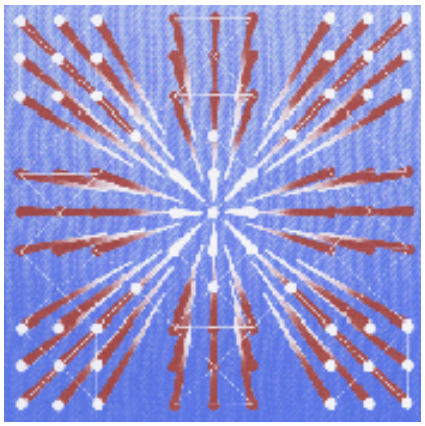
Catalogue no. 88-202-XIE

Industrial Research and Development

2003 Intentions

(with 2002 preliminary estimates and 2001 actual expenditures)



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Statistics Canada
Science, Innovation and Electronic Information Division

Industrial Research and Development

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(with 2002 preliminary estimates and 2001 actual expenditures)

Published by authority of the Minister responsible for Statistics Canada

December 2003

Catalogue No. 88-202-XIE

Frequency: Annual

ISSN 1495-706X

Ottawa

La version française de cette publication est disponible sur demande (n^{o} 88-202-XIF au catalogue).

Note of Appreciation

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Symbols

The following standard symbols are used in Statistics Canada Publications:

. not available for any reference period

.. not available for a specific reference period

… not applicable

[e] estimated figures

[i] spending intentions

[p] preliminary figures

[r] revised figures

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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 indigeneous 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 47 years. Maintaining the continuity and comparability of these data over time is of considerable importance. This publication, the seventeenth 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 2003. Actual data for 2001 expenditures, 2002 preliminary estimates, and 2003 spending intentions are derived from the survey “Research and Development in Canadian Industry” conducted in 2002.

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 Customs and Revenue Agency (CCRA), in place of survey data, for any firm funding or performing less than $ 1 million worth of R&D. This enabled the elimination of 8,199 questionnaire mailouts for the 2001 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 CCRA 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 CCRA records up to that point in time.

The use of CCRA 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.

Table of Contents

Table of Contents - Continued

List of Text Tables

Table of Contents – Continued

List of Charts

Chart Page

List of Tables in Appendix II

Table of Contents – Concluded

Highlights

- At 1.1% of Gross Domestic Product (GDP) in 2001, business enterprise expenditures on R&D (BERD) were similar to those of the middle rank OECD countries. Between 1991 and 2001, 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 yeard 2003 marked a slight recovery in research and development spending intentions after an unprecedented decline of 9% in 2002. This decrease was the first ever noted in this data series. It is worth noting that this increase is due to an increase in current expenditures and that capital expenditures are still decreasing.

- In 2002, the business enterprise sector continued to be the largest performing sector in Canada with 54% of all Canadian R&D, followed by Higher Education (33%) and the Federal Government (11%).

- While R&D spending decreases were felt across a wide number of industries, none was so hard hit as the Communications equipment industry with a forecasted 36% decrease in their R&D spending in 2002. However, despite the large decline in projected spending, it continued to be the largest industry. In the 2003 intentions, this industry remains steady but still below the 1999 recorded expenditures. Other industries forecasting declines between 2001 and 2002 include: Semiconductor and other electronic components (-14%), Electrical equipment, appliance and components (-14%). Wholesale trade (-12%) and Aerospace products and parts (-6%). While decreases were projected in several industries, others continued to forecast growth; Pharmaceuticals and medicine, Other manufacturing industries, Finance, insurance and real estate, and Scientific research and development services have all shown growth in each of the five years covered in this report.

- The majority of R&D performed in Canada was done by a relatively small number of firms. In fact, out of the 8,893 companies that performed R&D in 2001, just 40 accounted for more than 50% of the total R&D performed. When broken down by expenditure, only 35 companies spent more than $50 million, 85 more than $25 million and 306 more than $5 million.

- Quebec and Ontario remained the most heavily concentrated regions for R&D activity in 2001. Together they accounted for 76% of all R&D facilities and 85% of total intramural expenditures.

- The dominant industries in Quebec and Ontario continued to be Aerospace products & parts and Communications equipment respectively. 84% 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 68%.

- R&D personnel in 2001 were heavily concentrated in six industries: Communications equipment; Computer system design and related services; Aerospace products and parts; Pharmaceutical and medicine; Semiconductor and other electronic components; and Information and cultural industries. These industries accounted for half of the 100,658 person-years in 2001.


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Chapters 1 to 4


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1. R&D expenditures

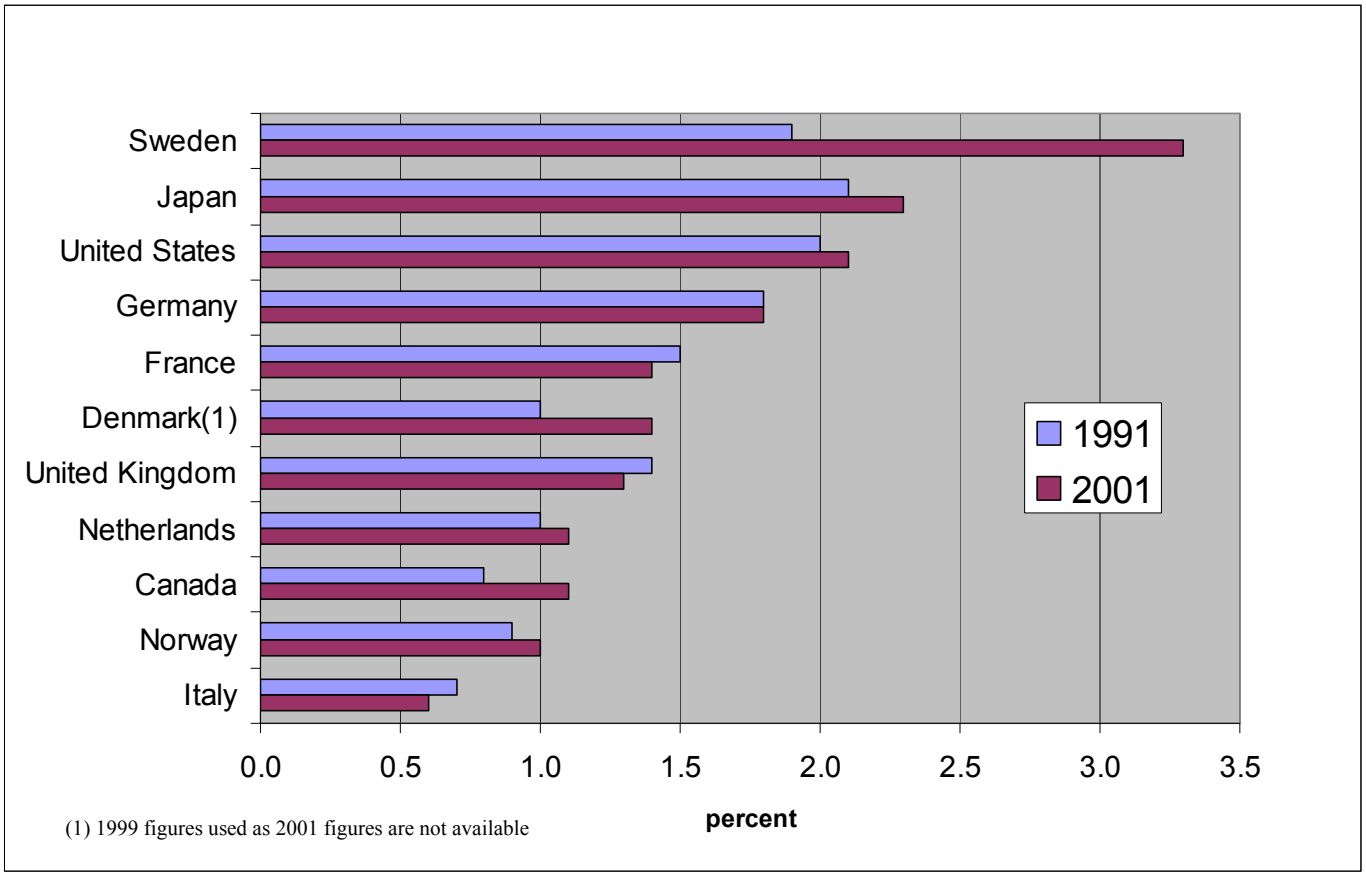
International comparisons

- Business enterprise expenditures on R&D (BERD) for 2001 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 (3.3%), Japan (2.3%), and the United States (2.1%) as shown in Table 1.1.

- Most countries, including Canada, have increased their industrial R&D effort over the last 10 years. Sweden has shown the largest increase, going from 1.9% in 1991 to 3.3% in 2001. 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 2001



Source: OECD, Main Science and Technology Indicators No. 1, 2003, May, 2003

TABLE 1.1 International comparison of BERD, by selected OECD countries, 1997 to 2001

Country	BERD/GDP				
	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent		
Sweden	2.7	..	2.7	..	3.3
Japan	2.0	2.1	2.1	2.1	2.3
United States	1.9	1.9	2.0	2.0	2.1
Germany	1.5	1.6	1.7	1.8	1.8
France	1.4	1.4	1.4	1.4	1.4
United Kingdom	1.2	1.2	1.3	1.2	1.3
Netherlands	1.1	1.1	1.1	1.1	1.1
Norway	0.9	..	0.9	..	1.0
Denmark	1.2	1.3	1.4	..	..
Canada	**1.0**	**1.1**	**1.1**	**1.1**	**1.1**
Italy	0.5	0.5	0.5	0.5	0.6

Source: OECD, Main Science and Technology Indicators No. 1, 2003, May 2003.

TABLE 1.2 Canada and United States company-funded R&D, 1997 to 2001

	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
United States[1]	133,611	145,016	160,288	180,421	181,606
Percentage change	**10.4**	**8.5**	**10.5**	**12.6**	**0.7**
Canada[2]	6,126	6,385	6,964	7,860	9,497
Percentage change	**12.4**	**4.2**	**9.1**	**12.9**	**20.8**

[1] *In millions of U.S. dollars.*
[2] *In millions of Canadian dollars.*
Source: National science foundation / SRS, survey of industrial research and development: 2001

Compared to GERD

- The largest performing sector in 2001 was business enterprises. This sector is expected to perform about 54% of all Canadian R&D, often referred to as GERD (gross domestic expenditures on research and development).

- Over the 20 year period 1983-2002, the business enterprise sector's participation (natural sciences and engineering only) in GERD has increased from 47% to 54% with the highest years (60%) occurring in 1997 and 1998. The federal government share has fallen by half, from 22% to 11%, while the higher education sector's participation grew from 26% to 33% over the same time period.

TABLE 1.3 GERD by performing sector, 1983 to 2002

Year	Federal government	Provincial governments	Business enterprises[1]	Higher education	Private non-profit organisations	Total
			percent			
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	26	1	100
1998	11	1	60	27	1	100
1999[r]	11	1	59	29	1	100
2000[r]	11	1	58	29	1	100
2001[p]	11	1	57	30	1	100
2002[p]	11	1	54	33	1	100

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

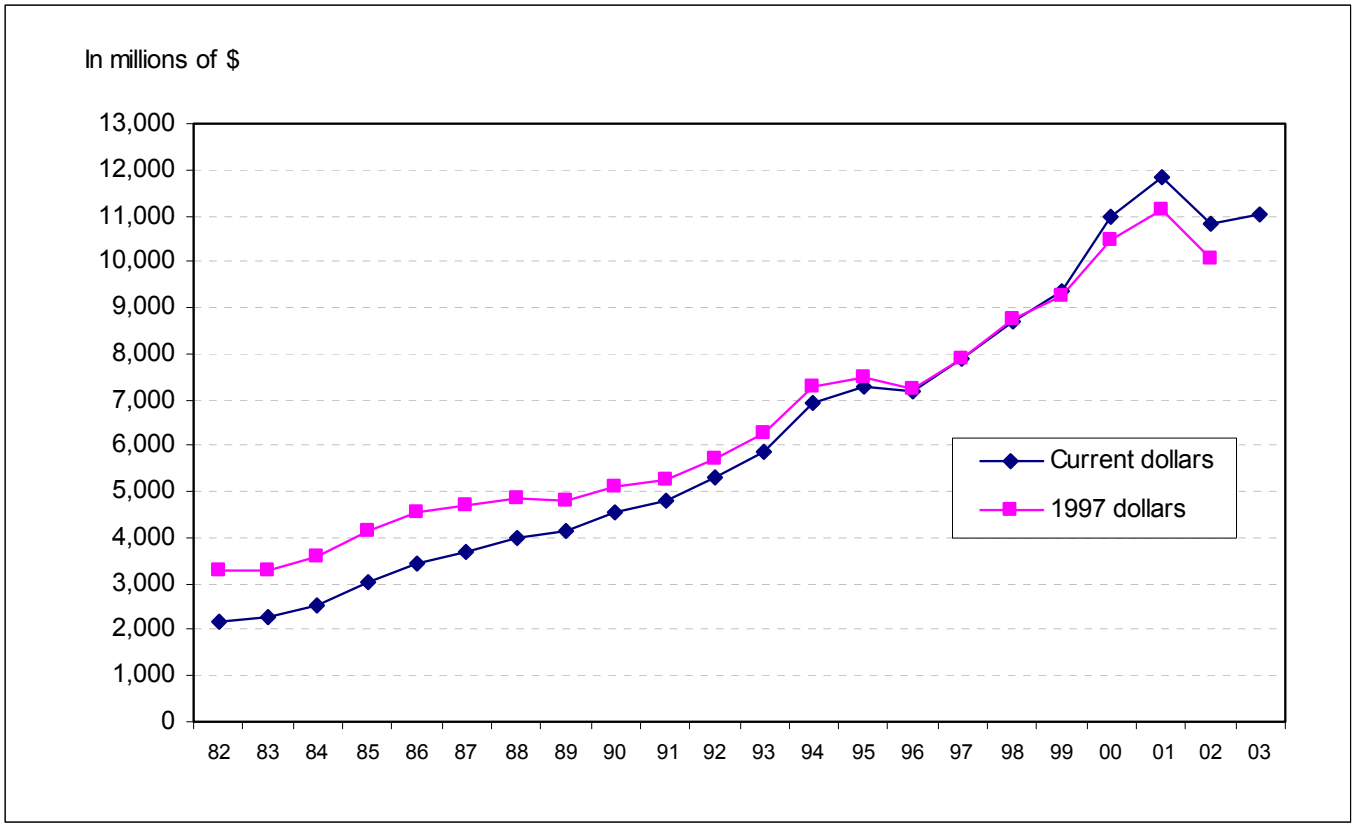
Source: Appendix II, Table 1.

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 1982 and 2001 with the exception of a slight decline in 1996. Preliminary estimates for 2002 show the first significant decline in expenditures in more than 40 years of publishing these statistics. R&D spending intentions for 2003 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 8.4% from 1982 to 2002. 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 1982 and 2002 is 6.0%.

CHART - 1.2 Current intramural R&D expenditures, 1982 to 2003



Source: Table 1.4.

TABLE 1.4 Summary of industrial R&D expenditures, 1982 to 2003

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 $		
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	5,265	91.4
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	7,238	98.9
1997[r]	7,876	865	8,741	7,876	100.0
1998[r]	8,718	953	9,671	8,753	99.6
1999[r]	9,358	1,036	10,394	9,247	101.2
2000[r]	10,994	1,181	12,175	10,450	105.2
2001[p]	11,827	1,352	13,179	11,126	106.3
2002[p]	10,839	1,147	11,985	10,082	107.5
2003[i]	11,007	1,053	12,060	..	..

[1] *Source: CANSIM II Table 384-0036*

Concentration among companies

- About two-thirds 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 8,893 companies which reported performing R&D in 2001, 100 (or 1.1%) accounted for 64% of the total R&D performed (see Table 1.5). The highest concentration in the last 30 years occurred in 1978 and 1979 where 80% of all R&D was performed by only 100 companies. The lowest concentration was reached in 1994 and 1995 when the top 100 companies performed 58% of R&D for those years.

- Even more notable is the concentration among the top 10 performing companies, who have averaged 34% of total intramural R&D over the thirty one years covered in Table 5.1. Preliminary figures for 2002 indicate the top 10 companies will perform 28% of all R&D, down from 35% in 2001. Generally speaking, there is a trend towards less concentration among companies. However, this is the first significant single year drop in the concentration of the top 10 companies since 1973.

- When companies are grouped by NAICS 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 2001, the top five major industries represented $6,853 million or 52% of all intramural R&D. These industries – Communications equipment; Computer system design and related services; Aerospace products and parts; Pharmaceutical and medicine; and Semiconductor and other electronic components consistently dominate the industrial R&D sector over the five years as demonstrated by Table 1.6 and Chart 1.3. The concentration remains relatively stable within each of these industries with the exception of Communication equipment, which, despite a projected decline in 2002 and 2003, remains the largest industry.

