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# Estimates of research and development personnel in Canada, 1979 to 2002

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# **Estimates of research and development personnel in Canada, 1979 to 2002**

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**Symbols used in this report:**

The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0<sup>s</sup> value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- <sup>p</sup> preliminary
- <sup>r</sup> revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- <sup>E</sup> use with caution
- F too unreliable to be published

**Note**

Due to rounding, components may not add to the totals.

**Abbreviations**

- R&D Research and Experimental Development
- S&T Science and Technology
- OECD Organization for Economic Co-operation and Development
- SOC Standard Occupational Classification
- NAICS North American Industrial Classification System
- SIC Standard Industrial Classification
- NSE Natural Sciences and Engineering
- SSH Social Sciences and Humanities
- STC Statistics Canada
- FTE Full-time equivalence
- ISCO International Standard Classification of Occupation

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## Estimates of research and development personnel in Canada

Canada's economic growth and competitiveness, like that of every other industrialized country, is tied to the development of its scientific and technological base. Of all the factors needed for a country's scientific and industrial development, the supply of suitable human resources is unquestionably one of the most vital. Thus, the formulation of science and technology policy requires reliable information on these human resources, especially those engaged in research and development (R&D). "... unless people with certain training and qualifications are available, organized R&D is almost impossible. Education and training are lengthy processes; personnel data are, therefore, essential to realistic science policy planning".<sup>1</sup>

The number of R&D personnel are also considered a supplementary measure to intramural expenditures on R&D. The Frascati Manual states that "... personnel provide concrete measurements for international comparisons of resources devoted to R&D."<sup>1</sup>

It is important to determine the status of these resources on a regular basis. In this report, we shall present some statistical estimates and definitions concerning R&D personnel. Data on R&D personnel are derived from surveys conducted by the Science and Innovation Surveys Section, Science, Innovation and Electronic Information Division and from estimates based on various data sources.

### Classification by Occupation:

R&D personnel are drawn from a wide variety of occupations "... from the Nobel prize-winner to the winner's secretary, from the designer of space experiments to the breeder of laboratory animals."<sup>1</sup> In order that analysis on needs and supplies of highly qualified personnel can be done, R&D personnel are classified into three categories. The International Standard Classification of Occupation (ISCO), distinguishes three occupational levels: researchers, technicians and equivalent staff, and other support staff.

**Researchers (scientists and engineers)** are engaged in the conception or creation of new knowledge, products, processes, methods and systems. This level also includes managers and administrators engaged in the planning and management of the scientific and technical aspects of a researcher's work. They are usually equal in rank to the researchers and are often former or part-time researchers themselves. Post-graduate students, in particular those performing significant amounts of R&D, are included in this category.

**Technicians and equivalent staff** are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences, or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff, perform the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.

**Support staff** included skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects. Also included are all managers and administrators dealing mainly with financial and personnel matters and general administration given that their activities are directly supporting R&D. Those providing an indirect service, such as canteen and cleaning staff, should be excluded.

### Institutional Classification:

R&D data are classified into five sectors of performance. This method facilitates the collection of data and also provides information that can be cross referenced between sectors.

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1. OECD (2002). *Proposed standard practice for surveys on research and experimental development, (Frascati Manual)*, OECD, Paris

The sectors are:

- federal government
- provincial governments (includes provincial research organizations)
- business enterprise
- higher education
- private non-profit organizations

### Measurement and data collection:

**Scientific research and experimental development (R&D)** comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications.

Whenever possible, the data are also classified by major field of science; natural sciences and engineering (NSE) or social sciences and humanities (SSH).

**Natural Sciences and Engineering** consists of disciplines concerned with understanding, exploring, developing or utilizing the natural world. Included are the engineering, mathematical, life and physical sciences.

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

Since most workers do not all spend the same amount of time on R&D, it is necessary to express the number of persons performing R&D in terms of **full-time equivalence (FTE)** or **person-years**. If only those persons employed in pure R&D are counted, the number of R&D personnel will be understated, just as counting every person who spends part of his/her time on R&D will result in an overstatement. On a full-time equivalence basis then, a person devoting a third of his/her time to R&D will be counted as 0.3 of a person-year.

In Canada with the exception of the Higher education sector, each of the sectors mentioned above are surveyed on an annual basis in order to collect R&D data (both expenditures and personnel). Questionnaires used to collect R&D data can be viewed on the Statistics Canada website:

The higher education sector R&D activities are estimated by Statistics Canada. Substantial modifications have been made to the estimation procedures this year. Data has been revised back to 1991. Descriptive of the estimation procedure is found in the chapter on the Higher education sector.

