge) Manufacturing	332420	9
Metal Can Manufacturing	332431	0
Other Metal Container Manufacturing	332439	6
Hardware Manufacturing	332510	13
Spring (Heavy Gauge) Manufacturing	332611	0
Other Fabricated Wire Product Manufacturing	332619	12
Machine Shops	332710	131
Turned Product and Screw, Nut and Bolt Manufacturing	332720	14
Coating, Engraving, Heat Treating and Allied Activities	332810	45
Metal Valve Manufacturing	332910	12
Ball and Roller Bearing Manufacturing	332991	2
All Other Miscellaneous Fabricated Metal Product Manufacturing	332999	39
MACHINERY		
Agricultural Implement Manufacturing	333110	57
Construction Machinery Manufacturing	333120	23
Mining and Oil and Gas Field Machinery Manufacturing	333130	24
Sawmill and Woodworking Machinery Manufacturing	333210	19
Rubber and Plastics Industry Machinery Manufacturing	333220	14
Paper Industry Machinery Manufacturing	333291	13
All Other Industrial Machinery Manufacturing	333299	55
Commercial and Service Industry Machinery Manufacturing	333310	69
Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	333413	21
Heating Equipment and Commercial Refrigeration Equipment Manufacturing	333416	46
Industrial Mould Manufacturing	333511	69
Other Metalworking Machinery Manufacturing	333519	103
Turbine and Turbine Generator Set Unit Manufacturing	333611	9
Other Engine and Power Transmission Equipment Manufacturing	333619	7
Pump and Compressor Manufacturing	333910	17
Material Handling Equipment Manufacturing	333920	67
All Other General-Purpose Machinery Manufacturing	333990	86
COMPUTER AND PERIPHERAL EQUIPMENT		
Computer and Peripheral Equipment Manufacturing	334110	69
COMMUNICATIONS EQUIPMENT		
Telephone Apparatus Manufacturing	334210	27
Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	334220	64
Other Communications Equipment Manufacturing	334290	24
SEMICONDUCTOR AND OTHER ELECTRONIC COMPONENT		
Semiconductor and Other Electronic Component Manufacturing	334410	123
NAVIGATIONAL, MEASURING, MEDICAL AND CONTROL INSTRUMENTS		
Navigational and Guidance Instruments Manufacturing	334511	33
Measuring, Medical and Controlling Devices Manufacturing	334512	178
OTHER COMPUTER AND ELECTRONIC PRODUCT		
Audio and Video Equipment Manufacturing	334310	18
Manufacturing and Reproducing Magnetic and Optical Media	334610	10
ELECTRICAL EQUIPMENT, APPLIANCE AND COMPONENT		
Electric Lamp Bulb and Parts Manufacturing	335110	1
Lighting Fixture Manufacturing	335120	31
Small Electrical Appliance Manufacturing	335210	9
Major Kitchen Appliance Manufacturing	335223	9
Other Major Appliance Manufacturing	335229	4
Power, Distribution and Specialty Transformers Manufacturing	335311	14
Motor and Generator Manufacturing	335312	6
Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	335315	38
Battery Manufacturing	335910	5
Communication and Energy Wire and Cable Manufacturing	335920	13
Wiring Device Manufacturing	335930	10
All Other Electrical Equipment and Component Manufacturing	335990	24

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
MOTOR VEHICLE AND PARTS		
Automobile and Light-Duty Motor Vehicle Manufacturing	336110	4
Heavy-Duty Truck Manufacturing	336120	10
Motor Vehicle Body Manufacturing	336211	10
Truck Trailer Manufacturing	336212	16
Motor Home, Travel Trailer and Camper Manufacturing	336215	7
Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	336310	10
Motor Vehicle Electrical and Electronic Equipment Manufacturing	336320	15
Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	336330	2
Motor Vehicle Brake System Manufacturing	336340	6
Motor Vehicle Transmission and Power Train Parts Manufacturing	336350	3
Motor Vehicle Seating and Interior Trim Manufacturing	336360	7
Motor Vehicle Metal Stamping	336370	12
Other Motor Vehicle Parts Manufacturing	336390	15
AEROSPACE PRODUCT AND PARTS		
Aerospace Product and Parts Manufacturing	336410	40
ALL OTHER TRANSPORTATION EQUIPMENT		
Railroad Rolling Stock Manufacturing	336510	8
Ship Building and Repairing	336611	1
Boat Building	336612	21