TABLE 1.5 Concentration of industrial R&D among companies, 1973 to 2003

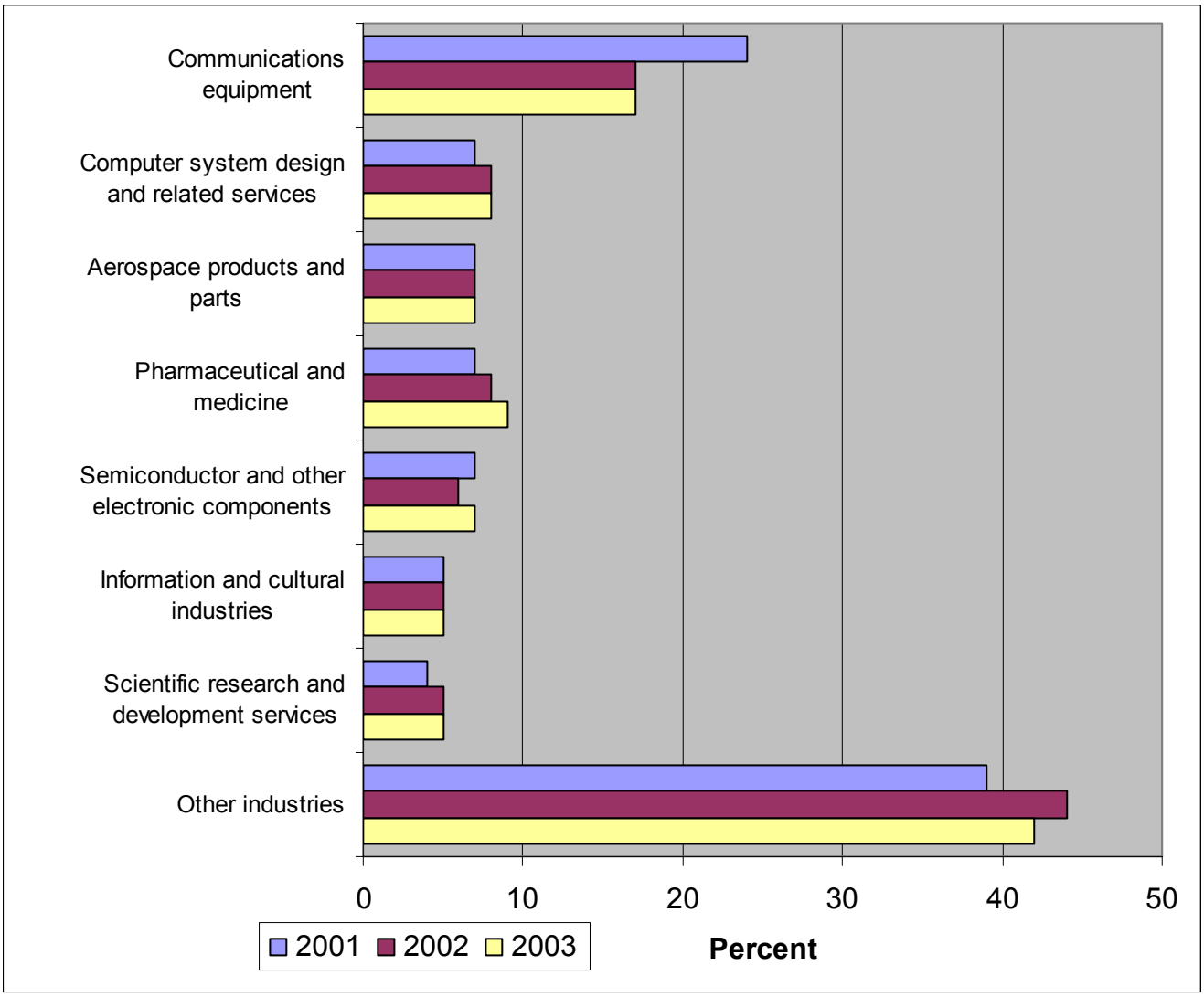
Year	Top 10	Top 25	Top 50	Top 75	Top 100	Total intramural expenditures
		percent of total intramural expenditures				in millions of $
1973	35	51	64	72	77	503
1974	36	52	65	71	76	613
1975	35	51	64	71	76	700
1976	36	51	64	72	77	755
1977	36	53	66	73	78	857
1978	39	55	68	76	80	1,006
1979	38	54	67	75	80	1,266
1980	34	50	64	72	77	1,571
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	3,633
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	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	9,671
1999[r]	34	44	54	59	63	10,394
2000[r]	37	47	55	60	64	12,175
2001[p]	35	44	53	60	64	13,179
2002[p]	28	38	49	56	61	11,985
2003[i]	28	38	49	56	60	12,060

TABLE 1.6 Concentration of industrial R&D among industries, 1998 to 2003

Selected industries	1998[r]	1999[r]	2000[r]	2001[p]	2002[p]	2003[i]
	percent of total intramural expenditures					
Communications equipment	23	22	26	24	17	17
Computer system design and related services	5	5	6	7	8	8
Aerospace products and parts	12	11	7	7	7	7
Pharmaceutical and medicine	5	6	6	7	8	9
Semiconductor and other electronic components	5	6	7	7	6	7
Information and cultural industries	3	3	3	5	5	5
Scientific research and development services	2	3	3	4	5	5
Other industries	45	44	42	39	44	42
	in millions of $					
Total expenditures, all industries	**9,671**	**10,394**	**12,175**	**13,179**	**11,985**	**12,060**

Source: Appendix II, Table 3.

CHART - 1.3 Estimated relative R&D spending for selected industries as a share of total R&D spending, 2001 to 2003



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 $42.7 million in 2001. This category included only 154 (or 1.7%) of all firms reporting R&D in the year. Conversely, companies with less than $1 million in revenues spent an average of $0.2 million on intramural R&D in 2001. This category represents 4,565 (or 51.3%) 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 $118.5 million for 2001. For smaller companies, this number steadily declines as the employment size decreases.

TABLE 1.7 Average total intramural R&D expenditures, by revenue size, 2001

Revenue size	Number of Firms	Expenditures	Average expenditures
	no.	in millions of $	in millions of $
Non-commercial firms	21	180	8.6
< $ 1,000,000	4,565	987	0.2
$ 1,000,000 - 9,999,999	2,844	1,480	0.5
$ 10,000,000 - 49,999,999	920	1,404	1.5
$ 50,000,000 - 99,999,999	188	760	4.0
$ 100,000,000 - 399,999,999	201	1,788	8.9
> $ 399,999,999	154	6,580	42.7
Total	**8,893**	**13,179**	**1.5**

TABLE 1.8 Average total intramural R&D expenditures, by employment size, 2001

Employment size	Number of firms	Expenditures	Average expenditures
	no.	in millions of $	in millions of $
Non-commercial firms	21	180	8.6
1 - 49	6,746	1,372	0.2
50 - 99	907	998	1.1
100 - 199	568	1,128	2.0
200 - 499	335	1,041	3.1
500 - 999	126	1,364	10.8
1,000 - 1,999	96	1,555	16.2
2,000 - 4,999	56	1,038	18.5
> 4,999	38	4,504	118.5
Total	**8,893**	**13,179**	**1.5**

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.

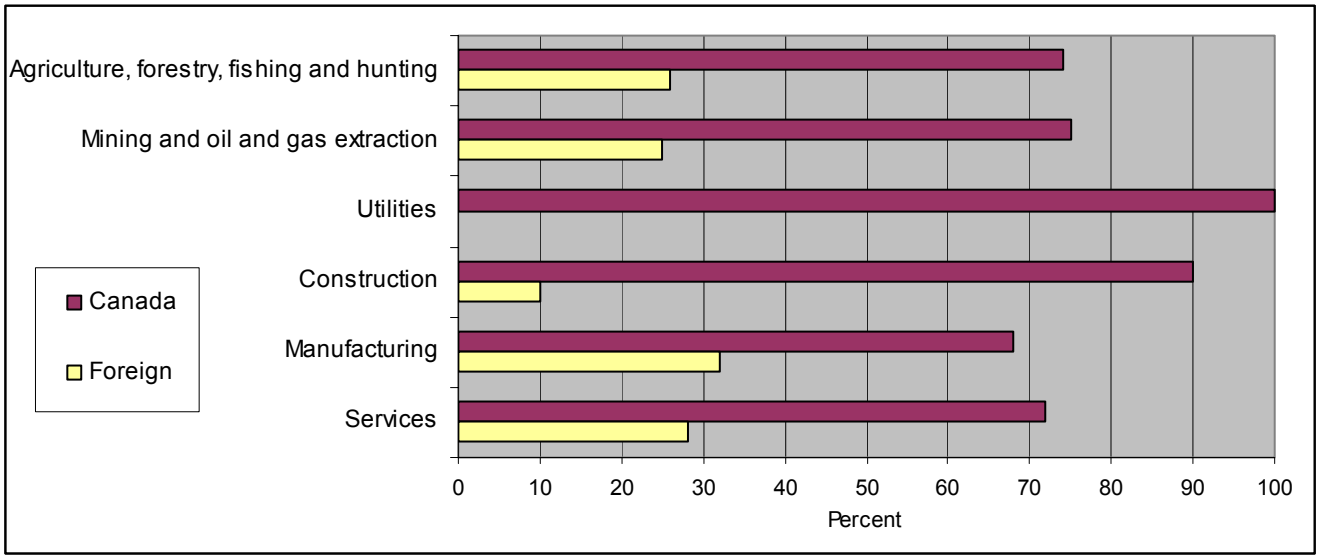
- In 2001, there were 428 foreign controlled firms out of a total 8,893 firms that performed R&D in Canada. Generally speaking, foreign companies are larger than Canadian ones and therefore also spend more on R&D. Although foreign controlled firms only represented 5% of all the firms performing R&D in Canada, their combined expenditures equaled $4,015 million or 30% of total intramural R&D for 2001.

- As shown in Table 1.9, the percent of total intramural R&D performed by Canadian controlled firms has remained relatively stable over the past several years. In terms of total R&D expenditures, the Manufacturing industry group is by far the largest group. However, it has the lowest concentration (68% of total intramural R&D) of Canadian controlled firms of all the industry sectors for 2001. The manufacturing sector is dominated by the following industries: Communications equipment; Aerospace products and parts; Pharmaceutical and medicine; and Semiconductor and other electronic components.

TABLE 1.9 Intramural R&D expenditures of Canadian-controlled companies compared to industry totals, by industry group, 1997 to 2001

Industry groups	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent		
Agriculture, forestry, fishing and hunting	71	62	62	64	74
Mining and oil and gas extraction	48	53	67	78	75
Utilities	100	100	100	100	100
Construction	85	70	81	74	90
Manufacturing	63	66	67	69	68
Services	69	68	69	71	72
Total	**65**	**67**	**68**	**70**	**70**

CHART - 1.4 Distribution of intramural R&D expenditures, by country of control of performers and by industry group, 2001



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 1997 to 2001. This group represented just under 87% in 1997 and has grown to just over 90% in 2001. (Table 1.10) There were 768 and 968 companies in this group for 1997 and 2001 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 23% of their funding from foreign sources.

TABLE 1.10 Total intramural R&D expenditures, by size of R&D program, 1997 to 2001

R&D size[1]	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			in millions of $		
< $ 50,000	101	100	98	97	77
$ 50,000 - 99,999	135	142	140	156	123
$ 100,000 - 199,999	223	239	249	272	231
$ 200,000 - 399,999	284	294	348	364	317
$ 400,000 - 999,999	400	467	517	573	516
> $ 999,999	7,597	8,430	9,043	10,713	11,916
Total	**8,741**	**9,671**	**10,394**	**12,175**	**13,179**

[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, 2001

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	96	2	1	2	0	100
$ 100,000 - 199,999	95	2	1	2	1	100
$ 200,000 - 399,999	93	2	1	3	1	100
$ 400,000 - 999,999	92	2	1	4	2	100
> $ 999,999	70	3	0	4	23	100
Total	**72**	**3**	**0**	**4**	**21**	**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 1997 to 2.2% in 2001. (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 2001 than they were in 1997.

TABLE 1.12 Current intramural R&D expenditures as a percent of company revenues, by company revenue size, 1997 to 2001

Revenue size	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent		
< $ 1,000,000	26.5	34.0	42.8	89.0	33.2
$ 1,000,000 - 9,999,999	7.3	7.4	8.6	9.5	12.9
$ 10,000,000 - 49,999,999	3.7	3.9	4.4	4.6	6.0
$ 50,000,000 - 99,999,999	2.7	3.0	3.4	4.0	5.1
$ 100,000,000 - 399,999,999	2.3	2.1	2.3	2.6	4.0
> $ 399,999,999	1.0	1.0	1.1	1.2	1.4
Total	**1.6**	**1.6**	**1.7**	**1.9**	**2.2**

TABLE 1.13 Current intramural R&D expenditures as a percent of company revenues, by country of control, 1997 to 2001

Country of control	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent		
Canada	1.9	1.7	2.0	2.4	2.7
Foreign	1.2	1.3	1.3	1.3	1.6
Total	**1.6**	**1.6**	**1.7**	**1.9**	**2.2**

By sources of funds

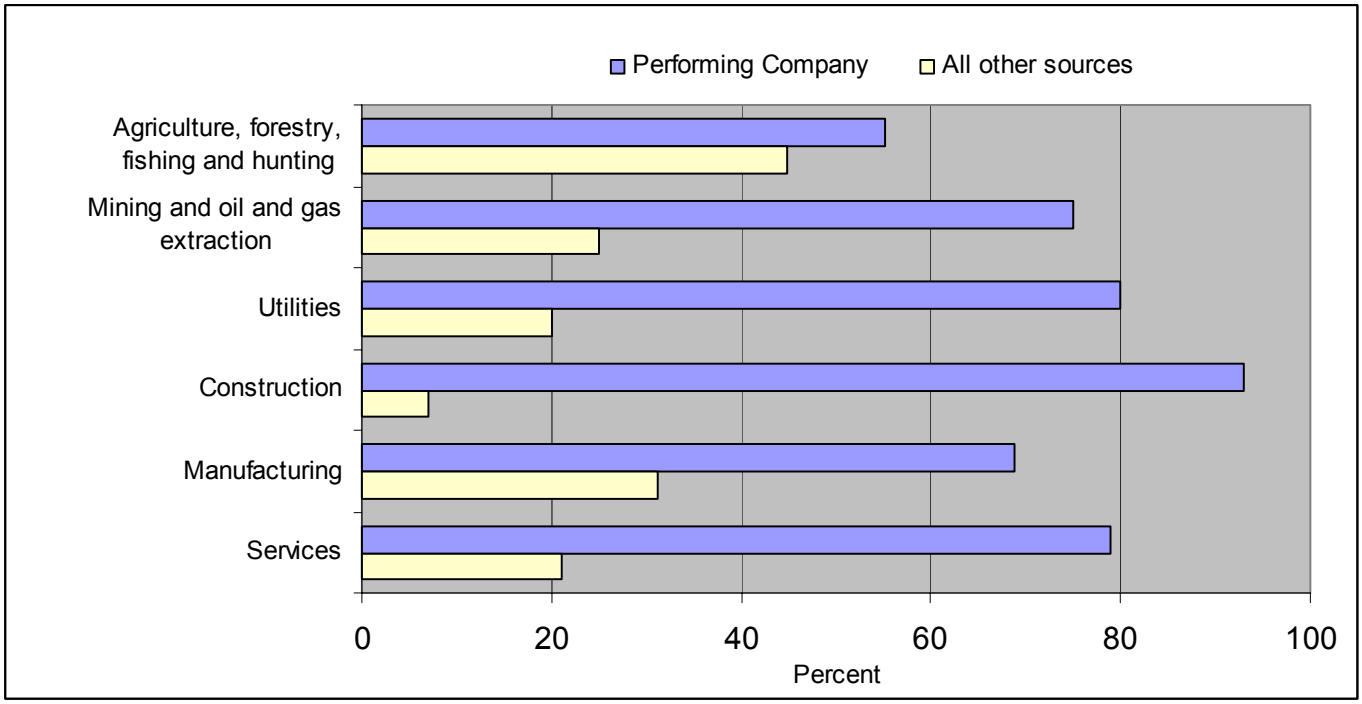
- Table 1.14 shows the proportion of intramural R&D expenditures supplied by different funders from 1997 to 2001. The distribution pattern of sources has been relatively constant during this period. The most significant source of funds is still the performing companies themselves, with 72% of the R&D in 2001 being self-financed. 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 18% and 100%.

- The second largest source of funds for industrial R&D continues to be foreign sources, which financed 21% of the total intramural R&D in 2001. More than 85% of these funds came from related companies and about 12% from foreign companies providing R&D contracts.

- The federal government provided 3% of total intramural R&D funding in 2001. 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 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 4% 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, 2001



Source: Appendix II, Table 20

TABLE 1.14 Sources of funds for intramural R&D, 1997 to 2001

Sources	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent		
Canadian:					
Performing firm	70	66	67	65	72
Federal government	4	3	3	2	3
Provincial governments	1	1	1	0	0
Other	5	5	4	4	4
Sub-total	**80**	**74**	**75**	**71**	**79**
Foreign	**20**	**26**	**25**	**29**	**21**
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 76% of all R&D establishments being located in these two provinces. These 7,047 establishments accounted for $11.2 billion or 85% of the total intramural R&D expenditures in Canada in 2001. The majority of the remaining establishments were in the western provinces of British Columbia and Alberta which totaled $1.6 billion or 12% of total intramural expenditures. All other provinces had a minor share of the total industrial R&D for 2001.

- Table 1.16 shows the distribution of intramural R&D for the dominant provinces of Quebec and Ontario, for selected industries in 2001. Ontario represents about 55% of all R&D activity in Canada, with the largest concentration being in the Communications equipment industry. This industry performed 87% of its R&D activities in Ontario. Quebec represents 30% of total Canadian industrial R&D and is most concentrated in the Aerospace products and parts industry, which conducts 68% of its R&D in this province.