### Related information available from STC

Information derived from surveys on scientific activities in Canada are available from the Science Statistics Section, Science Innovation and Electronic Information Division. Catalogue no. 88-001 presents highlights of each survey once they have been completed. A series of working papers presents more detail available from each survey. Two annual publications, catalogue no. 88-202 Industrial Research and Development and catalogue no. 88-204, Federal Scientific Activities are also available. Issue information is listed in the back of this report. You may contact Janet Thompson (613) 951-2580 [Janet.Thompson@statcan.ca](mailto:Janet.Thompson@statcan.ca) or Antoine Rose (613) 951-9919 [Antoine.Rose@statcan.ca](mailto:Antoine.Rose@statcan.ca) to obtain the information or visit our website at [www.statcan.ca](http://www.statcan.ca).

## Highlights:

Between 1979 and 2002, total R&D personnel in Canada has increased from 80,950 to 177,120 FTEs. In 2002, over half of R&D personnel, 63%, were employed in business enterprises, compared with 27% in higher education establishments, 8% in the federal government, 2% in provincial governments and less than 1% in private non-profit organizations.

According to the data in Table 1.1, in 2002, 63% of the persons engaged in R&D were researchers, 23% were technicians and 14% were other support staff. A shift in researchers and support staff is evident since 1979 when 46% of R&D personnel were researchers, 29% were technicians and 25% support staff. Over 87% of all R&D personnel in 2002 are concentrated in the NSE field, which means this field was responsible for almost all of the growth.

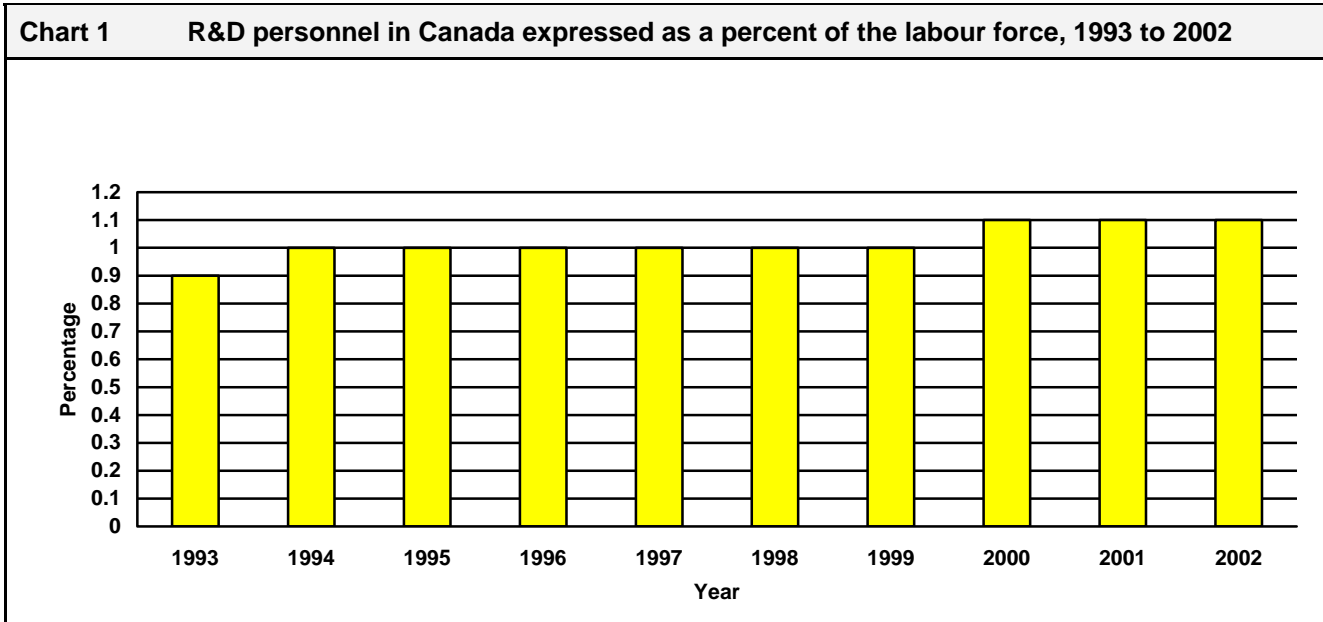
Technicians in the social sciences and humanities are now being identified (see table 1.4). This was made possible as a result of a modified estimation procedure in the higher education sector. Revisions as a result of these modifications were made back to 1991. Details of the modified procedure can be found in the section on higher education.