Other Transportation Equipment Manufacturing	336990	20
FURNITURE AND RELATED PRODUCT		
Wood Kitchen Cabinet and Counter Top Manufacturing	337110	9
Upholstered Household Furniture Manufacturing	337121	5
Other Wood Household Furniture Manufacturing	337123	24
Household Furniture (except Wood and Upholstered) Manufacturing	337126	7
Institutional Furniture Manufacturing	337127	8
Wood Office Furniture, including Custom Architectural Woodwork, Manufacturing	337213	21
Office Furniture (except Wood) Manufacturing	337214	11
Showcase, Partition, Shelving and Locker Manufacturing	337215	15
Mattress Manufacturing	337910	6
Blind and Shade Manufacturing	337920	0
OTHER MANUFACTURING INDUSTRIES		
Hosiery and Sock Mills	315110	8
Other Clothing Knitting Mills	315190	10
Cut and Sew Clothing Contracting	315210	3
Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing	315221	0
Men's and Boys' Cut and Sew Suit, Coat and Overcoat Manufacturing	315222	0
Men's and Boys' Cut and Sew Shirt Manufacturing	315226	0
Men's and Boys' Cut and Sew Trouser, Slack and Jean Manufacturing	315227	1
Other Men's and Boys' Cut and Sew Clothing Manufacturing	315229	4
Women's and Girls' Cut and Sew Lingerie, Loungewear and Nightwear Manufacturing	315231	5
Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing	315232	1
Women's and Girls' Cut and Sew Dress Manufacturing	315233	4
Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket and Skirt Manufacturing	315234	2
Other Women's and Girls' Cut and Sew Clothing Manufacturing	315239	5
Infants' Cut and Sew Clothing Manufacturing	315291	1
Fur and Leather Clothing Manufacturing	315292	2
All Other Cut and Sew Clothing Manufacturing	315299	1
Clothing Accessories and Other Clothing Manufacturing	315990	4
Leather and Hide Tanning and Finishing	316110	6
Footwear Manufacturing	316210	10
Other Leather and Allied Product Manufacturing	316990	1
Medical Equipment and Supplies Manufacturing	339110	77
Jewellery and Silverware Manufacturing	339910	14
Sporting and Athletic Goods Manufacturing	339920	40
Doll, Toy and Game Manufacturing	339930	6
Office Supplies (except Paper) Manufacturing	339940	5
Sign Manufacturing	339950	15
All Other Miscellaneous Manufacturing	339990	58
SERVICES		
WHOLESALE TRADE		
Live Animal Wholesaler-Distributors	411110	2
Oilseed and Grain Wholesaler-Distributors	411120	2
Nursery Stock and Plant Wholesaler-Distributors	411130	3
Other Farm Product Wholesaler-Distributors	411190	0
Petroleum Product Wholesaler-Distributors	412110	2
General-Line Food Wholesaler-Distributors	413110	3
Dairy and Milk Products Wholesaler-Distributors	413120	3
Poultry and Egg Wholesaler-Distributors	413130	0
Fish and Seafood Product Wholesaler-Distributors	413140	1
Fresh Fruit and Vegetable Wholesaler-Distributors	413150	13
Red Meat and Meat Product Wholesaler-Distributors	413160	6
Other Specialty-Line Food Wholesaler-Distributors	413190	25
Non-Alcoholic Beverage Wholesaler-Distributors	413210	1
Alcoholic Beverage Wholesaler-Distributors	413220	0
Cigarette and Tobacco Product Wholesaler-Distributors	413310	0
Clothing and Clothing Accessories Wholesaler-Distributors	414110	5
Footwear Wholesaler-Distributors	414120	2
Piece Goods, Notions and Other Dry Goods Wholesaler-Distributors	414130	11
Home Entertainment Equipment Wholesaler-Distributors	414210	4
Household Appliance Wholesaler-Distributors	414220	3
China, Glassware, Crockery and Pottery Wholesaler-Distributors	414310	1
Floor Covering Wholesaler-Distributors	414320	2
Linen, Drapery and Other Textile Furnishings Wholesaler-Distributors	414330	0
Other Home Furnishings Wholesaler-Distributors	414390	5
Jewellery and Watch Wholesaler-Distributors	414410	2
Book, Periodical and Newspaper Wholesaler-Distributors	414420	1
Photographic Equipment and Supplies Wholesaler-Distributors	414430	3
Sound Recording Wholesalers	414440	0
Video Cassette Wholesalers	414450	0
Toy and Hobby Goods Wholesaler-Distributors	414460	1
Amusement and Sporting Goods Wholesaler-Distributors	414470	5