TABLE 1.15 Provincial distribution of intramural R&D expenditures, 2001

Region	R&D units	Current expenditures	Capital expenditures	Total expenditures
	no.		in millions of $	
Newfoundland and Labrador	58	20	1	20
Prince Edward Island	17	4	0	4
Nova Scotia	167	74	4	78
New Brunswick	129	33	1	34
Quebec	4,182	3,534	364	3,897
Ontario	2,865	6,497	798	7,296
Manitoba	230	153	8	161
Saskatchewan	143	74	9	82
Alberta	607	565	49	614
British Columbia	855	873	119	992
Yukon, Northwest Territories and Nunavut	4	1	0	1
Total	**9,257**	**11,827**	**1,352**	**13,179**

Source: Appendix II, Tables 8 and 9

TABLE 1.16 Distribution of intramural R&D expenditures for Quebec and Ontario, for selected industries, 2001

Selected industries	Quebec	Ontario	Other provinces	Canada
		in millions of $		
Communications equipment	285	2,688	215	3,188
Computer system design and related services	216	620	100	936
Aerospace products and parts	633	294	5	933
Pharmaceutical and medicine	347	374	160	881
Semiconductor and other electronic components	153	573	152	878
Information and cultural industries	206	326	111	643
Scientific research and development services	190	253	149	592
Other industries	1,867	2,167	1,094	5,128
Total	**3,897**	**7,296**	**1,986**	**13,179**

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 2001. 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 19%. However, the Manufacturing industry group performs over half 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 $728 million, or 5.5% of all industrial R&D on energy research and development in 2001. In addition, these same companies performed $628 million in non-energy areas for total intramural expenditures of $1,356 million, or approximtely 10% of total R&D for 2001. This is down slightly from the previous year.

- Table 2.3, sources of funds for energy R&D by area of technology, indicates that 76% of the energy R&D is funded by the performing companies themselves. Although the government funded only 4% of total energy R&D, certain technology areas received the majority of this funding. Renewable resources received 12% of its overall funding from the government and Nuclear energy R&D received 15% of their total funding from government sources in 2001.

- The area of technology with the largest amount of energy R&D has shifted from Conservation to Fossil Fuels for 2001, which represented 25% of all intramural energy R&D expenditures.

TABLE 2.1 Number of energy R&D performers, by major industry group, 2001

Major industry groups	Energy R&D performers	Total R&D performers
	number	
Mining and oil and gas extraction	14	74
Manufacturing	70	3,862
Other	68	4,957
Total	**152**	**8,893**

TABLE 2.2 R&D expenditures of energy R&D performers, by major industry group, 2001

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	114	5	119	69	188
Manufacturing	390	618	1,008	7,680	8,688
Other	225	5	229	4,074	4,303
Total	**728**	**628**	**1,356**	**11,823**	**13,179**

TABLE 2.3 Energy R&D expenditures, by area of technology and by source of funds, 2001

Area of technology	Intramural R&D expenditures				Payments outside Canada	Total
	Self-funded	Government funded	Other sources	Sub-total		
			in millions of $			
Renewable resources	66	11	13	91	0	91
Transportation and transmission	84	0	15	100	1	101
Conservation	123	1	10	134	0	134
Fossil fuels	126	2	53	180	28	209
Nuclear	46	9	5	59	0	59
Other	111	5	0	116	33	148
Total	**555**	**29**	**144**	**728**	**63**	**791**

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

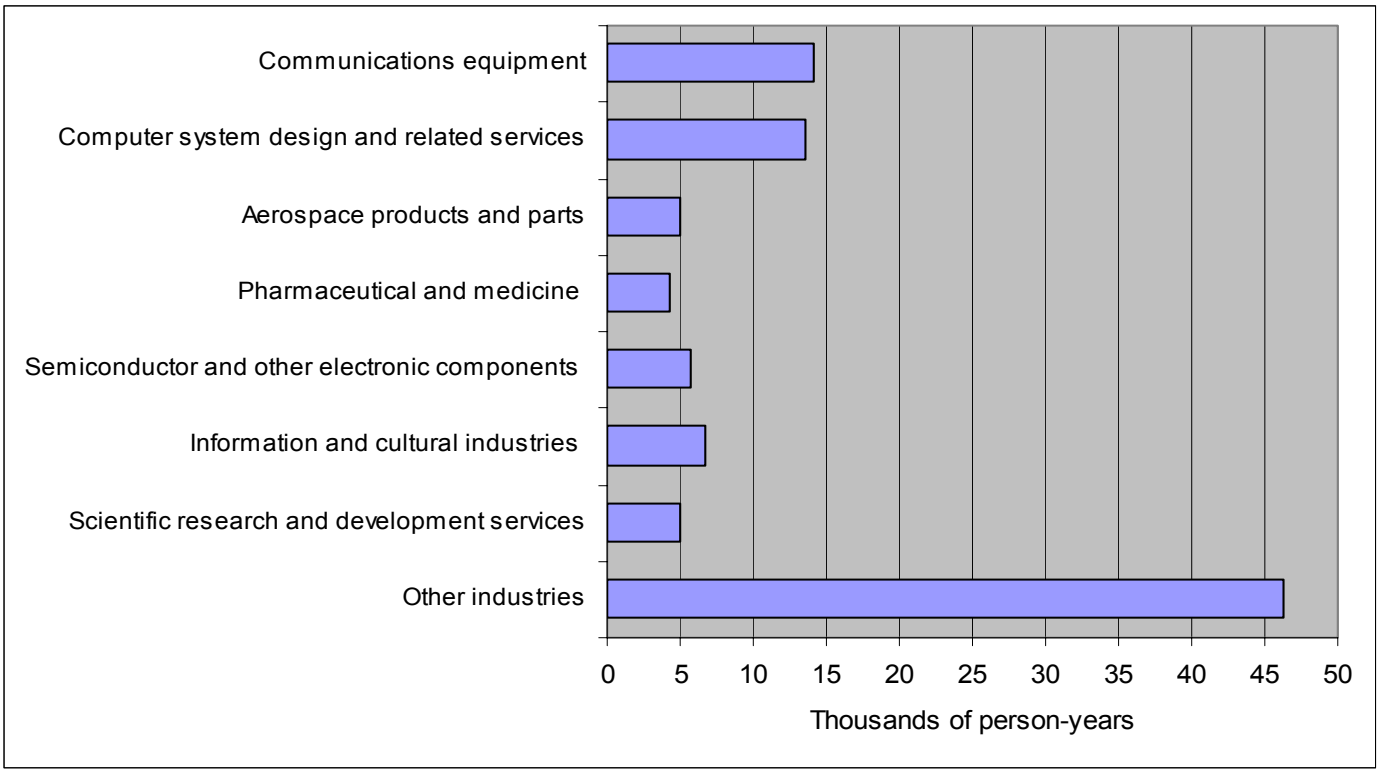
- According to Table 3.1, in 2001, 54% of all industrial R&D personnel are concentrated in the seven major R&D industries – Communications equipment; Computer system design and related services; Aerospace products and parts; Pharmaceutical and medicine; Semiconductor and other electronic components; Information and cultural industries; and Scientific research and development services. 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, 1997 to 2001

Selected industries	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			percent of total R&D personnel		
Communications equipment	17	16	15	15	14
Computer system design and related services	9	9	10	12	13
Aerospace products and parts	7	6	6	6	5
Pharmaceutical and medicine	3	3	3	4	4
Semiconductor and other electronic components	4	5	5	5	6
Information and cultural industries	5	5	5	5	7
Scientific research and development services	2	3	3	4	5
Other industries	53	52	52	49	46
			person-years		
Total R&D personnel	**82,693**	**85,812**	**90,820**	**100,892**	**100,658**

Source: Appendix II, Table 23

CHART - 3.1 R&D personnel, by selected industries, 2001



Source: Table 3.5

By occupational category

- The preliminary R&D personnel data for 2001 has 1,525 fewer firms than the revised 2000 numbers and thus data are understated. This is the result of the revised survey methodology as explained in Appendix 1. The 2000 revised R&D personnel increased by just over 9% in comparison to the previously released 2000 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 65% of total R&D personnel in 2001. 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 10% respectively) have remained stable over the period 1997 to 2001.

- 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 2001, 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 2001.

TABLE 3.2 Number of persons engaged in R&D, by occupational category, 1997 to 2001

Occupation	1997[r]	1998[r]	1999[r]	2000[r]	2001[p]
			person-years		
Professionals	51,992	54,594	57,969	65,233	65,067
Technicians	21,580	21,993	22,813	25,798	25,029
Other	9,121	9,225	10,038	9,861	10,562
Total	**82,693**	**85,812**	**90,820**	**100,892**	**100,658**

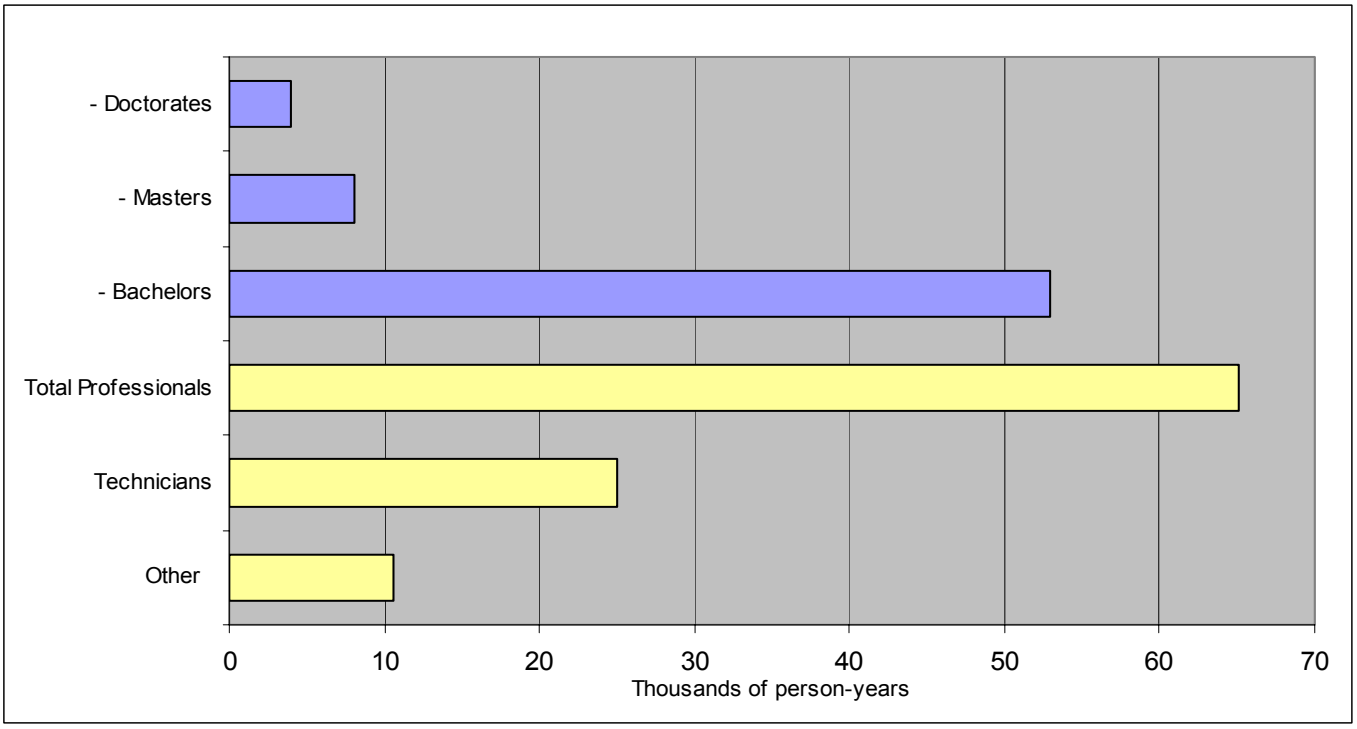
Source: Appendix II, Table 23

TABLE 3.3 Professional personnel engaged in R&D, by degree level, 1999 to 2001

Year	Bachelors	Masters	Doctorates	Total
		person-years		
1999[r]	45,388	8,354	4,227	57,969
2000[r]	53,177	8,092	3,964	65,233
2001[p]	52,993	8,063	4,011	65,067

Source: Appendix II, Table 24

CHART - 3.2 R&D personnel, by occupational category and by degree level, 2001



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 76% of R&D establishments being located in these two provinces. They account for 83% of the total personnel engaged in R&D for 2001. 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: 80% 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 60% of this industry's R&D personnel in 2001.

TABLE 3.4 Provincial distribution of R&D personnel, by occupational category, 2001

Region	R&D establishments	Professionals	Other personnel	Total
	no.		person-years	
Newfoundland and Labrador	58	152	110	262
Prince Edward Island	17	47	23	70
Nova Scotia	167	468	369	837
New Brunswick	129	252	276	528
Quebec	4,182	20,233	14,940	35,173
Ontario	2,865	34,283	13,862	48,145
Manitoba	230	600	823	1,423
Saskatchewan	143	470	443	913
Alberta	607	2,584	1,655	4,239
British Columbia	855	5,978	3,085	9,063
Yukon, Northwest Territories and Nunavut	4	0	5	5
Total	**9,257**	**65,067**	**35,591**	**100,658**

Source: Appendix II, Table 25

TABLE 3.5 Distribution of R&D personnel for Quebec and Ontario, by selected industries, 2001

Selected industries	Quebec	Ontario	Other Provinces	Canada
			person-years	
Communications equipment	1,904	10,878	1,404	14,186
Computer system design and related services	4,171	7,553	1,791	13,515
Aerospace products and parts	3,459	1,491	86	5,036
Pharmaceutical and medicine	1,469	2,166	711	4,346
Semiconductor and other electronic components	1,330	3,596	839	5,765
Information and cultural industries	2,304	2,726	1,620	6,650
Scientific research and development services	2,050	1,325	1,561	4,936
Other industries	18,486	18,410	9,328	46,224
Total	**35,173**	**48,145**	**17,340**	**100,658**

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 2001, Canada showed a net outflow of technology amounting to $1.5 billion.

- Table 4.2 shows that there are differences in the balance of technological services by industry. For 2001, industries such as Mining and oil and gas extraction, and Petroleum and coal products were net importers of technology. On the other hand, industries such as Chemical products, Computer and peripheral equipment, and Communications equipment all 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 2001

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	-466	-206
1986	301	487	551	35	250	-452	-202
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	759	637	1,661	242	902	-395	507
1997	912	698	1,750	184	838	-514	324
1998[r]	1,045	693	2,499	296	1,454	-397	1,057
1999[r]	1,490	521	2,640	320	1,150	-201	949
2000[r]	1,375	521	3,547	339	2,172	-182	1,990
2001[p]	1,323	304	2,761	389	1,438	85	1,523

[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], 2001

Selected industries	Payments	Receipts	Balance
		in millions of $	
Mining and oil and gas extraction	29	5	-24
Petroleum and coal products	74	5	-69
Chemical products	77	101	24
Computer and peripheral equipment	1	83	82
Communications equipment	716	1,363	647
All other manufacturing industries	428	980	552
Total manufacturing	**1,296**	**2,533**	**1,236**
Other industries	302	613	311
Total	**1,627**	**3,150**	**1,523**

[1] *Effective 1997, data is only for firms engaged in R&D over $1 million.*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Appendix I

Survey methodology and reliability of the data


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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 Customs and Revenue Agency (CCRA) 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 CCRA. 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. CCRA collects data only on actual expenditures and it allows 18 months for the submission. This means that when survey data are ready for publication in 2001, for example, not all of the CCRA data for 2001 will have been received. Experience since 1997 shows that this amounts to an understatement of about 5.5% of the total value of expenditure in the figures for 2001 as they are now published as actual expenditures in 2003, along with the preliminary figures for 2002 and the spending intentions for 2003. However, the figures for 2001 will be revised when they are published in 2004 and again in 2005 to take this into account.

For 1997, 1998 and for 1999, the understatement was about 5.5% of total value when the figures were first published and the assumption could be made that it will be about the same for 2000 as the four years were similar in their economic characteristics. This may change for the year 2001 and especially for 2002 where there has been a reduction in growth in sectors that are leading performers of R&D. A similar understatement of 11% occurs in the personnel data.

The data for 2001 also influence the totals for the years 2002 and 2003. For these years the survey data, which account for 91% of the total, are combined with estimates for the data for firms spending less than a million dollars on R&D. These estimates are arrived at by determining the change between the year 2002 or 2003 and the year 2001 for the survey data only. These changes are then applied to the administrative data for the year 2001 to arrive at estimates for the contribution of small R&D performers for the years 2002 and 2003.

Trends in R&D spending are important economic signals and the trends are not seriously affected by a small understatement resulting from the CCRA 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, 2002-2003**, (Catalogue no. 88-204-XIE).

The 2001 survey was mailed out in May 2002. 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 2001, of firms reported by government respondents as R&D contractors or grantees for 2001-2002, 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, 2000, 2001, 2002 and 2003.

Administrative data were used for R&D performers or funders of less than one million dollars.

The survey response

The response for the 2001 "base year" survey is shown below.

Survey Group	Responded R&D	No R&D	Deleted[1]	Did not Respond[2]	Total
		number			
Long form	759[3]	9	16	384	1,168
Administrative data[4]	8,199	…	…	…	8,199
Total	**8,958**	**9**	**16**	**384**	**9,367**

[1] *Inactive, out of business and unlocated.*
[2] *Includes estimates made for 384 long form delinquents.*
[3] *Includes 217 companies added from T661.*
[4] *Data from Canada Customs and Revenue Agency.*

TECHNICAL NOTES

Statistics for even years

Data for the reference year 2001 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 2001

Terminology

In this publication (i.e. Appendix 11 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 6%.

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 less than 9% 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 2001 survey, the 2001 business enterprise sector R&D expenditures would be based on full enumeration but about 9% of the expenditures for 2002 and 2003 would have been imputed.

Appendix II

Tables 1 to 28


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Table 1.

GERD, by performing sector, 1963 to 2002

Year	Federal government	Provincial governments	Business enterprises[1]	Higher education	Private non-profit organizations	Total
			in millions of $			
1963[1]	175	17	176	86	4	458
1964[1]	195	18	229	109	4	555
1965[1]	221	21	285	130	5	662
1966[1]	241	24	313	167	5	750
1967[1]	282	26	333	206	6	853
1968[1]	309	27	339	229	6	910
1969[1]	315	30	369	266	6	986
1970[1]	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[r]	1,356	213	3,635	1,722	59	6,985
1986	1,407	217	4,022	1,839	61	7,546
1987[r]	1,383	228	4,341	1,934	64	7,950
1988[r]	1,429	242	4,623	2,669	82	9,045
1989[r]	1,533	272	4,779	2,844	89	9,517
1990[r]	1,654	302	5,169	3,033	102	10,260
1991[r]	1,685	328	5,355	3,289	110	10,767
1992[r]	1,716	293	5,742	3,519	68	11,338
1993[r]	1,757	269	6,424	3,660	74	12,184
1994[r]	1,754	260	7,567	3,675	86	13,342
1995[r]	1,727	254	7,991	3,691	91	13,754
1996[r]	1,792	242	7,997	3,697	89	13,817
1997[r]	1,720	214	8,744	3,879	82	14,639
1998[r]	1,743	216	9,676	4,370	77	16,082
1999[r]	1,859	233	10,228	5,082	63	17,465
2000[r]	2,080	261	11,449	5,787	57	19,634
2001[p]	2,217	257	11,973	6,313	68	20,828
2002[p]	2,227	261	11,244	6,942	71	20,745

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

Table 2.

BERD compared to GERD and GDP, 1981 to 2002

Year	BERD[1]	BERD/GERD[2]	GDP[3]	BERD/GDP	GDP Implicit price index[3]	BERD in 1997 dollars
	in millions of $	%	in millions of $	%		in millions of $
1981[r]	2,124	48.12	360,471	0.59	60.1	3,535
1982[r]	2,489	47.87	379,859	0.66	65.1	3,823
1983[r]	2,602	47.17	411,386	0.63	68.7	3,788
1984[r]	3,022	48.18	449,582	0.67	70.9	4,263
1985[r]	3,633	52.01	485,714	0.75	73.2	4,963
1986[r]	4,022	53.30	512,541	0.78	75.4	5,335
1987[r]	4,340	54.59	558,949	0.78	78.8	5,508
1988[r]	4,623	51.12	613,094	0.75	82.4	5,611
1989[r]	4,779	50.22	657,728	0.73	86.1	5,551
1990[r]	5,169	50.38	679,921	0.76	88.9	5,815
1991[r]	5,355	49.73	685,367	0.78	91.4	5,859
1992[r]	5,742	50.65	700,480	0.82	92.7	6,194
1993[r]	6,424	52.72	727,184	0.88	94.0	6,834
1994[r]	7,567	56.72	770,873	0.98	95.1	7,957
1995[r]	7,991	58.10	810,426	0.99	97.2	8,221
1996[r]	7,996	57.87	836,864	0.96	98.9	8,085
1997[r]	8,741	59.71	882,733	0.99	100.0	8,741
1998[r]	9,671	60.14	914,973	1.06	99.6	9,710
1999[r]	10,394	59.51	982,441	1.06	101.2	10,271
2000[r]	12,175	62.01	1,075,566	1.13	105.2	11,573
2001[p]	13,179	63.28	1,107,459	1.19	106.3	12,398
2002[p]	11,985	57.77	1,154,949	1.04	107.5	11,149

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

[2] *Source: Table for GERD data.*

[3] *Source: CANSIM Table 380-0017 and Table 384-0036*

Table 3.

Total intramural R&D expenditures, by industry, 1999 to 2003

Industries	1999[r]	2000[r]	2001[p]	2002[p]	2003[i]
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	45	50	50	51	53
Forestry and logging	20	18	13	13	13
Fishing, hunting and trapping	5	8	6	6	6
Total agriculture, forestry, fishing and hunting	**69**	**75**	**69**	**70**	**72**
Mining and oil and gas extraction					
Oil and gas extraction	88	124	141	134	129
Mining	46	52	46	46	49
Total mining and oil and gas extraction	**134**	**176**	**188**	**180**	**177**
Utilities					
Electric power	191	181	179	179	180
Other utilities	5	6	6	6	7
Total utilities	**196**	**187**	**185**	**185**	**187**
Construction	**36**	**42**	**43**	**40**	**39**
Manufacturing					
Food	66	70	61	63	59
Beverage and tobacco	21	23	22	22	24
Textile	38	43	40	43	44
Wood products	47	41	38	39	39
Paper	113	137	254	252	256
Printing	8	9	9	9	9
Petroleum and coal products	57	41	53	84	81
Pharmaceutical and medicine	576	765	881	971	1,051
Other chemicals	307	266	258	237	243
Plastic products	69	66	58	59	60
Rubber products	27	31	20	20	20
Non-metallic mineral products	17	17	14	15	15
Primary metal (ferrous)	23	22	28	25	25
Primary metal (non-ferrous)	140	140	154	162	156
Fabricated metal products	85	89	77	79	79
Machinery	325	362	355	362	378
Computer and peripheral equipment	181	198	178	175	176
Communications equipment	2,278	3,160	3,188	2,035	2,035
Semiconductor and other electronic components	581	817	878	753	791
Navigational, measuring, medical and control instruments	309	424	443	430	388
Other computer and electronic products	19	20	20	20	20
Electrical equipment, appliance and components	202	203	265	228	226
Motor vehicle and parts	303	359	306	305	286
Aerospace products and parts	1,129	887	933	875	872
All other transportation equipment	20	23	25	25	27
Furniture and related products	10	8	8	9	9
Other manufacturing industries	105	118	119	122	124
Total manufacturing	**7,058**	**8,338**	**8,688**	**7,420**	**7,495**
Services					
Wholesale trade	607	735	584	515	525
Retail trade	26	25	31	31	31
Transportation and warehousing	25	34	32	64	27
Information and cultural industries	310	352	643	629	628
Finance, insurance and real estate	109	138	153	203	208
Architectural, engineering and related services	412	406	495	537	508
Computer system design and related services	563	731	936	926	946
Management, scientific and technical consulting services	44	62	61	62	65
Scientific research and development services	264	390	592	615	639
Health care and social assistance	319	306	317	346	351
All other services	223	178	161	162	162
Total services	**2,900**	**3,356**	**4,006**	**4,090**	**4,090**
Total all industries	**10,394**	**12,175**	**13,179**	**11,985**	**12,060**

Table 4.

Current intramural R&D expenditures, by industry, 1999 to 2003

Industries	1999[r]	2000[r]	2001[p]	2002[p]	2003[i]
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	37	45	44	47	48
Forestry and logging	19	17	12	13	13
Fishing, hunting and trapping	4	6	6	6	5
Total agriculture, forestry, fishing and hunting	**60**	**69**	**62**	**65**	**66**
Mining and oil and gas extraction					
Oil and gas extraction	82	106	125	118	113
Mining	43	41	42	39	42
Total mining and oil and gas extraction	**125**	**147**	**167**	**157**	**154**
Utilities					
Electric power	163	159	166	166	166
Other utilities	5	5	6	6	7
Total utilities	**169**	**164**	**171**	**172**	**173**
Construction	**33**	**40**	**40**	**37**	**37**
Manufacturing					
Food	63	67	59	61	57
Beverage and tobacco	20	20	21	20	23
Textile	37	41	38	41	42
Wood products	44	40	37	39	39
Paper	105	128	248	245	250
Printing	8	9	9	8	8
Petroleum and coal products	56	38	42	62	57
Pharmaceutical and medicine	517	663	788	865	954
Other chemicals	192	223	217	196	202
Plastic products	57	60	54	56	56
Rubber products	25	29	19	19	19
Non-metallic mineral products	16	16	13	13	13
Primary metal (ferrous)	22	21	24	24	24
Primary metal (non-ferrous)	133	133	147	145	147
Fabricated metal products	78	84	74	75	76
Machinery	309	346	340	346	362
Computer and peripheral equipment	167	181	161	159	160
Communications equipment	2,094	2,869	2,923	1,843	1,845
Semiconductor and other electronic components	497	638	693	662	702
Navigational, measuring, medical and control instruments	298	409	424	418	377
Other computer and electronic products	18	19	18	18	18
Electrical equipment, appliance and components	171	189	234	209	204
Motor vehicle and parts	233	331	263	279	260
Aerospace products and parts	1,104	865	914	856	853
All other transportation equipment	19	22	24	25	27
Furniture and related products	9	8	8	9	9
Other manufacturing industries	93	105	102	110	110
Total manufacturing	**6,386**	**7,552**	**7,896**	**6,803**	**6,895**
Services					
Wholesale trade	547	695	518	481	491
Retail trade	23	23	30	30	30
Transportation and warehousing	23	32	30	27	25
Information and cultural industries	282	312	544	542	541
Finance, insurance and real estate	99	128	137	189	195
Architectural, engineering and related services	359	351	394	448	455
Computer system design and related services	511	655	851	848	868
Management, scientific and technical consulting services	41	51	53	55	58
Scientific research and development services	233	333	511	526	558
Health care and social assistance	263	280	273	304	309
All other services	203	160	151	154	154
Total services	**2,585**	**3,021**	**3,491**	**3,604**	**3,683**
Total all industries	**9,358**	**10,994**	**11,827**	**10,839**	**11,007**

Table 5.

Capital R&D expenditures, by industry, 1999 to 2003

Industries	1999[r]	2000[r]	2001[p]	2002[p]	2003[i]
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	8	5	6	4	5
Forestry and logging	1	0	1	1	1
Fishing, hunting and trapping	1	1	0	0	0
Total agriculture, forestry, fishing and hunting	**9**	**6**	**7**	**5**	**6**
Mining and oil and gas extraction					
Oil and gas extraction	6	18	16	16	16
Mining	3	11	5	7	7
Total mining and oil and gas extraction	**9**	**28**	**21**	**23**	**23**
Utilities					
Electric power	28	22	13	13	13
Other utilities	0	1	0	0	0
Total utilities	**28**	**23**	**13**	**14**	**14**
Construction	**3**	**2**	**3**	**3**	**3**
Manufacturing					
Food	3	4	2	2	2
Beverage and tobacco	1	3	2	2	2
Textile	1	2	2	2	2
Wood products	3	1	1	0	0
Paper	8	9	7	7	7
Printing	0	0	0	0	0
Petroleum and coal products	2	2	11	22	24
Pharmaceutical and medicine	58	102	93	106	97
Other chemicals	115	42	41	41	41
Plastic products	12	6	4	4	4
Rubber products	2	2	1	1	1
Non-metallic mineral products	1	1	1	1	1
Primary metal (ferrous)	1	1	4	1	1
Primary metal (non-ferrous)	7	7	7	16	9
Fabricated metal products	7	5	3	4	4
Machinery	17	16	15	16	16
Computer and peripheral equipment	15	17	17	16	16
Communications equipment	184	292	265	193	190
Semiconductor and other electronic components	84	180	185	92	89
Navigational, measuring, medical and control instruments	11	15	19	12	11
Other computer and electronic products	1	1	2	2	2
Electrical equipment, appliance and components	31	14	31	19	21
Motor vehicle and parts	70	27	43	26	26
Aerospace products and parts	25	22	18	20	19
All other transportation equipment	0	0	0	0	0
Furniture and related products	1	0	0	0	0
Other manufacturing industries	12	14	17	13	14
Total manufacturing	**672**	**786**	**792**	**617**	**600**
Services					
Wholesale trade	60	39	66	34	34
Retail trade	3	2	1	2	2
Transportation and warehousing	1	2	2	37	2
Information and cultural industries	28	39	100	87	87
Finance, insurance and real estate	10	10	16	14	13
Architectural, engineering and related services	53	56	102	89	53
Computer system design and related services	52	76	85	77	79
Management, scientific and technical consulting services	3	11	7	7	7
Scientific research and development services	31	56	81	88	81
Health care and social assistance	56	26	44	42	42
All other services	20	18	11	8	8
Total services	**316**	**335**	**515**	**486**	**407**
Total all industries	**1,036**	**1,181**	**1,352**	**1,147**	**1,053**

Table 6.

Current intramural R&D expenditures, by industry and by type of expenditure, 2001

Industries	Current expenditures		
	Wages and salaries	Other costs	Total
	in millions of $		
Agriculture, forestry, fishing and hunting			
Agriculture	21	24	44
Forestry and logging	9	3	12
Fishing, hunting and trapping	3	3	6
Total agriculture, forestry, fishing and hunting	**32**	**30**	**62**
Mining and oil and gas extraction			
Oil and gas extraction	31	94	125
Mining	17	25	42
Total mining and oil and gas extraction	**48**	**119**	**167**
Utilities			
Electric power	71	95	166
Other utilities	3	3	6
Total utilities	**74**	**97**	**171**
Construction	**31**	**9**	**40**
Manufacturing			
Food	38	21	59
Beverage and tobacco	10	10	21
Textile	23	15	38
Wood products	21	16	37
Paper	81	167	248
Printing	7	2	9
Petroleum and coal products	16	27	42
Pharmaceutical and medicine	281	507	788
Other chemicals	108	109	217
Plastic products	31	23	54
Rubber products	11	8	19
Non-metallic mineral products	10	4	13
Primary metal (ferrous)	16	8	24
Primary metal (non-ferrous)	77	70	147
Fabricated metal products	55	19	74
Machinery	191	148	340
Computer and peripheral equipment	105	56	161
Communications equipment	1,452	1,470	2,923
Semiconductor and other electronic components	403	290	693
Navigational, measuring, medical and control instruments	251	173	424
Other computer and electronic products	12	6	18
Electrical equipment, appliance and components	122	112	234
Motor vehicle and parts	106	157	263
Aerospace products and parts	374	540	914
All other transportation equipment	13	12	24
Furniture and related products	6	2	8
Other manufacturing industries	60	42	102
Total manufacturing	**3,881**	**4,015**	**7,896**
Services			
Wholesale trade	246	272	518
Retail trade	25	5	30
Transportation and warehousing	18	12	30
Information and cultural industries	329	214	544
Finance, insurance and real estate	88	48	137
Architectural, engineering and related services	264	130	394
Computer system design and related services	695	156	851
Management, scientific and technical consulting services	43	11	53
Scientific research and development services	239	272	511
Health care and social assistance	146	128	273
All other services	109	42	151
Total services	**2,202**	**1,290**	**3,491**
Total all industries	**6,268**	**5,559**	**11,827**

Table 7.

Capital intramural R&D expenditures, by industry and by type of expenditure, 2001

Industries	Capital expenditures			
	Land	Buildings	Equipment	Total
	in millions of $			
Agriculture, forestry, fishing and hunting				
Agriculture	0	0	5	6
Forestry and logging	0	0	1	1
Fishing, hunting and trapping	0	0	0	0
Total agriculture, forestry, fishing and hunting	**0**	**0**	**6**	**7**
Mining and oil and gas extraction				
Oil and gas extraction	0	0	16	16
Mining	0	0	5	5
Total mining and oil and gas extraction	**0**	**0**	**21**	**21**
Utilities				
Electric power	0	1	12	13
Other utilities	0	0	0	0
Total utilities	**0**	**1**	**12**	**13**
Construction	**0**	**0**	**3**	**3**
Manufacturing				
Food	0	0	2	2
Beverage and tobacco	0	0	1	2
Textile	0	0	2	2
Wood products	0	0	1	1
Paper	0	0	6	7
Printing	0	0	0	0
Petroleum and coal products	0	0	11	11
Pharmaceutical and medicine	0	26	67	93
Other chemicals	0	0	41	41
Plastic products	0	0	4	4
Rubber products	0	0	1	1
Non-metallic mineral products	0	0	1	1
Primary metal (ferrous)	0	0	4	4
Primary metal (non-ferrous)	0	1	7	7
Fabricated metal products	0	0	3	3
Machinery	0	1	14	15
Computer and peripheral equipment	0	0	17	17
Communications equipment	0	31	234	265
Semiconductor and other electronic components	0	65	120	185
Navigational, measuring, medical and control instruments	1	4	13	19
Other computer and electronic products	0	0	2	2
Electrical equipment, appliance and components	0	0	31	31
Motor vehicle and parts	0	0	42	43
Aerospace products and parts	0	0	18	18
All other transportation equipment	0	0	0	0
Furniture and related products	0	0	0	0
Other manufacturing industries	1	3	13	17
Total manufacturing	**2**	**133**	**658**	**792**
Services				
Wholesale trade	0	2	64	66
Retail trade	0	0	1	1
Transportation and warehousing	0	0	2	2
Information and cultural industries	0	0	100	100
Finance, insurance and real estate	0	1	15	16
Architectural, engineering and related services	0	45	57	102
Computer system design and related services	0	2	83	85
Management, scientific and technical consulting services	0	0	7	7
Scientific research and development services	0	4	77	81
Health care and social assistance	0	9	34	44
All other services	0	0	10	11
Total services	**0**	**64**	**451**	**515**
Total all industries	**2**	**198**	**1,152**	**1,352**

Table 8.