Pharmaceuticals and Pharmacy Supplies Wholesaler-Distributors	414510	36
Toiletries, Cosmetics and Sundries Wholesaler-Distributors	414520	10
New and Used Automobile and Light-Duty Truck Wholesaler-Distributors	415110	0
Truck, Truck Tractor and Bus Wholesaler-Distributors	415120	3
Recreational and Other Motor Vehicles Wholesaler-Distributors	415190	2
Tire Wholesaler-Distributors	415210	0
Other New Motor Vehicle Parts and Accessories Wholesaler-Distributors	415290	7
Used Motor Vehicle Parts and Accessories Wholesaler-Distributors	415310	0
Electrical Wiring and Construction Supplies Wholesaler-Distributors	416110	12
Plumbing, Heating and Air-Conditioning Equipment and Supplies Wholesaler-Distributors	416120	23
Metal Service Centres	416210	8
General-Line Building Supplies Wholesaler-Distributors	416310	4
Lumber, Plywood and Millwork Wholesaler-Distributors	416320	9
Hardware Wholesaler-Distributors	416330	12
Paint, Glass and Wallpaper Wholesaler-Distributors	416340	4
Other Specialty-Line Building Supplies Wholesaler-Distributors	416390	10
Farm, Lawn and Garden Machinery and Equipment Wholesaler-Distributors	417110	18
Construction and Forestry Machinery, Equipment and Supplies Wholesaler-Distributors	417210	8

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
Mining and Oil and Gas Well Machinery, Equipment and Supplies Wholesaler-Distributors	417220	6
Industrial Machinery, Equipment and Supplies Wholesaler-Distributors	417230	58
Computer, Computer Peripheral and Pre-Packaged Software Wholesaler-Distributors	417310	53
Electronic Components, Navigational and Communications Equipment and Supplies Wholesaler-Distributors	417320	46
Office and Store Machinery and Equipment Wholesaler-Distributors	417910	13
Service Establishment Machinery, Equipment and Supplies Wholesaler-Distributors	417920	10
Professional Machinery, Equipment and Supplies Wholesaler-Distributors	417930	35
All Other Machinery, Equipment and Supplies Wholesaler-Distributors	417990	16
Recyclable Metal Wholesaler-Distributors	418110	4
Recyclable Paper and Paperboard Wholesaler-Distributors	418120	1
Other Recyclable Material Wholesaler-Distributors	418190	13
Stationery and Office Supplies Wholesaler-Distributors	418210	4
Other Paper and Disposable Plastic Product Wholesaler-Distributors	418220	1
Agricultural Feed Wholesaler-Distributors	418310	8
Seed Wholesaler-Distributors	418320	9
Agricultural Chemical and Other Farm Supplies Wholesaler-Distributors	418390	9
Chemical (except Agricultural) and Allied Product Wholesaler-Distributors	418410	23
Log and Wood Chip Wholesaler-Distributors	418910	3
Mineral, Ore and Precious Metal Wholesaler-Distributors	418920	1
Second-Hand Goods (except Machinery and Automotive) Wholesaler-Distributors	418930	0
All Other Wholesaler-Distributors	418990	42
Farm Product Agents and Brokers	419110	1
Petroleum Product Agents and Brokers	419120	1
Food, Beverage and Tobacco Agents and Brokers	419130	3
Personal and Household Goods Agents and Brokers	419140	2
Motor Vehicle and Parts Agents and Brokers	419150	1
Building Material and Supplies Agents and Brokers	419160	2
Machinery, Equipment and Supplies Agents and Brokers	419170	12
Other Wholesale Agents and Brokers	419190	14
RETAIL TRADE		
New Car Dealers	441110	0
Used Car Dealers	441120	0
Recreational Vehicle Dealers	441210	0
Motorcycle, Boat and Other Motor Vehicle Dealers	441220	7
Automotive Parts and Accessories Stores	441310	2
Tire Dealers	441320	1
Furniture Stores	442110	2
Floor Covering Stores	442210	0
Window Treatment Stores	442291	1
Print and Picture Frame Stores	442292	2
All Other Home Furnishings Stores	442298	1
Appliance, Television and Other Electronics Stores	443110	15
Computer and Software Stores	443120	53
Camera and Photographic Supplies Stores	443130	0
Home Centres	444110	0
Paint and Wallpaper Stores	444120	2
Hardware Stores	444130	2
Other Building Material Dealers	444190	5
Outdoor Power Equipment Stores	444210	1
Nursery and Garden Centres	444220	5
Supermarkets and Other Grocery (except Convenience) Stores	445110	0
Convenience Stores	445120	0
Meat Markets	445210	1
Fish and Seafood Markets	445220	0
Fruit and Vegetable Markets	445230	1
Baked Goods Stores	445291	3
Confectionery and Nut Stores	445292	2
All Other Specialty Food Stores	445299	4
Beer, Wine and Liquor Stores	445310	0
Pharmacies and Drug Stores	446110	2
Cosmetics, Beauty Supplies and Perfume Stores	446120	1
Optical Goods Stores	446130	1
Food (Health) Supplement Stores	446191	1
All Other Health and Personal Care Stores	446199	1
Gasoline Stations with Convenience Stores	447110	0
Other Gasoline Stations	447190	0
Men's Clothing Stores	448110	0
Women's Clothing Stores	448120	2
Children's and Infants' Clothing Stores	448130	0
Family Clothing Stores	448140	1
Clothing Accessories Stores	448150	0
Fur Stores	448191	0
All Other Clothing Stores	448199	0
Shoe Stores	448210	1
Jewellery Stores	448310	1
Luggage and Leather Goods Stores	448320	0
Sporting Goods Stores	451110	4
Hobby, Toy and Game Stores	451120	1
Sewing, Needlework and Piece Goods Stores	451130	1
Musical Instrument and Supplies Stores	451140	1
Book Stores and News Dealers	451210	1
Pre-Recorded Tape, Compact Disc and Record Stores	451220	0
Department Stores	452110	0
Warehouse Clubs and Superstores	452910	0
Home and Auto Supplies Stores	452991	2
All Other Miscellaneous General Merchandise Stores	452999	3
Florists	453110	0
Office Supplies and Stationery Stores	453210	0
Gift, Novelty and Souvenir Stores	453220	3
Used Merchandise Stores	453310	0
Pet and Pet Supplies Stores	453910	0
Art Dealers	453920	0
Mobile Home Dealers	453930	0
Beer and Wine-Making Supplies Stores	453992	1
All Other Miscellaneous Store Retailers (except Beer and Wine-Making Supplies Stores)	453999	5
Electronic Shopping and Mail-Order Houses	454110	9
Vending Machine Operators	454210	3
Fuel Dealers	454310	1
Other Direct Selling Establishments	454390	4
TRANSPORTATION AND WAREHOUSING		
Scheduled Air Transportation	481110	0
Non-Scheduled Chartered Air Transportation	481214	3
Non-Scheduled Specialty Flying Services	481215	1
Short-Haul Freight Rail Transportation	482112	0
Mainline Freight Rail Transportation	482113	2
Passenger Rail Transportation	482114	0
Deep Sea, Coastal and Great Lakes Water Transportation (except by Ferries)	483115	1
Deep Sea, Coastal and Great Lakes Water Transportation by Ferries	483116	0
Inland Water Transportation (except by Ferries)	483213	0
Inland Water Transportation by Ferries	483214	0
General Freight Trucking, Local	484110	3
General Freight Trucking, Long Distance, Truck-Load	484121	4
General Freight Trucking, Long Distance, Less Than Truck-Load	484122	1
Used Household and Office Goods Moving	484210	0
Bulk Liquids Trucking, Local	484221	0
Dry Bulk Materials Trucking, Local	484222	1
Forest Products Trucking, Local	484223	1
Other Specialized Freight (except Used Goods) Trucking, Local	484229	0
Bulk Liquids Trucking, Long Distance	484231	0
Dry Bulk Materials Trucking, Long Distance	484232	1
Forest Products Trucking, Long Distance	484233	0
Other Specialized Freight (except Used Goods) Trucking, Long Distance	484239	2
Urban Transit Systems	485110	0
Interurban and Rural Bus Transportation	485210	0
Taxi Service	485310	0
Limousine Service	485320	0
School and Employee Bus Transportation	485410	0

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
Charter Bus Industry	485510	0
Other Transit and Ground Passenger Transportation	485990	0
Pipeline Transportation of Crude Oil	486110	0
Pipeline Transportation of Natural Gas	486210	1
Pipeline Transportation of Refined Petroleum Products	486910	0
All Other Pipeline Transportation	486990	0
Scenic and Sightseeing Transportation, Land	487110	0
Scenic and Sightseeing Transportation, Water	487210	1
Scenic and Sightseeing Transportation, Other	487990	1
Air Traffic Control	488111	0
Other Airport Operations	488119	0
Other Support Activities for Air Transportation	488190	5