Total intramural R&D expenditures, by province, 1999 to 2001

Province	1999[r]	2000[r]	2001[p]
		in millions of $	
Newfoundland and Labrador	18	20	20
Prince Edward Island	3	5	4
Nova Scotia	66	72	78
New Brunswick	40	39	34
Quebec	3,047	3,555	3,897
Ontario	5,780	6,721	7,296
Manitoba	148	132	161
Saskatchewan	78	74	82
Alberta	491	582	614
British Columbia	722	975	992
Yukon, Northwest Territories and Nunavut	2	0	1
Total	**10,394**	**12,175**	**13,179**

Table 9.

Current intramural R&D expenditures, by province, 1999 to 2001

Province	1999[r]	2000[r]	2001[p]
		in millions of $	
Newfoundland and Labrador	18	20	20
Prince Edward Island	3	5	4
Nova Scotia	59	67	74
New Brunswick	37	37	33
Quebec	2,778	3,243	3,534
Ontario	5,167	6,058	6,497
Manitoba	138	126	153
Saskatchewan	72	64	74
Alberta	457	533	565
British Columbia	625	840	873
Yukon, Northwest Territories and Nunavut	2	0	1
Total	**9,358**	**10,994**	**11,827**

Table 10.

Total intramural R&D expenditures for Quebec, by selected industry, 1999 to 2001

Selected industries	1999[r]	2000[r]	2001[p]
		in millions of $	
Agriculture, forestry, fishing and hunting, and Utilities, and Construction [1]	**147**	**143**	**149**
Mining and oil and gas extraction	**3**	**2**	**1**
Manufacturing			
Food, beverages and tobacco	22	28	27
Textile	27	33	33
Wood products	24	19	19
Paper	81	89	148
Printing	4	5	5
Pharmaceutical and medicine	214	313	347
Other chemicals	33	53	53
Rubber and plastic products	23	23	16
Non-metallic mineral products	8	6	6
Primary metals	96	95	101
Fabricated metal products	27	30	30
Machinery	82	106	108
Computer and peripheral equipment	29	35	29
Communications equipment	179	257	285
Semiconductor and other electronic components	81	112	153
Navigational, measuring, medical and control instruments	166	177	193
Other computer and electronic products	2	2	3
Electrical equipment, appliance and components	29	28	36
Motor vehicle and parts	16	22	22
Aerospace products and parts	619	562	633
All other transportation equipment	8	10	10
Furniture and related products	4	5	5
Other manufacturing industries	39	53	54
Total manufacturing	**1,811**	**2,061**	**2,315**
Services			
Wholesale trade	197	349	180
Retail trade	6	6	7
Transportation and warehousing	7	14	13
Information and cultural industries	98	126	206
Finance, insurance and real estate	5	10	15
Architectural, engineering and related services	226	227	283
Computer system design and related services	149	185	216
Management, scientific and technical consulting services	17	21	25
Scientific research and development services	96	124	190
Health care and social assistance	206	219	237
All other services	79	66	59
Total services	**1,086**	**1,348**	**1,432**
Total all industries	**3,047**	**3,555**	**3,897**

[1] *Industry groups have been combined to maintain confidentiality requirements.*

Table 11.

Total intramural R&D expenditures for Ontario, by selected industry, 1999 to 2001

Selected industries	1999[r]	2000[r]	2001[p]
		in millions of $	
Agriculture, forestry, fishing and hunting, and Utilities, and Construction [1]	**106**	**97**	**98**
Mining and oil and gas extraction	**25**	**26**	**20**
Manufacturing			
Food, beverages and tobacco	46	47	40
Textile	9	8	5
Wood products	6	4	1
Paper	8	23	25
Printing	3	3	3
Pharmaceutical and medicine	271	326	374
Other chemicals	239	178	173
Rubber and plastic products	63	66	55
Non-metallic mineral products	8	8	7
Primary metals	63	63	74
Fabricated metal products	48	49	40
Machinery	197	206	206
Computer and peripheral equipment	100	94	72
Communications equipment	1,886	2,690	2,688
Semiconductor and other electronic components	421	541	573
Navigational, measuring, medical and control instruments	93	172	166
Other computer and electronic products	15	15	15
Electrical equipment, appliance and components	145	139	187
Motor vehicle and parts	202	226	218
Aerospace products and parts	504	317	294
All other transportation equipment	10	10	4
Furniture and related products	4	3	3
Other manufacturing industries	81	64	69
Total manufacturing	**4,420**	**5,253**	**5,294**
Services			
Wholesale trade	318	303	326
Retail trade	16	13	20
Transportation and warehousing	5	4	4
Information and cultural industries	145	111	326
Finance, insurance and real estate	85	106	122
Architectural, engineering and related services	91	101	132
Computer system design and related services	326	458	620
Management, scientific and technical consulting services	13	20	16
Scientific research and development services	96	153	253
Health care and social assistance	47	20	22
All other services	85	55	42
Total services	**1,228**	**1,345**	**1,884**
Total all industries	**5,780**	**6,721**	**7,296**

[1] *Industry groups have been combined to maintain confidentiality requirements.*

Table 12.

Current intramural R&D expenditures as a percent of performing company revenues, by industry, 1999 to 2001

Industries	1999[r]	2000[r]	2001[p]
	percent of company revenues		
Agriculture, forestry, fishing and hunting			
Agriculture	4.6	5.1	4.7
Forestry and logging	0.2	0.2	0.1
Fishing, hunting and trapping	12.4	14.6	21.5
Total agriculture, forestry, fishing and hunting	**0.9**	**1.3**	**1.4**
Mining and oil and gas extraction			
Oil and gas extraction	0.6	0.4	0.3
Mining	0.4	0.4	0.6
Total mining and oil and gas extraction	**0.5**	**0.4**	**0.3**
Utilities			
Electric power	0.8	0.8	0.6
Other utilities	0.3	0.3	8.9
Total utilities	**0.8**	**0.7**	**0.7**
Construction	**1.5**	**3.4**	**6.8**
Manufacturing			
Food	0.4	0.3	0.3
Beverage and tobacco	0.4	0.2	0.2
Textile	1.4	1.5	1.5
Wood products	0.3	0.3	0.2
Paper	0.3	0.4	0.9
Printing	1.3	1.8	1.6
Petroleum and coal products	0.2	0.1	0.1
Pharmaceutical and medicine	7.9	7.9	9.3
Other chemicals	0.8	0.8	1.1
Plastic products	1.1	1.2	0.8
Rubber products	1.2	1.1	0.8
Non-metallic mineral products	0.6	1.5	0.7
Primary metal (ferrous)	0.2	0.2	0.3
Primary metal (non-ferrous)	1.1	1.0	1.2
Fabricated metal products	0.2	1.3	1.6
Machinery	2.7	3.5	3.9
Computer and peripheral equipment	3.5	4.1	3.4
Communications equipment	16.7	14.7	12.7
Semiconductor and other electronic components	4.8	5.3	6.8
Navigational, measuring, medical and control instruments	8.8	9.8	9.9
Other computer and electronic products	8.6	8.7	11.3
Electrical equipment, appliance and components	2.4	2.6	2.8
Motor vehicle and parts	0.2	0.3	0.3
Aerospace products and parts	8.9	6.5	5.7
All other transportation equipment	1.0	1.3	1.3
Furniture and related products	0.9	1.0	1.3
Other manufacturing industries	0.8	0.9	1.0
Total manufacturing	**1.7**	**2.0**	**2.3**
Services			
Wholesale trade	1.5	2.9	4.1
Retail trade	0.9	0.5	4.7
Transportation and warehousing	0.2	0.2	0.2
Information and cultural industries	1.4	1.7	2.7
Finance, insurance and real estate	0.3	0.3	0.3
Architectural, engineering and related services	7.6	8.8	13.7
Computer system design and related services	11.2	11.2	13.5
Management, scientific and technical consulting services	17.2	14.4	21.9
Scientific research and development services	35.3	53.2	66.4
Health care and social assistance	52.8	32.4	32.2
All other services	1.4	1.1	1.5
Total services	**1.9**	**2.3**	**3.0**
Total all industries	**1.7**	**1.9**	**2.2**

Table 13.

Current intramural R&D expenditures as a percent of performing company revenues, by industry and by country of control, 2001

Industries	Country of control		
	Canada	Foreign	Total
	percent of company revenues		
Agriculture, forestry, fishing and hunting			
Agriculture	4.0	7.0	4.7
Forestry and logging	0.1	0.0	0.1
Fishing, hunting and trapping	32.8	0.8	21.5
Total agriculture, forestry, fishing and hunting	**1.0**	**6.7**	**1.4**
Mining and oil and gas extraction			
Oil and gas extraction	0.4	0.1	0.3
Mining	0.7	0.5	0.6
Total mining and oil and gas extraction	**0.4**	**0.2**	**0.3**
Utilities			
Electric power	0.6	0.0	0.6
Other utilities	8.9	0.0	8.9
Total utilities	**0.7**	**0.0**	**0.7**
Construction	**6.3**	**53.1**	**6.8**
Manufacturing			
Food	0.3	0.2	0.3
Beverage and tobacco	0.4	0.1	0.2
Textile	1.5	1.6	1.5
Wood products	0.2	0.4	0.2
Paper	1.0	0.5	0.9
Printing	1.8	0.3	1.6
Petroleum and coal products	0.2	0.1	0.1
Pharmaceutical and medicine	13.9	8.3	9.3
Other chemicals	1.6	0.9	1.1
Plastic products	0.7	1.5	0.8
Rubber products	3.2	0.5	0.8
Non-metallic mineral products	2.4	0.1	0.7
Primary metal (ferrous)	0.3	0.5	0.3
Primary metal (non-ferrous)	1.3	0.6	1.2
Fabricated metal products	1.8	0.9	1.6
Machinery	3.9	3.9	3.9
Computer and peripheral equipment	2.6	4.4	3.4
Communications equipment	13.5	8.1	12.7
Semiconductor and other electronic components	14.9	3.2	6.8
Navigational, measuring, medical and control instruments	11.8	6.5	9.9
Other computer and electronic products	11.3	0.0	11.3
Electrical equipment, appliance and components	3.5	2.5	2.8
Motor vehicle and parts	3.4	0.2	0.3
Aerospace products and parts	3.5	10.9	5.7
All other transportation equipment	1.3	1.4	1.3
Furniture and related products	1.3	0.0	1.3
Other manufacturing industries	0.9	3.1	1.0
Total manufacturing	**3.6**	**1.3**	**2.3**
Services			
Wholesale trade	3.4	4.8	4.1
Retail trade	5.0	0.7	4.7
Transportation and warehousing	0.1	0.2	0.2
Information and cultural industries	2.4	15.9	2.7
Finance, insurance and real estate	0.3	2.0	0.3
Architectural, engineering and related services	11.2	17.0	13.7
Computer system design and related services	12.9	16.0	13.5
Management, scientific and technical consulting services	21.7	27.7	21.9
Scientific research and development services	53.9	184.5	66.4
Health care and social assistance	25.3	95.8	32.2
All other services	1.3	5.1	1.5
Total services	**2.4**	**7.5**	**3.0**
Total all industries	**2.7**	**1.6**	**2.2**

Table 14.

Current intramural R&D expenditures as a percent of performing company revenues, by country of control, 1999 to 2001

Country of control	1999[r]	2000[r]	2001[p]
	percent of company revenues		
Canada	2.0	2.4	2.7
United States	1.2	1.3	1.5
Other foreign	1.5	1.5	1.8
Total	**1.7**	**1.9**	**2.2**

TABLE 15.

Current intramural R&D expenditures as a percent of performing company revenues, by employment size, 1999 to 2001

Employment size	1999[r]	2000[r]	2001[p]
		percent of company revenues	
1 to 49	2.1	5.9	5.5
50 to 99	4.9	5.8	7.0
100 to 199	3.5	4.9	5.6
200 to 499	2.2	2.3	3.1
500 to 999	2.1	2.5	3.5
1000 to 1999	2.2	2.1	2.3
2000 to 4999	0.7	0.9	1.1
Greater than 4999	1.4	1.4	1.6
Total	**1.7**	**1.9**	**2.2**

Table 16.

Total intramural R&D expenditures, by country of control, 1999 to 2001

Country of control	1999[r]	2000[r]	2001[p]
		in millions of $	
Canada	7,072	8,571	9,164
United States	2,229	2,507	2,828
Other foreign	1,093	1,096	1,187
Total	**10,394**	**12,175**	**13,179**

Table 17.

Total intramural R&D expenditures, by employment size, 1999 to 2001

Employment size	1999[r]	2000[r]	2001[p]
		in millions of $	
Non-Commercial Enterprise	147	157	180
1 to 49	1,230	1,401	1,372
50 to 99	611	751	998
100 to 199	774	1,064	1,128
200 to 499	1,069	999	1,041
500 to 999	787	1,157	1,364
1000 to 1999	1,468	1,471	1,555
2000 to 4999	833	1,024	1,038
Greater than 4999	3,475	4,150	4,504
Total	**10,394**	**12,175**	**13,179**

Table 18.

Total intramural R&D expenditures of Canadian-controlled firms as a percent of all intramural R&D expenditures, by industry, 1999 to 2001

Industries	1999[r]	2000[r]	2001[p]
		percent	
Agriculture, forestry, fishing and hunting			
Agriculture	52	52	64
Forestry and logging	x	x	100
Fishing, hunting and trapping	x	100	x
Total agriculture, forestry, fishing and hunting	**62**	**64**	**74**
Mining and oil and gas extraction			
Oil and gas extraction	69	80	77
Mining	61	74	69
Total mining and oil and gas extraction	**67**	**78**	**75**
Utilities			
Electric power	100	100	100
Other utilities	x	100	100
Total utilities	**x**	**100**	**100**
Construction	**x**	**x**	**x**
Manufacturing			
Food	70	73	75
Beverage and tobacco	x	64	75
Textile	74	69	55
Wood products	98	x	x
Paper	77	78	87
Printing	x	x	x
Petroleum and coal products	x	x	x
Pharmaceutical and medicine	27	24	25
Other chemicals	16	35	37
Plastic products	78	83	76
Rubber products	45	34	41
Non-metallic mineral products	78	88	86
Primary metal (ferrous)	x	78	81
Primary metal (non-ferrous)	87	x	x
Fabricated metal products	91	90	87
Machinery	82	80	80
Computer and peripheral equipment	69	73	43
Communications equipment	85	89	90
Semiconductor and other electronic components	x	x	x
Navigational, measuring, medical and control instruments	71	73	77
Other computer and electronic products	100	100	100
Electrical equipment, appliance and components	42	43	33
Motor vehicle and parts	44	48	39
Aerospace products and parts	62	49	42
All other transportation equipment	62	71	44
Furniture and related products	100	100	100
Other manufacturing industries	85	87	89
Total manufacturing	**67**	**69**	**68**
Services			
Wholesale trade	36	57	48
Retail trade	x	x	x
Transportation and warehousing	72	x	x
Information and cultural industries	82	74	88
Finance, insurance and real estate	93	x	x
Architectural, engineering and related services	x	x	x
Computer system design and related services	83	81	76
Management, scientific and technical consulting services	x	x	x
Scientific research and development services	80	83	76
Health care and social assistance	x	x	x
All other services	x	x	82
Total services	**69**	**71**	**72**
Total all industries	**68**	**70**	**70**

Table 19.

Sources of funds for intramural R&D, 1981 to 2001

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 r	2,714	255	125	287	155	60	9	734	4,340
1988 r	2,855	285	123	272	181	63	5	840	4,623
1989 r	2,981	325	164	239	177	69	6	819	4,779
1990 r	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 r	3,639	266	188	261	271	86	12	1,019	5,742
1993 r	4,073	347	242	266	250	105	7	1,134	6,424
1994 r	4,922	337	266	267	200	99	10	1,466	7,567
1995 r	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	6,385	294	167	179	84	56	8	2,499	9,671
1999 r	6,964	201	214	241	68	58	8	2,640	10,394
2000 r	7,860	296	182	165	74	45	7	3,547	12,175
2001 p	9,497	321	167	268	93	58	14	2,761	13,179

Table 20.

Sources of funds for intramural R&D, by industry, 2001

Industries	Canadian performing companies	Federal government	Other Canadian sources	Foreign sources	Total
			in millions of $		
Agriculture, forestry, fishing and hunting					
Agriculture	31	0	x	x	50
Forestry and logging	2	x	x	0	13
Fishing, hunting and trapping	4	x	x	0	6
Total agriculture, forestry, fishing and hunting	**38**	**x**	**19**	**x**	**69**
Mining and oil and gas extraction					
Oil and gas extraction	96	x	x	x	141
Mining	45	x	x	x	46
Total mining and oil and gas extraction	**141**	**x**	**44**	**x**	**188**
Utilities					
Electric power	144	1	x	x	179
Other utilities	4	0	x	x	6
Total utilities	**148**	**1**	**27**	**9**	**185**
Construction	**40**	**0**	**3**	**0**	**43**
Manufacturing					
Food	59	1	x	x	61
Beverage and tobacco	22	0	0	0	22
Textile	40	0	0	0	40
Wood products	16	0	x	x	38
Paper	209	x	x	x	254
Printing	x	x	x	0	9
Petroleum and coal products	48	x	0	x	53
Pharmaceutical and medicine	505	5	87	284	881
Other chemicals	144	11	14	88	258
Plastic products	58	0	0	0	58
Rubber products	13	0	x	x	20
Non-metallic mineral products	13	x	x	x	14
Primary metal (ferrous)	x	x	x	0	28
Primary metal (non-ferrous)	116	x	x	x	154
Fabricated metal products	75	1	1	0	77
Machinery	336	14	x	x	355
Computer and peripheral equipment	136	1	x	x	178
Communications equipment	1,873	15	x	x	3,188
Semiconductor and other electronic components	580	x	x	x	878
Navigational, measuring, medical and control instruments	311	46	8	78	443
Other computer and electronic products	13	x	x	x	20
Electrical equipment, appliance and components	236	2	x	x	265
Motor vehicle and parts	279	x	x	17	306
Aerospace products and parts	716	165	x	x	933
All other transportation equipment	25	0	0	0	25
Furniture and related products	8	0	0	0	8
Other manufacturing industries	102	7	x	x	119
Total manufacturing	**5,972**	**299**	**219**	**2,198**	**8,688**
Services					
Wholesale trade	466	1	16	100	584
Retail trade	31	0	0	0	31
Transportation and warehousing	31	x	x	0	32
Information and cultural industries	574	3	11	54	643
Finance, insurance and real estate	142	x	x	0	153
Architectural, engineering and related services	425	13	39	19	495
Computer system design and related services	787	8	58	84	936
Management, scientific and technical consulting services	48	5	5	3	61
Scientific research and development services	368	12	48	165	592
Health care and social assistance	155	3	47	112	317
All other services	132	10	15	4	161
Total services	**3,158**	**57**	**250**	**542**	**4,006**
Total all industries	**9,497**	**361**	**561**	**2,761**	**13,179**

Table 21.

Sources of funds for intramural R&D, by country of control of performer, 2001

Country of control	Canadian performing companies	Federal government	Provincial governments	Other Canadian sources	Foreign sources	Total
			in millions of $			
Canada	7,027	165	52	342	1,577	9,164
United States	1,620	170	4	140	894	2,828
Other foreign	849	26	2	20	290	1,187
Total	**9,497**	**361**	**58**	**502**	**2,761**	**13,179**

Table 22.

Sources of funds for intramural R&D, by employment size, 2001

Employment size	Canadian performing companies	Federal government	Provincial governments	Other Canadian sources	Foreign sources	Total
			in millions of $			
Non-Commercial Enterprise	21	19	30	100	9	180
1 to 49	1,191	35	12	63	70	1,372
50 to 99	781	28	4	52	132	998
100 to 199	883	11	3	73	158	1,128
200 to 499	897	15	2	39	89	1,041
500 to 999	966	65	3	89	242	1,364
1000 to 1999	1,097	46	3	53	356	1,555
2000 to 4999	830	4	0	13	192	1,038
Greater than 4999	2,830	138	0	21	1,514	4,504
Total	**9,497**	**361**	**58**	**502**	**2,761**	**13,179**

Table 23.

Number of persons engaged in R&D, by industry and by occupational category, 2001

Industries	Professionals	Technicians	Other	Total
			person-years	
Agriculture, forestry, fishing and hunting				
Agriculture	223	181	117	521
Forestry and logging	101	42	19	162
Fishing, hunting and trapping	23	34	20	77
Total agriculture, forestry, fishing and hunting	**347**	**257**	**156**	**760**
Mining and oil and gas extraction				
Oil and gas extraction	220	256	34	510
Mining	197	114	37	348
Total mining and oil and gas extraction	**417**	**370**	**71**	**858**
Utilities				
Electric power	517	214	150	881
Other utilities	73	34	17	124
Total utilities	**590**	**248**	**167**	**1,005**
Construction	**464**	**212**	**97**	**773**
Manufacturing				
Food	446	289	127	862
Beverage and tobacco	143	37	7	187
Textile	148	220	160	528
Wood products	195	176	87	458
Paper	364	365	511	1,240
Printing	59	87	23	169
Petroleum and coal products	115	73	9	197
Pharmaceutical and medicine	2,349	1,142	855	4,346
Other chemicals	1,042	727	274	2,043
Plastic products	334	377	120	831
Rubber products	145	100	68	313
Non-metallic mineral products	115	109	46	270
Primary metal (ferrous)	158	88	38	284
Primary metal (non-ferrous)	465	387	127	979
Fabricated metal products	621	524	184	1,329
Machinery	1,955	1,326	586	3,867
Computer and peripheral equipment	1,322	362	64	1,748
Communications equipment	12,979	986	221	14,186
Semiconductor and other electronic components	4,353	985	427	5,765
Navigational, measuring, medical and control instruments	2,915	1,006	248	4,169
Other computer and electronic products	181	40	41	262
Electrical equipment, appliance and components	1,080	727	229	2,036
Motor vehicle and parts	1,245	561	169	1,975
Aerospace products and parts	2,183	1,304	1,549	5,036
All other transportation equipment	123	95	83	301
Furniture and related products	59	71	41	171
Other manufacturing industries	595	493	185	1,273
Total manufacturing	**35,689**	**12,657**	**6,479**	**54,825**
Services				
Wholesale trade	2,784	993	463	4,240
Retail trade	269	230	58	557
Transportation and warehousing	207	118	19	344
Information and cultural industries	4,277	1,799	574	6,650
Finance, insurance and real estate	654	450	95	1,199
Architectural, engineering and related services	3,616	762	473	4,851
Computer system design and related services	9,449	3,389	677	13,515
Management, scientific and technical consulting services	654	302	93	1,049
Scientific research and development services	3,218	1,366	352	4,936
Health care and social assistance	1,188	1,261	526	2,975
All other services	1,244	615	262	2,121
Total services	**27,560**	**11,285**	**3,592**	**42,437**
Total all industries	**65,067**	**25,029**	**10,562**	**100,658**

Table 24.

Professional personnel engaged in R&D, by industry and by degree level, 2001

Industries	Bachelors	Masters	Doctorates	Total
		person-years		
Agriculture, forestry, fishing and hunting				
Agriculture	163	24	36	223
Forestry and logging	76	22	3	101
Fishing, hunting and trapping	20	2	1	23
Total agriculture, forestry, fishing and hunting	**259**	**48**	**40**	**347**
Mining and oil and gas extraction				
Oil and gas extraction	182	17	21	220
Mining	142	18	37	197
Total mining and oil and gas extraction	**324**	**35**	**58**	**417**
Utilities				
Electric power	230	139	148	517
Other utilities	66	2	5	73
Total utilities	**296**	**141**	**153**	**590**
Construction	**436**	**15**	**13**	**464**
Manufacturing				
Food	376	38	32	446
Beverage and tobacco	119	10	14	143
Textile	141	6	1	148
Wood products	141	25	29	195
Paper	226	48	90	364
Printing	56	1	2	59
Petroleum and coal products	70	8	37	115
Pharmaceutical and medicine	1,327	484	538	2,349
Other chemicals	803	107	132	1,042
Plastic products	312	13	9	334
Rubber products	102	20	23	145
Non-metallic mineral products	103	3	9	115
Primary metal (ferrous)	114	26	18	158
Primary metal (non-ferrous)	238	99	128	465
Fabricated metal products	591	26	4	621
Machinery	1,753	154	48	1,955
Computer and peripheral equipment	1,078	151	93	1,322
Communications equipment	10,038	2,379	562	12,979
Semiconductor and other electronic components	3,491	759	103	4,353
Navigational, measuring, medical and control instruments	2,391	361	163	2,915
Other computer and electronic products	154	14	13	181
Electrical equipment, appliance and components	839	158	83	1,080
Motor vehicle and parts	1,095	110	40	1,245
Aerospace products and parts	1,604	482	97	2,183
All other transportation equipment	114	4	5	123
Furniture and related products	59	0	0	59
Other manufacturing industries	463	66	66	595
Total manufacturing	**27,798**	**5,552**	**2,339**	**35,689**
Services				
Wholesale trade	2,162	315	307	2,784
Retail trade	264	2	3	269
Transportation and warehousing	177	17	13	207
Information and cultural industries	3,876	311	90	4,277
Finance, insurance and real estate	582	50	22	654
Architectural, engineering and related services	3,258	201	157	3,616
Computer system design and related services	8,568	697	184	9,449
Management, scientific and technical consulting services	588	45	21	654
Scientific research and development services	2,570	319	329	3,218
Health care and social assistance	779	203	206	1,188
All other services	1,056	112	76	1,244
Total services	**23,880**	**2,272**	**1,408**	**27,560**
Total all industries	**52,993**	**8,063**	**4,011**	**65,067**

Table 25.

Number of persons engaged in R&D, by province and by occupational category, 2001

Province	Professionals	Other	Total
		person-years	
Newfoundland and Labrador	152	110	262
Prince Edward Island	47	23	70
Nova Scotia	468	369	837
New Brunswick	252	276	528
Quebec	20,233	14,940	35,173
Ontario	34,283	13,862	48,145
Manitoba	600	823	1,423
Saskatchewan	470	443	913
Alberta	2,584	1,655	4,239
British Columbia	5,978	3,085	9,063
Yukon, Northwest Territories and Nunavut	0	5	5
Total	**65,067**	**35,591**	**100,658**

Table 26.

Number of persons engaged in R&D, by industry group and by region, 2001

Industry group	Quebec	Ontario	Alberta	British Columbia	Other provinces [1]	Total
			person-years			
Agriculture, forestry, fishing and hunting	368	121	35	174	62	760
Mining and oil and gas extraction	20	203	495	90	50	858
Utilities	717	133	5	86	64	1,005
Construction	322	288	24	93	46	773
Manufacturing	17,123	29,985	1,424	4,233	2,060	54,825
Services	16,623	17,415	2,256	4,387	1,756	42,437
Total	**35,173**	**48,145**	**4,239**	**9,063**	**4,038**	**100,658**

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

Table 27.

Number of R&D performers, by industry and by country of control, 2001

Industries	Country of control			Total
	Canada	U.S.	Other foreign	
	number			
Agriculture, forestry, fishing and hunting				
Agriculture	182	2	2	186
Forestry and logging	32	0	0	32
Fishing, hunting and trapping	25	0	1	26
Total agriculture, forestry, fishing and hunting	**239**	**2**	**3**	**244**
Mining and oil and gas extraction				
Oil and gas extraction	30	7	1	38
Mining	27	4	5	36
Total mining and oil and gas extraction	**57**	**11**	**6**	**74**
Utilities				
Electric power	10	0	0	10
Other utilities	44	0	0	44
Total utilities	**54**	**0**	**0**	**54**
Construction	**224**	**1**	**0**	**225**
Manufacturing				
Food	214	12	6	232
Beverage and tobacco	20	0	4	24
Textile	94	8	5	107
Wood products	120	2	1	123
Paper	60	6	8	74
Printing	65	0	1	66
Petroleum and coal products	19	2	3	24
Pharmaceutical and medicine	67	12	9	88
Other chemicals	232	24	15	271
Plastic products	212	4	4	220
Rubber products	42	5	6	53
Non-metallic mineral products	84	2	4	90
Primary metal (ferrous)	27	0	5	32
Primary metal (non-ferrous)	32	1	2	35
Fabricated metal products	413	8	1	422
Machinery	678	9	12	699
Computer and peripheral equipment	64	8	0	72
Communications equipment	97	11	2	110
Semiconductor and other electronic components	117	4	0	121
Navigational, measuring, medical and control instruments	210	5	8	223
Other computer and electronic products	37	0	0	37
Electrical equipment, appliance and components	154	8	9	171
Motor vehicle and parts	103	13	7	123
Aerospace products and parts	45	7	2	54
All other transportation equipment	48	3	3	54
Furniture and related products	77	0	0	77
Other manufacturing industries	250	8	2	260
Total manufacturing	**3,581**	**162**	**119**	**3,862**
Services				
Wholesale trade	648	21	27	696
Retail trade	147	0	1	148
Transportation and warehousing	46	2	0	48
Information and cultural industries	344	12	5	361
Finance, insurance and real estate	89	1	0	90
Architectural, engineering and related services	495	4	5	504
Computer system design and related services	1,253	15	7	1,275
Management, scientific and technical consulting services	235	1	2	238
Scientific research and development services	467	6	5	478
Health care and social assistance	74	2	1	77
All other services	512	6	1	519
Total services	**4,310**	**70**	**54**	**4,434**
Total all industries	**8,465**	**246**	**182**	**8,893**

Table 28.

Number of R&D performers, by NAICS, 2001

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	2
Rice Farming	111160	0
Other Grain Farming	111190	3
Potato Farming	111211	14
Other Vegetable (except Potato) and Melon Farming	111219	23
Orange Groves	111310	0
Citrus (except Orange) Groves	111320	0
Non-Citrus Fruit and Tree Nut Farming	111330	16
Mushroom Production	111411	8
Other Food Crops Grown Under Cover	111419	11
Nursery and Tree Production	111421	16
Floriculture Production	111422	25
Tobacco Farming	111910	4
Cotton Farming	111920	0
Sugar-Cane Farming	111930	0
Hay Farming	111940	1
Fruit and Vegetable Combination Farming	111993	3
All Other Miscellaneous Crop Farming	111999	18
Beef Cattle Ranching and Farming, including Feedlots	112110	6
Dairy Cattle and Milk Production	112120	8
Hog and Pig Farming	112210	26
Chicken Egg Production	112310	1
Broiler and Other Meat-Type Chicken Production	112320	2
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	1
Animal Aquaculture	112510	24
Apiculture	112910	2
Horse and Other Equine Production	112920	1
Fur-Bearing Animal and Rabbit Production	112930	1
Livestock Combination Farming	112991	5
All Other Miscellaneous Animal Production	112999	1
Support Activities for Crop Production	115110	22
Support Activities for Animal Production	115210	10
FORESTRY AND LOGGING		
Timber Tract Operations	113110	1
Forest Nurseries and Gathering of Forest Products	113210	1
Logging (except Contract)	113311	12
Contract Logging	113312	11
Support Activities for Forestry	115310	17
FISHING, HUNTING AND TRAPPING		
Salt Water Fishing	114113	3
Inland Fishing	114114	1
Hunting and Trapping	114210	0
MINING AND OIL AND GAS EXTRACTION		
OIL AND GAS EXTRACTION		
Conventional Oil and Gas Extraction	211113	19
Non-Conventional Oil Extraction	211114	3
Oil and Gas Contract Drilling	213111	5
Services to Oil and Gas Extraction	213118	19
MINING		
Bituminous Coal Mining	212114	1
Subbituminous Coal Mining	212115	0
Lignite Coal Mining	212116	0
Iron Ore Mining	212210	2
Gold and Silver Ore Mining	212220	2
Lead-Zinc Ore Mining	212231	0
Nickel-Copper Ore Mining	212232	2
Copper-Zinc Ore Mining	212233	4
Uranium Ore Mining	212291	2
All Other Metal Ore Mining	212299	0
Granite Mining and Quarrying	212314	3
Limestone Mining and Quarrying	212315	2
Marble Mining and Quarrying	212316	1
Sandstone Mining and Quarrying	212317	0
Sand and Gravel Mining and Quarrying	212323	1
Shale, Clay and Refractory Mineral Mining and Quarrying	212326	0
Diamond Mines	212392	0
Salt Mines	212393	0
Asbestos Mining	212394	1
Gypsum Mining	212395	0
Potash Mining	212396	3
Peat Extraction	212397	4
All Other Non-Metallic Mineral Mining and Quarrying	212398	4
Contract Drilling (except Oil and Gas)	213117	4
Other Support Activities for Mining	213119	7
UTILITIES		
ELECTRIC POWER		
Hydro-Electric Power Generation	221111	9
Fossil-Fuel Electric Power Generation	221112	1
Nuclear Electric Power Generation	221113	0
Other Electric Power Generation	221119	0
Electric Bulk Power Transmission and Control	221121	1
Electric Power Distribution	221122	1
OTHER UTILITIES		
Natural Gas Distribution	221210	0
Water Supply and Irrigation Systems	221310	7
Sewage Treatment Facilities	221320	3
Steam and Air-Conditioning Supply	221330	2
Waste Collection	562110	5
Waste Treatment and Disposal	562210	9
Remediation Services	562910	12
Material Recovery Facilities	562920	2
All Other Waste Management Services	562990	4
CONSTRUCTION		
Land Subdivision and Land Development	231110	12
Residential Building Construction	231210	23
Non-Residential Building Construction	231220	14
Highway, Street and Bridge Construction	231310	19
Water and Sewer Construction	231320	1
Oil and Gas Pipelines and Related Industrial Complexes Construction	231330	0
Other Engineering Construction	231390	9
Construction Management	231410	4
Site Preparation Work	232110	10
Forming Work	232210	2
Concrete Pouring and Finishing Work	232220	6
Structural Steel and Precast Concrete Erection Work	232230	2
Crane Rental Services	232240	0
Framing and Rough Carpentry Work	232250	1
Other Building Structure Work	232290	2
Masonry Work	232310	1
Glass and Glazing Work	232320	0
Roofing and Related Work	232330	1
Metallic and Other Siding Work	232340	3