Support Activities for Rail Transportation	488210	1
Port and Harbour Operations	488310	0
Marine Cargo Handling	488320	1
Marine Salvage Services	488331	1
Ship Piloting Services	488332	0
Other Navigational Services to Shipping	488339	0
Other Support Activities for Water Transportation	488390	2
Motor Vehicle Towing	488410	1
Other Support Activities for Road Transportation	488490	1
Marine Shipping Agencies	488511	0
Other Freight Transportation Arrangement	488519	4
Other Support Activities for Transportation	488990	3
Postal Service	491110	0
Couriers	492110	0
Local Messengers and Local Delivery	492210	0
General Warehousing and Storage	493110	5
Refrigerated Warehousing and Storage	493120	3
Farm Product Warehousing and Storage	493130	2
Other Warehousing and Storage	493190	1
INFORMATION AND CULTURAL INDUSTRIES		
Newspaper Publishers	511110	1
Periodical Publishers	511120	1
Book Publishers	511130	3
Directory and Mailing List Publishers	511140	4
Other Publishers	511190	2
Software Publishers	511210	210
Motion Picture and Video Production	512110	12
Motion Picture and Video Distribution	512120	1
Motion Picture and Video Exhibition	512130	0
Post-Production and Other Motion Picture and Video Industries	512190	3
Record Production	512210	1
Integrated Record Production/Distribution	512220	0
Music Publishers	512230	0
Sound Recording Studios	512240	2
Other Sound Recording Industries	512290	0
Radio Broadcasting	515110	0
Television Broadcasting	515120	0
Pay and Specialty Television	515210	1
Internet Publishing and Broadcasting	516110	1
Wired Telecommunications Carriers	517110	13
Wireless Telecommunications Carriers (except Satellite)	517210	9
Telecommunications Resellers	517310	6
Satellite Telecommunications	517410	5
Cable and Other Program Distribution	517510	2
Other Telecommunications	517910	0
Internet Service Providers	518111	24
Web Search Portals	518112	1
Data Processing, Hosting, and Related Services	518210	26
News Syndicates	519110	1
Libraries	519121	2
Archives	519122	2
All Other Information Services	519190	5
FINANCE, INSURANCE AND REAL ESTATE		
Monetary Authorities - Central Bank	521110	0
Personal and Commercial Banking Industry	522111	4
Corporate and Institutional Banking Industry	522112	0
Local Credit Unions	522130	0
Other Depository Credit Intermediation	522190	0
Credit Card Issuing	522210	0
Sales Financing	522220	1
Consumer Lending	522291	0
All Other Non-Depository Credit Intermediation	522299	6
Mortgage and Non-mortgage Loan Brokers	522310	1
Central Credit Unions	522321	0
Other Financial Transactions Processing and Clearing House Activities	522329	1
Other Activities Related to Credit Intermediation	522390	0
Investment Banking and Securities Dealing	523110	2
Securities Brokerage	523120	1
Commodity Contracts Dealing	523130	0
Commodity Contracts Brokerage	523140	1
Securities and Commodity Exchanges	523210	1
Miscellaneous Intermediation	523910	1
Portfolio Management	523920	21
Investment Advice	523930	1
All Other Financial Investment Activities	523990	6
Direct Individual Life, Health and Medical Insurance Carriers	524111	0
Direct Group Life, Health and Medical Insurance Carriers	524112	0
Direct General Property and Casualty Insurance Carriers	524121	0
Direct, Private, Automobile Insurance Carriers	524122	0
Direct, Public, Automobile Insurance Carriers	524123	0
Direct Property Insurance Carriers	524124	0
Direct Liability Insurance Carriers	524125	0
Other Direct Insurance (except Life, Health and Medical) Carriers	524129	0
Life Reinsurance Carriers	524131	0
Accident and Sickness Reinsurance Carriers	524132	0
Automobile Reinsurance Carriers	524133	0
Property Reinsurance Carriers	524134	0
Liability Reinsurance Carriers	524135	0
General and Other Reinsurance Carriers	524139	0
Insurance Agencies and Brokerages	524210	0
Claims Adjusters	524291	1
All Other Insurance Related Activities	524299	1
Trusteed Pension Funds	526111	0
Non-Trusteed Pension Funds	526112	0
Equity Funds - Canadian	526911	0
Equity Funds - Foreign	526912	0