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Other Building Exterior Finishing Work	232390	1
Drywall and Plaster Work	232410	0
Terrazzo and Tile Work	232420	0
Carpet and Resilient Flooring Work	232430	0
Insulation Work	232440	0
Building Painting and Paperhanging Work	232450	6
Finish Carpentry and Wood Flooring Work	232460	8
Other Building Interior Finishing Work	232490	1
Electrical Work	232510	44
Plumbing, Heating and Air-Conditioning Installation	232520	36
Automatic Sprinkler System Installation	232530	2
Commercial Refrigeration Installation	232540	7
Elevator and Escalator Installation	232550	1
Other Building Equipment Installation	232590	12
Fencing and Interlocking Stone Contracting	232910	1
Residential and Commercial Paving Contracting	232920	0
All Other Special Trade Contracting	232990	5
MANUFACTURING		
FOOD		
Dog and Cat Food Manufacturing	311111	1
Other Animal Food Manufacturing	311119	20
Flour Milling	311211	7
Rice Milling and Malt Manufacturing	311214	2
Wet Corn Milling	311221	1
Oilseed Processing	311224	0
Fat and Oil Refining and Blending	311225	2
Breakfast Cereal Manufacturing	311230	5
Sugar Manufacturing	311310	1
Chocolate and Confectionery Manufacturing from Cacao Beans	311320	2
Confectionery Manufacturing from Purchased Chocolate	311330	2
Non-Chocolate Confectionery Manufacturing	311340	3
Frozen Food Manufacturing	311410	12
Fruit and Vegetable Canning, Pickling and Drying	311420	18
Fluid Milk Manufacturing	311511	8
Butter, Cheese, and Dry and Condensed Dairy Products Manufacturing	311515	18
Ice Cream and Frozen Dessert Manufacturing	311520	3
Animal (except Poultry) Slaughtering	311611	10
Rendering and Meat Processing from Carcasses	311614	16
Poultry Processing	311615	13
Seafood Product Preparation and Packaging	311710	19
Retail Bakeries	311811	4
Commercial Bakeries and Frozen Bakery Product Manufacturing	311814	17
Cookie and Cracker Manufacturing	311821	3
Flour Mixes and Dough Manufacturing from Purchased Flour	311822	5
Dry Pasta Manufacturing	311823	3
Tortilla Manufacturing	311830	1
Roasted Nut and Peanut Butter Manufacturing	311911	2
Other Snack Food Manufacturing	311919	1
Coffee and Tea Manufacturing	311920	3
Flavouring Syrup and Concentrate Manufacturing	311930	0
Seasoning and Dressing Manufacturing	311940	12
All Other Food Manufacturing	311990	26
BEVERAGES AND TOBACCO		
Soft Drink and Ice Manufacturing	312110	0
Breweries	312120	10
Wineries	312130	10
Distilleries	312140	2
Tobacco Stemming and Redrying	312210	0
Tobacco Product Manufacturing	312220	3
TEXTILE		
Fibre, Yarn and Thread Mills	313110	10
Broad-Woven Fabric Mills	313210	21
Narrow Fabric Mills and Schiffli Machine Embroidery	313220	7
Nonwoven Fabric Mills	313230	2
Knit Fabric Mills	313240	18
Textile and Fabric Finishing	313310	15
Fabric Coating	313320	2
Carpet and Rug Mills	314110	7
Curtain and Linen Mills	314120	5
Textile Bag and Canvas Mills	314910	11
All Other Textile Product Mills	314990	10
WOOD PRODUCTS		
Sawmills (except Shingle and Shake Mills)	321111	75
Shingle and Shake Mills	321112	4
Wood Preservation	321114	8
Hardwood Veneer and Plywood Mills	321211	9
Softwood Veneer and Plywood Mills	321212	5
Structural Wood Product Manufacturing	321215	5
Particle Board and Fibreboard Mills	321216	3
Waferboard Mills	321217	1
Wood Window and Door Manufacturing	321911	12
Other Millwork	321919	27
Wood Container and Pallet Manufacturing	321920	7
Manufactured (Mobile) Home Manufacturing	321991	1
Prefabricated Wood Building Manufacturing	321992	9
All Other Miscellaneous Wood Product Manufacturing	321999	10
PAPER		
Mechanical Pulp Mills	322111	1
Chemical Pulp Mills	322112	8
Paper (except Newsprint) Mills	322121	14
Newsprint Mills	322122	19
Paperboard Mills	322130	1
Corrugated and Solid Fibre Box Manufacturing	322211	4
Folding Paperboard Box Manufacturing	322212	7
Other Paperboard Container Manufacturing	322219	2
Paper Bag and Coated and Treated Paper Manufacturing	322220	19
Stationery Product Manufacturing	322230	2
Sanitary Paper Product Manufacturing	322291	6
All Other Converted Paper Product Manufacturing	322299	9
PRINTING		
Commercial Screen Printing	323113	4
Quick Printing	323114	0
Digital Printing	323115	3
Manifold Business Forms Printing	323116	3
Other Printing	323119	40
Support Activities for Printing	323120	18
PETROLEUM AND COAL PRODUCTS		
Petroleum Refineries	324110	10
Asphalt Paving Mixture and Block Manufacturing	324121	5
Asphalt Shingle and Coating Material Manufacturing	324122	0
Other Petroleum and Coal Products Manufacturing	324190	11
PHARMACEUTICAL AND MEDICINE		
Pharmaceutical and Medicine Manufacturing	325410	90
OTHER CHEMICAL		
Petrochemical Manufacturing	325110	1
Industrial Gas Manufacturing	325120	2
Synthetic Dye and Pigment Manufacturing	325130	7
Alkali and Chlorine Manufacturing	325181	1
All Other Basic Inorganic Chemical Manufacturing	325189	13
Other Basic Organic Chemical Manufacturing	325190	13
Resin and Synthetic Rubber Manufacturing	325210	27
Artificial and Synthetic Fibres and Filaments Manufacturing	325220	6
Chemical Fertilizer (except Potash) Manufacturing	325313	3
Mixed Fertilizer Manufacturing	325314	12
Pesticide and Other Agricultural Chemical Manufacturing	325320	8
Paint and Coating Manufacturing	325510	46

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Adhesive Manufacturing	325520	20
Soap and Cleaning Compound Manufacturing	325610	36
Toilet Preparation Manufacturing	325620	27
Printing Ink Manufacturing	325910	9
Explosives Manufacturing	325920	5
Custom Compounding of Purchased Resins	325991	5
All Other Miscellaneous Chemical Product Manufacturing	325999	43
PLASTIC PRODUCT		
Unsupported Plastic Bag Manufacturing	326111	13
Unsupported Plastic Film and Sheet Manufacturing	326114	14
Unsupported Plastic Profile Shape Manufacturing	326121	9
Plastic Pipe and Pipe Fitting Manufacturing	326122	6
Laminated Plastic Plate, Sheet and Shape Manufacturing	326130	5
Polystyrene Foam Product Manufacturing	326140	5
Urethane and Other Foam Product (except Polystyrene) Manufacturing	326150	12
Plastic Bottle Manufacturing	326160	4
Plastic Plumbing Fixture Manufacturing	326191	13
Motor Vehicle Plastic Parts Manufacturing	326193	18
All Other Plastic Product Manufacturing	326198	123
RUBBER PRODUCT		
Tire Manufacturing	326210	3
Rubber and Plastic Hose and Belting Manufacturing	326220	11
Other Rubber Product Manufacturing	326290	39
NON-METALLIC MINERAL PRODUCTS		
Pottery, Ceramics and Plumbing Fixture Manufacturing	327110	0
Clay Building Material and Refractory Manufacturing	327120	7
Glass Manufacturing	327214	10
Glass Product Manufacturing from Purchased Glass	327215	13
Cement Manufacturing	327310	1
Ready-Mix Concrete Manufacturing	327320	5
Concrete Pipe, Brick and Block Manufacturing	327330	11
Other Concrete Product Manufacturing	327390	14
Lime Manufacturing	327410	0
Gypsum Product Manufacturing	327420	2
Abrasive Product Manufacturing	327910	8
All Other Non-Metallic Mineral Product Manufacturing	327990	20
PRIMARY METAL (FERROUS)		
Iron and Steel Mills and Ferro-Alloy Manufacturing	331110	7
Iron and Steel Pipes and Tubes Manufacturing from Purchased Steel	331210	6
Cold-Rolled Steel Shape Manufacturing	331221	2
Steel Wire Drawing	331222	1
Iron Foundries	331511	9
Steel Foundries	331514	7
PRIMARY METAL (NON-FERROUS)		
Primary Production of Alumina and Aluminum	331313	6
Aluminum Rolling, Drawing, Extruding and Alloying	331317	6
Non-Ferrous Metal (except Aluminum) Smelting and Refining	331410	7
Copper Rolling, Drawing, Extruding and Alloying	331420	1
Non-Ferrous Metal (except Copper and Aluminum) Rolling, Drawing, Extruding and Alloying	331490	7
Non-Ferrous Die-Casting Foundries	331523	6
Non-Ferrous Foundries (except Die-Casting)	331529	4
FABRICATED METAL PRODUCT		
Forging	332113	14
Stamping	332118	17
Cutlery and Hand Tool Manufacturing	332210	22
Prefabricated Metal Building and Component Manufacturing	332311	7
Concrete Reinforcing Bar Manufacturing	332314	0
Other Plate Work and Fabricated Structural Product Manufacturing	332319	24
Metal Window and Door Manufacturing	332321	25
Other Ornamental and Architectural Metal Products Manufacturing	332329	29
Power Boiler and Heat Exchanger Manufacturing	332410	9
Metal Tank (Heavy Gauge) Manufacturing	332420	8
Metal Can Manufacturing	332431	0
Other Metal Container Manufacturing	332439	8
Hardware Manufacturing	332510	18
Spring (Heavy Gauge) Manufacturing	332611	0
Other Fabricated Wire Product Manufacturing	332619	17
Machine Shops	332710	124
Turned Product and Screw, Nut and Bolt Manufacturing	332720	8
Coating, Engraving, Heat Treating and Allied Activities	332810	41
Metal Valve Manufacturing	332910	11
Ball and Roller Bearing Manufacturing	332991	3
All Other Miscellaneous Fabricated Metal Product Manufacturing	332999	43
MACHINERY		
Agricultural Implement Manufacturing	333110	66
Construction Machinery Manufacturing	333120	23
Mining and Oil and Gas Field Machinery Manufacturing	333130	28
Sawmill and Woodworking Machinery Manufacturing	333210	22
Rubber and Plastics Industry Machinery Manufacturing	333220	13
Paper Industry Machinery Manufacturing	333291	17
All Other Industrial Machinery Manufacturing	333299	60
Commercial and Service Industry Machinery Manufacturing	333310	65
Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	333413	26
Heating Equipment and Commercial Refrigeration Equipment Manufacturing	333416	50
Industrial Mould Manufacturing	333511	52
Other Metalworking Machinery Manufacturing	333519	94
Turbine and Turbine Generator Set Unit Manufacturing	333611	11
Other Engine and Power Transmission Equipment Manufacturing	333619	10
Pump and Compressor Manufacturing	333910	16
Material Handling Equipment Manufacturing	333920	68
All Other General-Purpose Machinery Manufacturing	333990	88
COMPUTER AND PERIPHERAL EQUIPMENT		
Computer and Peripheral Equipment Manufacturing	334110	72
COMMUNICATIONS EQUIPMENT		
Telephone Apparatus Manufacturing	334210	28
Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	334220	59
Other Communications Equipment Manufacturing	334290	25
SEMICONDUCTOR AND OTHER ELECTRONIC COMPONENT		
Semiconductor and Other Electronic Component Manufacturing	334410	121
NAVIGATIONAL, MEASURING, MEDICAL AND CONTROL INSTRUMENTS		
Navigational and Guidance Instruments Manufacturing	334511	37
Measuring, Medical and Controlling Devices Manufacturing	334512	191
OTHER COMPUTER AND ELECTRONIC PRODUCT		
Audio and Video Equipment Manufacturing	334310	20
Manufacturing and Reproducing Magnetic and Optical Media	334610	18
ELECTRICAL EQUIPMENT, APPLIANCE AND COMPONENT		
Electric Lamp Bulb and Parts Manufacturing	335110	2
Lighting Fixture Manufacturing	335120	28
Small Electrical Appliance Manufacturing	335210	18
Major Kitchen Appliance Manufacturing	335223	6
Other Major Appliance Manufacturing	335229	3
Power, Distribution and Specialty Transformers Manufacturing	335311	16
Motor and Generator Manufacturing	335312	6
Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	335315	41

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Battery Manufacturing	335910	4
Communication and Energy Wire and Cable Manufacturing	335920	12
Wiring Device Manufacturing	335930	11
All Other Electrical Equipment and Component Manufacturing	335990	26
MOTOR VEHICLE AND PARTS		
Automobile and Light-Duty Motor Vehicle Manufacturing	336110	6
Heavy-Duty Truck Manufacturing	336120	7
Motor Vehicle Body Manufacturing	336211	21
Truck Trailer Manufacturing	336212	18
Motor Home, Travel Trailer and Camper Manufacturing	336215	6
Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	336310	9
Motor Vehicle Electrical and Electronic Equipment Manufacturing	336320	15
Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	336330	3
Motor Vehicle Brake System Manufacturing	336340	5
Motor Vehicle Transmission and Power Train Parts Manufacturing	336350	5
Motor Vehicle Seating and Interior Trim Manufacturing	336360	7
Motor Vehicle Metal Stamping	336370	7
Other Motor Vehicle Parts Manufacturing	336390	18
AEROSPACE PRODUCT AND PARTS		
Aerospace Product and Parts Manufacturing	336410	54
ALL OTHER TRANSPORTATION EQUIPMENT		
Railroad Rolling Stock Manufacturing	336510	7
Ship Building and Repairing	336611	2
Boat Building	336612	22
Other Transportation Equipment Manufacturing	336990	23
FURNITURE AND RELATED PRODUCT		
Wood Kitchen Cabinet and Counter Top Manufacturing	337110	8
Upholstered Household Furniture Manufacturing	337121	6
Other Wood Household Furniture Manufacturing	337123	15
Household Furniture (except Wood and Upholstered) Manufacturing	337126	7
Institutional Furniture Manufacturing	337127	7
Wood Office Furniture, including Custom Architectural Woodwork, Manufacturing	337213	14
Office Furniture (except Wood) Manufacturing	337214	9
Showcase, Partition, Shelving and Locker Manufacturing	337215	8
Mattress Manufacturing	337910	2
Blind and Shade Manufacturing	337920	2
OTHER MANUFACTURING INDUSTRIES		
Hosiery and Sock Mills	315110	5
Other Clothing Knitting Mills	315190	8
Cut and Sew Clothing Contracting	315210	3
Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing	315221	1
Men's and Boys' Cut and Sew Suit, Coat and Overcoat Manufacturing	315222	1
Men's and Boys' Cut and Sew Shirt Manufacturing	315226	1
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	6
Women's and Girls' Cut and Sew Lingerie, Loungewear and Nightwear Manufacturing	315231	4
Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing	315232	1
Women's and Girls' Cut and Sew Dress Manufacturing	315233	2
Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket and Skirt Manufacturing	315234	1
Other Women's and Girls' Cut and Sew Clothing Manufacturing	315239	3
Infants' Cut and Sew Clothing Manufacturing	315291	1
Fur and Leather Clothing Manufacturing	315292	0
All Other Cut and Sew Clothing Manufacturing	315299	0
Clothing Accessories and Other Clothing Manufacturing	315990	5
Leather and Hide Tanning and Finishing	316110	4
Footwear Manufacturing	316210	9
Other Leather and Allied Product Manufacturing	316990	3
Medical Equipment and Supplies Manufacturing	339110	81
Jewellery and Silverware Manufacturing	339910	13
Sporting and Athletic Goods Manufacturing	339920	33
Doll, Toy and Game Manufacturing	339930	7
Office Supplies (except Paper) Manufacturing	339940	6
Sign Manufacturing	339950	12
All Other Miscellaneous Manufacturing	339990	57
SERVICES		
WHOLESALE TRADE		
Live Animal Wholesaler-Distributors	411110	3
Oilseed and Grain Wholesaler-Distributors	411120	4
Nursery Stock and Plant Wholesaler-Distributors	411130	3
Other Farm Product Wholesaler-Distributors	411190	0
Petroleum Product Wholesaler-Distributors	412110	3
General-Line Food Wholesaler-Distributors	413110	5
Dairy and Milk Products Wholesaler-Distributors	413120	2
Poultry and Egg Wholesaler-Distributors	413130	0
Fish and Seafood Product Wholesaler-Distributors	413140	1
Fresh Fruit and Vegetable Wholesaler-Distributors	413150	14
Red Meat and Meat Product Wholesaler-Distributors	413160	5
Other Specialty-Line Food Wholesaler-Distributors	413190	18
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	7
Footwear Wholesaler-Distributors	414120	1
Piece Goods, Notions and Other Dry Goods Wholesaler-Distributors	414130	8
Home Entertainment Equipment Wholesaler-Distributors	414210	6
Household Appliance Wholesaler-Distributors	414220	3
China, Glassware, Crockery and Pottery Wholesaler-Distributors	414310	2
Floor Covering Wholesaler-Distributors	414320	1
Linen, Drapery and Other Textile Furnishings Wholesaler-Distributors	414330	0
Other Home Furnishings Wholesaler-Distributors	414390	3
Jewellery and Watch Wholesaler-Distributors	414410	4
Book, Periodical and Newspaper Wholesaler-Distributors	414420	1
Photographic Equipment and Supplies Wholesaler-Distributors	414430	2
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	3
Pharmaceuticals and Pharmacy Supplies Wholesaler-Distributors	414510	35
Toiletries, Cosmetics and Sundries Wholesaler-Distributors	414520	17
New and Used Automobile and Light-Duty Truck Wholesaler-Distributors	415110	0
Truck, Truck Tractor and Bus Wholesaler-Distributors	415120	2
Recreational and Other Motor Vehicles Wholesaler-Distributors	415190	1
Tire Wholesaler-Distributors	415210	0
Other New Motor Vehicle Parts and Accessories Wholesaler-Distributors	415290	5
Used Motor Vehicle Parts and Accessories Wholesaler-Distributors	415310	1
Electrical Wiring and Construction Supplies Wholesaler-Distributors	416110	17
Plumbing, Heating and Air-Conditioning Equipment and Supplies Wholesaler-Distributors	416120	21
Metal Service Centres	416210	10
General-Line Building Supplies Wholesaler-Distributors	416310	3
Lumber, Plywood and Millwork Wholesaler-Distributors	416320	7
Hardware Wholesaler-Distributors	416330	14
Paint, Glass and Wallpaper Wholesaler-Distributors	416340	1
Other Specialty-Line Building Supplies Wholesaler-Distributors	416390	8