Mortgage Funds	526913	0
Money Market Funds	526914	0
Bond and Income / Dividend Funds - Canadian	526915	0
Bond and Income / Dividend Funds - Foreign	526916	0
Balanced Funds / Asset Allocation Funds	526917	0
Other Open-Ended Funds	526919	0
Mortgage Investment Funds	526920	0
Segregated (except Pension) Funds	526930	0
Securitization Vehicles	526981	0
All Other Miscellaneous Funds and Financial Vehicles	526989	0
Lessors of Residential Buildings and Dwellings (except Social Housing Projects)	531111	0
Lessors of Social Housing Projects	531112	0
Lessors of Non-Residential Buildings (except Mini-Warehouses)	531120	4
Self-Storage Mini-Warehouses	531130	0
Lessors of Other Real Estate Property	531190	1
Offices of Real Estate Agents and Brokers	531210	3
Real Estate Property Managers	531310	1
Offices of Real Estate Appraisers	531320	2
Other Activities Related to Real Estate	531390	0
Passenger Car Rental	532111	1
Passenger Car Leasing	532112	0
Truck, Utility Trailer and RV (Recreational Vehicle) Rental and Leasing	532120	0
Consumer Electronics and Appliance Rental	532210	0
Formal Wear and Costume Rental	532220	0
Video Tape and Disc Rental	532230	1
Other Consumer Goods Rental	532290	1
General Rental Centres	532310	1
Construction, Transportation, Mining, and Forestry Machinery and Equipment Rental and Leasing	532410	6
Office Machinery and Equipment Rental and Leasing	532420	0
Other Commercial and Industrial Machinery and Equipment Rental and Leasing	532490	6
Lessors of Non-Financial Intangible Assets (Except Copyrighted Works)	533110	7

Table 28. (continued)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
ARCHITECTURAL, ENGINEERING AND RELATED		
Architectural Services	541310	7
Landscape Architectural Services	541320	0
Engineering Services	541330	378
Drafting Services	541340	5
Building Inspection Services	541350	5
Geophysical Surveying and Mapping Services	541360	14
Surveying and Mapping (except Geophysical) Services	541370	19
Testing Laboratories	541380	56
COMPUTER SYSTEM DESIGN AND RELATED		
Computer Systems Design and Related Services	541510	1335
MANAGEMENT, SCIENTIFIC AND TECHNICAL CONSULTING		
Administrative Management and General Management Consulting Services	541611	97
Human Resource and Executive Search Consulting Services	541612	6
Other Management Consulting Services	541619	38
Environmental Consulting Services	541620	34
Other Scientific and Technical Consulting Services	541690	130
SCIENTIFIC RESEARCH AND DEVELOPMENT		
Research and Development in the Physical, Engineering and Life Sciences	541710	461
Research and Development in the Social Sciences and Humanities	541720	25
HEALTH CARE AND SOCIAL ASSISTANCE		
Offices of Physicians	621110	11
Offices of Dentists	621210	2
Offices of Chiropractors	621310	1
Offices of Optometrists	621320	2
Offices of Mental Health Practitioners (except Physicians)	621330	3
Offices of Physical, Occupational, and Speech Therapists and Audiologists	621340	1
Offices of All Other Health Practitioners	621390	3
Family Planning Centres	621410	1
Out-Patient Mental Health and Substance Abuse Centres	621420	0
Community Health Centres	621494	0
All Other Out-Patient Care Centres	621499	0
Medical and Diagnostic Laboratories	621510	42
Home Health Care Services	621610	1
Ambulance (except Air Ambulance) Services	621911	0
Air Ambulance Services	621912	0
All Other Ambulatory Health Care Services	621990	1
General (except Paediatric) Hospitals	622111	0
Paediatric Hospitals	622112	0
Psychiatric and Substance Abuse Hospitals	622210	0
Specialty (except Psychiatric and Substance Abuse) Hospitals	622310	1
Nursing Care Facilities	623110	0
Residential Developmental Handicap Facilities	623210	0
Residential Substance Abuse Facilities	623221	0
Homes for the Psychiatrically Disabled	623222	0
Community Care Facilities for the Elderly	623310	0
Transition Homes for Women	623991	0
Homes for Emotionally Disturbed Children	623992	0
Homes for the Physically Handicapped or Disabled	623993	0
All Other Residential Care Facilities	623999	1
Child and Youth Services	624110	0
Services for the Elderly and Persons with Disabilities	624120	0
Other Individual and Family Services	624190	0
Community Food Services	624210	0
Community Housing Services	624220	0
Emergency and Other Relief Services	624230	0
Vocational Rehabilitation Services	624310	0
Child Day-Care Services	624410	2

NAICS description	NAICS	Firms
ALL OTHER SERVICES		
Offices of Lawyers	541110	2
Offices of Notaries	541120	0
Other Legal Services	541190	1
Offices of Accountants	541212	6
Tax Preparation Services	541213	1
Bookkeeping, Payroll and Related Services	541215	4
Interior Design Services	541410	1
Industrial Design Services	541420	31
Graphic Design Services	541430	24
Other Specialized Design Services	541490	6
Advertising Agencies	541810	17
Public Relations Services	541820	0
Media Buying Agencies	541830	1
Media Representatives	541840	6
Display Advertising	541850	4
Direct Mail Advertising	541860	1
Advertising Material Distribution Services	541870	0
Specialty Advertising Distributors	541891	1
All Other Services Related to Advertising	541899	5
Marketing Research and Public Opinion Polling	541910	16
Photographic Services	541920	3
Translation and Interpretation Services	541930	0
Veterinary Services	541940	5
All Other Professional, Scientific and Technical Services	541990	13
Holding Companies	551113	60
Head Offices	551114	0
Office Administrative Services	561110	26
Facilities Support Services	561210	0
Employment Placement Agencies	561310	4
Temporary Help Services	561320	1
Professional Employer Organization	561330	0
Document Preparation Services	561410	5
Telephone Call Centres	561420	4
Business Service Centres	561430	1
Collection Agencies	561440	0
Credit Bureaus	561450	1
Other Business Support Services	561490	1
Travel Agencies	561510	0
Tour Operators	561520	2
Other Travel Arrangement and Reservation Services	561590	1
Investigation Services	561611	1
Security Guard and Patrol Services	561612	0
Armoured Car Services	561613	1
Security Systems Services (except Locksmiths)	561621	16
Locksmiths	561622	0
Exterminating and Pest Control Services	561710	3
Window Cleaning Services	561721	0
Janitorial Services (except Window Cleaning)	561722	6
Landscaping Services	561730	6
Carpet and Upholstery Cleaning Services	561740	1
Duct and Chimney Cleaning Services	561791	2
All Other Services to Buildings and Dwellings	561799	2
Packaging and Labelling Services	561910	11
Convention and Trade Show Organizers	561920	2
All Other Support Services	561990	48
Elementary and Secondary Schools	611110	1
Community Colleges and C.E.G.E.P.s	611210	5
Universities	611310	0
Business and Secretarial Schools	611410	0
Computer Training	611420	6
Professional and Management Development Training	611430	2
Technical and Trade Schools	611510	3
Fine Arts Schools	611610	0
Athletic Instruction	611620	2
Language Schools	611630	0
All Other Schools and Instruction	611690	4
Educational Support Services	611710	1
Theatre (except Musical) Companies	711111	1
Musical Theatre and Opera Companies	711112	0
Dance Companies	711120	1
Musical Groups and Artists	711130	0
Other Performing Arts Companies	711190	0
Sports Teams and Clubs	711211	0

Table 28. (concluded)

Number of R&D performers, by NAICS, 2002

NAICS description	NAICS	Firms
Horse Race Tracks	711213	1
Other Spectator Sports	711218	0
Live Theatres and Other Performing Arts Presenters with Facilities	711311	1
Sports Stadiums and Other Presenters with Facilities	711319	0
Performing Arts Promoters (Presenters) without Facilities	711321	2
Festivals without Facilities	711322	0
Sports Presenters and Other Presenters without Facilities	711329	0
Agents and Managers for Artists, Athletes, Entertainers and Other Public Figures	711410	1
Independent Artists, Writers and Performers	711510	7
Non-Commercial Art Museums and Galleries	712111	0
Museums (except Art Museums and Galleries)	712119	1
Historic and Heritage Sites	712120	0
Zoos and Botanical Gardens	712130	1