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Farm, Lawn and Garden Machinery and Equipment Wholesaler-Distributors	417110	14
Construction and Forestry Machinery, Equipment and Supplies Wholesaler-Distributors	417210	6
Mining and Oil and Gas Well Machinery, Equipment and Supplies Wholesaler-Distributors	417220	13
Industrial Machinery, Equipment and Supplies Wholesaler-Distributors	417230	61
Computer, Computer Peripheral and Pre-Packaged Software Wholesaler-Distributors	417310	61
Electronic Components, Navigational and Communications Equipment and Supplies Wholesaler-Distributors	417320	55
Office and Store Machinery and Equipment Wholesaler-Distributors	417910	10
Service Establishment Machinery, Equipment and Supplies Wholesaler-Distributors	417920	12
Professional Machinery, Equipment and Supplies Wholesaler-Distributors	417930	45
All Other Machinery, Equipment and Supplies Wholesaler-Distributors	417990	25
Recyclable Metal Wholesaler-Distributors	418110	6
Recyclable Paper and Paperboard Wholesaler-Distributors	418120	1
Other Recyclable Material Wholesaler-Distributors	418190	17
Stationery and Office Supplies Wholesaler-Distributors	418210	2
Other Paper and Disposable Plastic Product Wholesaler-Distributors	418220	1
Agricultural Feed Wholesaler-Distributors	418310	8
Seed Wholesaler-Distributors	418320	11
Agricultural Chemical and Other Farm Supplies Wholesaler-Distributors	418390	15
Chemical (except Agricultural) and Allied Product Wholesaler-Distributors	418410	29
Log and Wood Chip Wholesaler-Distributors	418910	1
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	54
Farm Product Agents and Brokers	419110	0
Petroleum Product Agents and Brokers	419120	2
Food, Beverage and Tobacco Agents and Brokers	419130	3
Personal and Household Goods Agents and Brokers	419140	1
Motor Vehicle and Parts Agents and Brokers	419150	0
Building Material and Supplies Agents and Brokers	419160	4
Machinery, Equipment and Supplies Agents and Brokers	419170	15
Other Wholesale Agents and Brokers	419190	11
RETAIL TRADE		
New Car Dealers	441110	0
Used Car Dealers	441120	2
Recreational Vehicle Dealers	441210	0
Motorcycle, Boat and Other Motor Vehicle Dealers	441220	4
Automotive Parts and Accessories Stores	441310	3
Tire Dealers	441320	1
Furniture Stores	442110	1
Floor Covering Stores	442210	0
Window Treatment Stores	442291	2
Print and Picture Frame Stores	442292	0
All Other Home Furnishings Stores	442298	0
Appliance, Television and Other Electronics Stores	443110	15
Computer and Software Stores	443120	53
Camera and Photographic Supplies Stores	443130	0
Home Centres	444110	1
Paint and Wallpaper Stores	444120	1
Hardware Stores	444130	2
Other Building Material Dealers	444190	4
Outdoor Power Equipment Stores	444210	0
Nursery and Garden Centres	444220	2
Supermarkets and Other Grocery (except Convenience) Stores	445110	0
Convenience Stores	445120	0
Meat Markets	445210	0
Fish and Seafood Markets	445220	0
Fruit and Vegetable Markets	445230	0
Baked Goods Stores	445291	2
Confectionery and Nut Stores	445292	3
All Other Specialty Food Stores	445299	2
Beer, Wine and Liquor Stores	445310	0
Pharmacies and Drug Stores	446110	4
Cosmetics, Beauty Supplies and Perfume Stores	446120	1
Optical Goods Stores	446130	1
Food (Health) Supplement Stores	446191	4
All Other Health and Personal Care Stores	446199	3
Gasoline Stations with Convenience Stores	447110	0
Other Gasoline Stations	447190	0
Men's Clothing Stores	448110	0
Women's Clothing Stores	448120	1
Children's and Infants' Clothing Stores	448130	0
Family Clothing Stores	448140	2
Clothing Accessories Stores	448150	0
Fur Stores	448191	0
All Other Clothing Stores	448199	0
Shoe Stores	448210	1
Jewellery Stores	448310	0
Luggage and Leather Goods Stores	448320	0
Sporting Goods Stores	451110	5
Hobby, Toy and Game Stores	451120	1
Sewing, Needlework and Piece Goods Stores	451130	0
Musical Instrument and Supplies Stores	451140	1
Book Stores and News Dealers	451210	0
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	1
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	1
Manufactured (Mobile) Home Dealers	453930	0
Beer and Wine-Making Supplies Stores	453992	2
All Other Miscellaneous Store Retailers (except Beer and Wine-Making Supplies Stores)	453999	7
Electronic Shopping and Mail-Order Houses	454110	12
Vending Machine Operators	454210	1
Fuel Dealers	454310	0
Other Direct Selling Establishments	454390	5
TRANSPORTATION AND WAREHOUSING		
Scheduled Air Transportation	481110	1
Non-Scheduled Chartered Air Transportation	481214	2
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	0
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	1
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	3
Forest Products Trucking, Local	484223	0
Other Specialized Freight (except Used Goods) Trucking, Local	484229	0
Bulk Liquids Trucking, Long Distance	484231	0
Dry Bulk Materials Trucking, Long Distance	484232	2
Forest Products Trucking, Long Distance	484233	1
Other Specialized Freight (except Used Goods) Trucking, Long Distance	484239	3
Urban Transit Systems	485110	0
Interurban and Rural Bus Transportation	485210	0
Taxi Service	485310	0

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Limousine Service	485320	0
School and Employee Bus Transportation	485410	0
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	0
Air Traffic Control	488111	0
Other Airport Operations	488119	0
Other Support Activities for Air Transportation	488190	4
Support Activities for Rail Transportation	488210	2
Port and Harbour Operations	488310	0
Marine Cargo Handling	488320	1
Marine Salvage Services	488331	0
Ship Piloting Services	488332	0
Other Navigational Services to Shipping	488339	1
Other Support Activities for Water Transportation	488390	1
Motor Vehicle Towing	488410	2
Other Support Activities for Road Transportation	488490	1
Marine Shipping Agencies	488511	0
Other Freight Transportation Arrangement	488519	3
Other Support Activities for Transportation	488990	1
Postal Service	491110	1
Couriers	492110	0
Local Messengers and Local Delivery	492210	0
General Warehousing and Storage	493110	6
Refrigerated Warehousing and Storage	493120	3
Farm Product Warehousing and Storage	493130	3
Other Warehousing and Storage	493190	1
INFORMATION AND CULTURAL INDUSTRIES		
Newspaper Publishers	511110	2
Periodical Publishers	511120	2
Book Publishers	511130	3
Database and Directory Publishers	511140	3
Other Publishers	511190	1
Software Publishers	511210	238
Motion Picture and Video Production	512110	7
Motion Picture and Video Distribution	512120	0
Motion Picture and Video Exhibition	512130	1
Post-Production and Other Motion Picture and Video Industries	512190	4
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	513110	1
Television Broadcasting	513120	0
Pay and Specialty Television	513210	0
Cable and Other Program Distribution	513220	4
Wired Telecommunications Carriers	513310	11
Wireless Telecommunications Carriers (except Satellite)	513320	13
Telecommunications Resellers	513330	5
Satellite Telecommunications	513340	3
Other Telecommunications	513390	0
News Syndicates	514110	2
Libraries	514121	3
Archives	514122	1
On-Line Information Services	514191	35
All Other Information Services	514199	0
Data Processing Services	514210	23
FINANCE, INSURANCE AND REAL ESTATE		
Monetary Authorities - Central Bank	521110	0
Personal and Commercial Banking Industry	522111	5
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	2
Consumer Lending	522291	0
All Other Non-Depository Credit Intermediation	522299	5
Mortgage and Non-mortgage Loan Brokers	522310	2
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	0
Securities Brokerage	523120	0
Commodity Contracts Dealing	523130	0
Commodity Contracts Brokerage	523140	0
Securities and Commodity Exchanges	523210	0
Miscellaneous Intermediation	523910	1
Portfolio Management	523920	29
Investment Advice	523930	1
All Other Financial Investment Activities	523990	4
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	1
Claims Adjusters	524291	0
All Other Insurance Related Activities	524299	0
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	1
Lessors of Social Housing Projects	531112	0
Lessors of Non-Residential Buildings (except Mini-Warehouses)	531120	6
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	5
Offices of Real Estate Appraisers	531320	0
Other Activities Related to Real Estate	531390	0
Passenger Car Rental	532111	0
Passenger Car Leasing	532112	0
Truck, Utility Trailer and RV (Recreational Vehicle) Rental and Leasing	532120	0
Consumer Electronics and Appliance Rental	532210	1
Formal Wear and Costume Rental	532220	0
Video Tape and Disc Rental	532230	1
Other Consumer Goods Rental	532290	2
General Rental Centres	532310	2
Construction, Transportation, Mining, and Forestry Machinery and Equipment Rental and Leasing	532410	8
Office Machinery and Equipment Rental and Leasing	532420	1
Other Commercial and Industrial Machinery and Equipment Rental and Leasing	532490	5
Lessors of Non-Financial Intangible Assets (Except Copyrighted Works)	533110	8

Table 28. (continued)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
ARCHITECTURAL, ENGINEERING AND RELATED		
Architectural Services	541310	3
Landscape Architectural Services	541320	0
Engineering Services	541330	397
Drafting Services	541340	6
Building Inspection Services	541350	2
Geophysical Surveying and Mapping Services	541360	13
Surveying and Mapping (except Geophysical) Services	541370	15
Testing Laboratories	541380	81
COMPUTER SYSTEM DESIGN AND RELATED		
Computer Systems Design and Related Services	541510	1323
MANAGEMENT, SCIENTIFIC AND TECHNICAL CONSULTING		
Administrative Management and General Management Consulting Services	541611	88
Human Resource and Executive Search Consulting Services	541612	11
Other Management Consulting Services	541619	30
Environmental Consulting Services	541620	44
Other Scientific and Technical Consulting Services	541690	80
SCIENTIFIC RESEARCH AND DEVELOPMENT		
Research and Development in the Physical, Engineering and Life Sciences	541710	475
Research and Development in the Social Sciences and Humanities	541720	28
HEALTH CARE AND SOCIAL ASSISTANCE		
Offices of Physicians	621110	43
Offices of Dentists	621210	0
Offices of Chiropractors	621310	1
Offices of Optometrists	621320	2
Offices of Mental Health Practitioners (except Physicians)	621330	4
Offices of Physical, Occupational, and Speech Therapists and Audiologists	621340	3
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	1
Medical and Diagnostic Laboratories	621510	50
Home Health Care Services	621610	2
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	2
Child and Youth Services	624110	0
Services for the Elderly and Persons with Disabilities	624120	0
Other Individual and Family Services	624190	1
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	1
Offices of Notaries	541120	0
Other Legal Services	541190	1
Offices of Accountants	541212	4
Tax Preparation Services	541213	0
Bookkeeping, Payroll and Related Services	541215	6
Interior Design Services	541410	1
Industrial Design Services	541420	36
Graphic Design Services	541430	11
Other Specialized Design Services	541490	7
Advertising Agencies	541810	19
Public Relations Services	541820	0
Media Buying Agencies	541830	0
Media Representatives	541840	4
Display Advertising	541850	3
Direct Mail Advertising	541860	0
Advertising Material Distribution Services	541870	0
Specialty Advertising Distributors	541891	1
All Other Services Related to Advertising	541899	8
Marketing Research and Public Opinion Polling	541910	15
Photographic Services	541920	5
Translation and Interpretation Services	541930	0
Veterinary Services	541940	5
All Other Professional, Scientific and Technical Services	541990	18
Holding Companies	551113	72
Head Offices	551114	0
Office Administrative Services	561110	27
Facilities Support Services	561210	0
Employment Placement Agencies	561310	1
Temporary Help Services	561320	3
Employee Leasing Services	561330	0
Document Preparation Services	561410	3
Telephone Call Centres	561420	7
Business Service Centres	561430	1
Collection Agencies	561440	0
Credit Bureaus	561450	1
Other Business Support Services	561490	0
Travel Agencies	561510	2
Tour Operators	561520	1
Other Travel Arrangement and Reservation Services	561590	2
Investigation Services	561611	1
Security Guard and Patrol Services	561612	2
Armoured Car Services	561613	1
Security Systems Services (except Locksmiths)	561621	15
Locksmiths	561622	0
Exterminating and Pest Control Services	561710	4
Window Cleaning Services	561721	0
Janitorial Services (except Window Cleaning)	561722	4
Landscaping Services	561730	3
Carpet and Upholstery Cleaning Services	561740	2
Duct and Chimney Cleaning Services	561791	3
All Other Services to Buildings and Dwellings	561799	0
Packaging and Labelling Services	561910	7
Convention and Trade Show Organizers	561920	1
All Other Support Services	561990	29
Elementary and Secondary Schools	611110	1
Community Colleges and C.E.G.E.P.s	611210	6
Universities	611310	0
Business and Secretarial Schools	611410	1
Computer Training	611420	2
Professional and Management Development Training	611430	3
Technical and Trade Schools	611510	2
Fine Arts Schools	611610	0
Athletic Instruction	611620	4
Language Schools	611630	0
All Other Schools and Instruction	611690	9
Educational Support Services	611710	2
Theatre (except Musical) Companies	711111	0
Musical Theatre and Opera Companies	711112	0
Dance Companies	711120	0
Musical Groups and Artists	711130	0
Other Performing Arts Companies	711190	1
Sports Teams and Clubs	711211	0

Table 28. (concluded)

Number of R&D performers, by NAICS, 2001

NAICS description	NAICS	Firms
Horse Race Tracks	711213	0
Other Spectator Sports	711218	0
Live Theatres and Other Performing Arts Presenters with Facilities	711311	0
Sports Stadiums and Other Presenters with Facilities	711319	0
Performing Arts Promoters (Presenters) without Facilities	711321	1
Festivals without Facilities	711322	0
Sports Presenters and Other Presenters without Facilities	711329	1
Agents and Managers for Artists, Athletes, Entertainers and Other Public Figures	711410	0
Independent Artists, Writers and Performers	711510	7
Non-Commercial Art Museums and Galleries	712111	0
Museums (except Art Museums and Galleries)	712119	0
Historic and Heritage Sites	712120	0
Zoos and Botanical Gardens	712130	0
Other Heritage Institutions	712190	0
Amusement and Theme Parks	713110	0
Amusement Arcades	713120	1
Casinos (except Casino Hotels)	713210	0
Lotteries	713291	2
All Other Gambling Industries	713299	0
Golf Courses and Country Clubs	713910	1
Skiing Facilities	713920	3
Marinas	713930	1
Fitness and Recreational Sports Centres	713940	0
Bowling Centres	713950	0
All Other Amusement and Recreation Industries	713990	2
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	0
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	8
Food Service Contractors	722310	0
Caterers	722320	1
Mobile Food Services	722330	0
Drinking Places (Alcoholic Beverages)	722410	1
General Automotive Repair	811111	7
Automotive Exhaust System Repair	811112	1
Other Automotive Mechanical and Electrical Repair and Maintenance	811119	2
Automotive Body, Paint and Interior Repair and Maintenance	811121	3
Automotive Glass Replacement Shops	811122	2
Car Washes	811192	1
All Other Automotive Repair and Maintenance	811199	1
Electronic and Precision Equipment Repair and Maintenance	811210	23
Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	811310	75
Home and Garden Equipment Repair and Maintenance	811411	2
Appliance Repair and Maintenance	811412	1
Reupholstery and Furniture Repair	811420	1
Footwear and Leather Goods Repair	811430	0
Other Personal and Household Goods Repair and Maintenance	811490	3
Barber Shops	812114	0
Beauty Salons	812115	2
Unisex Hair Salons	812116	0
Other Personal Care Services	812190	2
Funeral Homes	812210	0
Cemeteries and Crematoria	812220	0
Coin-Operated Laundries and Dry Cleaners	812310	0
Dry Cleaning and Laundry Services (except Coin-Operated)	812320	2
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	4
Professional Organizations	813920	2
Labour Organizations	813930	0
Political Organizations	813940	0
Other Membership Organizations	813990	0
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	1
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		**8,893**

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