Other Heritage Institutions	712190	1
Amusement and Theme Parks	713110	0
Amusement Arcades	713120	0
Casinos (except Casino Hotels)	713210	0
Lotteries	713291	1
All Other Gambling Industries	713299	1
Golf Courses and Country Clubs	713910	1
Skiing Facilities	713920	1
Marinas	713930	0
Fitness and Recreational Sports Centres	713940	0
Bowling Centres	713950	0
All Other Amusement and Recreation Industries	713990	1
Hotels	721111	0
Motor Hotels	721112	1
Resorts	721113	0
Motels	721114	0
Casino Hotels	721120	0
Bed and Breakfast	721191	0
Housekeeping Cottages and Cabins	721192	0
All Other Traveller Accommodation	721198	1
RV (Recreational Vehicle) Parks and Campgrounds	721211	0
Hunting and Fishing Camps	721212	0
Recreational (except Hunting and Fishing) and Vacation Camps	721213	0
Rooming and Boarding Houses	721310	0
Full-Service Restaurants	722110	1
Limited-Service Eating Places	722210	2
Food Service Contractors	722310	0
Caterers	722320	1
Mobile Food Services	722330	0
Drinking Places (Alcoholic Beverages)	722410	0
General Automotive Repair	811111	7
Automotive Exhaust System Repair	811112	0
Other Automotive Mechanical and Electrical Repair and Maintenance	811119	3
Automotive Body, Paint and Interior Repair and Maintenance	811121	8
Automotive Glass Replacement Shops	811122	1
Car Washes	811192	2
All Other Automotive Repair and Maintenance	811199	0
Electronic and Precision Equipment Repair and Maintenance	811210	23
Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	811310	66
Home and Garden Equipment Repair and Maintenance	811411	1
Appliance Repair and Maintenance	811412	3
Reupholstery and Furniture Repair	811420	1
Footwear and Leather Goods Repair	811430	0
Other Personal and Household Goods Repair and Maintenance	811490	5
Barber Shops	812114	0
Beauty Salons	812115	2
Unisex Hair Salons	812116	0
Other Personal Care Services	812190	1
Funeral Homes	812210	1
Cemeteries and Crematoria	812220	0
Coin-Operated Laundries and Dry Cleaners	812310	0
Dry Cleaning and Laundry Services (except Coin-Operated)	812320	3
Linen and Uniform Supply	812330	0
Pet Care (except Veterinary) Services	812910	0
Photo Finishing Laboratories (except One-Hour)	812921	0
One-Hour Photo Finishing	812922	0
Parking Lots and Garages	812930	1
All Other Personal Services	812990	0
Religious Organizations	813110	0
Grant-Making and Giving Services	813210	1
Social Advocacy Organizations	813310	2
Civic and Social Organizations	813410	3
Business Associations	813910	2
Professional Organizations	813920	4
Labour Organizations	813930	0
Political Organizations	813940	0
Other Membership Organizations	813990	1
Private Households	814110	0
Defence Services	911110	0
Federal Courts of Law	911210	0
Federal Correctional Services	911220	0
Federal Police Services	911230	0
Federal Regulatory Services	911240	0
Other Federal Protective Services	911290	0
Federal Labour and Employment Services	911310	0
Immigration Services	911320	0
Other Federal Labour, Employment and Immigration Services	911390	0
Foreign Affairs	911410	0
International Assistance	911420	0
Other Federal Government Public Administration	911910	2
Provincial Courts of Law	912110	0
Provincial Correctional Services	912120	0
Provincial Police Services	912130	0
Provincial Fire-Fighting Services	912140	0
Provincial Regulatory Services	912150	0
Other Provincial Protective Services	912190	0
Provincial Labour and Employment Services	912210	0
Other Provincial and Territorial Public Administration	912910	0
Municipal Courts of Law	913110	0
Municipal Correctional Services	913120	0
Municipal Police Services	913130	0
Municipal Fire-Fighting Services	913140	0
Municipal Regulatory Services	913150	0
Other Municipal Protective Services	913190	0
Other Local, Municipal and Regional Public Administration	913910	0
Aboriginal Public Administration	914110	0
International and Other Extra-Territorial Public Administration	919110	0
Total all R&D performers		**8,892**

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