<b>Table 1.1 Personnel engaged in R&amp;D, all sectors, by occupational category, 1979 to 2002</b>										
Year	Researchers			Technicians			Support staff			Total
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH <sup>1</sup>	Total	
FTE's (rounded to the nearest 10)										
1979	27,270	9,940	<b>37,210</b>	23,140	..	<b>23,140</b>	13,150	7,450	<b>20,600</b>	<b>80,950</b>
1980 <sup>f</sup>	28,140	10,010	<b>38,150</b>	23,990	..	<b>23,990</b>	12,960	7,450	<b>20,410</b>	<b>82,550</b>
1981	30,680	9,740	<b>40,420</b>	26,730	..	<b>26,730</b>	14,540	7,650	<b>22,190</b>	<b>89,340</b>
1982 <sup>f</sup>	33,950	10,250	<b>44,200</b>	27,100	..	<b>27,100</b>	14,760	7,210	<b>21,970</b>	<b>93,270</b>
1983 <sup>f</sup>	35,170	10,520	<b>45,690</b>	26,610	..	<b>26,610</b>	15,900	6,770	<b>22,670</b>	<b>94,970</b>
1984	37,900	10,920	<b>48,820</b>	27,700	..	<b>27,700</b>	15,300	6,440	<b>21,740</b>	<b>98,260</b>
1985 <sup>f</sup>	41,330	11,170	<b>52,500</b>	28,240	..	<b>28,240</b>	15,390	5,920	<b>21,310</b>	<b>102,050</b>
1986 <sup>f</sup>	45,630	11,690	<b>57,320</b>	29,680	..	<b>29,680</b>	15,890	5,630	<b>21,520</b>	<b>108,520</b>
1987 <sup>f</sup>	47,370	11,950	<b>59,320</b>	29,940	..	<b>29,940</b>	15,640	5,640	<b>21,280</b>	<b>110,540</b>
1988 <sup>f</sup>	49,910	12,430	<b>62,340</b>	30,410	..	<b>30,410</b>	16,670	5,670	<b>22,340</b>	<b>115,090</b>
1989 <sup>f</sup>	51,050	12,650	<b>63,700</b>	30,750	..	<b>30,750</b>	15,300	5,400	<b>20,700</b>	<b>115,150</b>
1990	52,860	13,100	<b>65,960</b>	29,330	..	<b>29,330</b>	15,840	5,270	<b>21,110</b>	<b>116,400</b>
1991 <sup>f</sup>	53,900	13,180	<b>67,080</b>	27,100	2,060	<b>29,160</b>	18,600	2,800	<b>21,590</b>	<b>117,650</b>
1992 <sup>f</sup>	57,770	13,640	<b>71,410</b>	27,920	2,020	<b>29,940</b>	18,490	2,810	<b>21,420</b>	<b>122,640</b>
1993 <sup>f</sup>	61,450	14,040	<b>75,490</b>	28,980	1,980	<b>30,960</b>	18,030	2,760	<b>20,790</b>	<b>127,240</b>
1994 <sup>f</sup>	71,580	14,320	<b>85,900</b>	34,060	1,930	<b>35,990</b>	19,040	2,700	<b>21,740</b>	<b>143,630</b>
1995 <sup>f</sup>	72,920	14,460	<b>87,380</b>	34,150	1,850	<b>36,000</b>	19,000	2,590	<b>21,590</b>	<b>144,970</b>
1996 <sup>f</sup>	73,220	17,270	<b>90,490</b>	31,440	1,760	<b>33,200</b>	17,550	2,480	<b>20,030</b>	<b>143,720</b>
1997 <sup>f</sup>	75,890	17,320	<b>93,210</b>	31,200	1,760	<b>32,960</b>	17,120	2,450	<b>19,570</b>	<b>145,740</b>
1998 <sup>f</sup>	78,250	17,000	<b>95,250</b>	31,470	1,720	<b>33,190</b>	17,080	2,410	<b>19,490</b>	<b>147,930</b>
1999 <sup>f</sup>	82,790	16,020	<b>98,810</b>	32,270	1,750	<b>34,020</b>	17,920	2,450	<b>20,370</b>	<b>153,200</b>
2000 <sup>f</sup>	92,180	16,310	<b>108,490</b>	36,240	1,830	<b>38,070</b>	18,790	2,510	<b>21,300</b>	<b>167,860</b>
2001 <sup>f</sup>	98,340	16,620	<b>114,960</b>	38,730	1,640	<b>40,370</b>	20,880	2,770	<b>23,650</b>	<b>178,980</b>
2002	95,670	16,960	<b>112,630</b>	38,690	1,690	<b>40,380</b>	21,240	2,870	<b>24,110</b>	<b>177,120</b>

1. From 1979 to 1990, includes the fews technicians engaged in R&D in the social sciences and humanities.

Source: Tables 1.3, 1.4 and 1.5.

Note: Historical revisions have not been made to data prior to 1991.

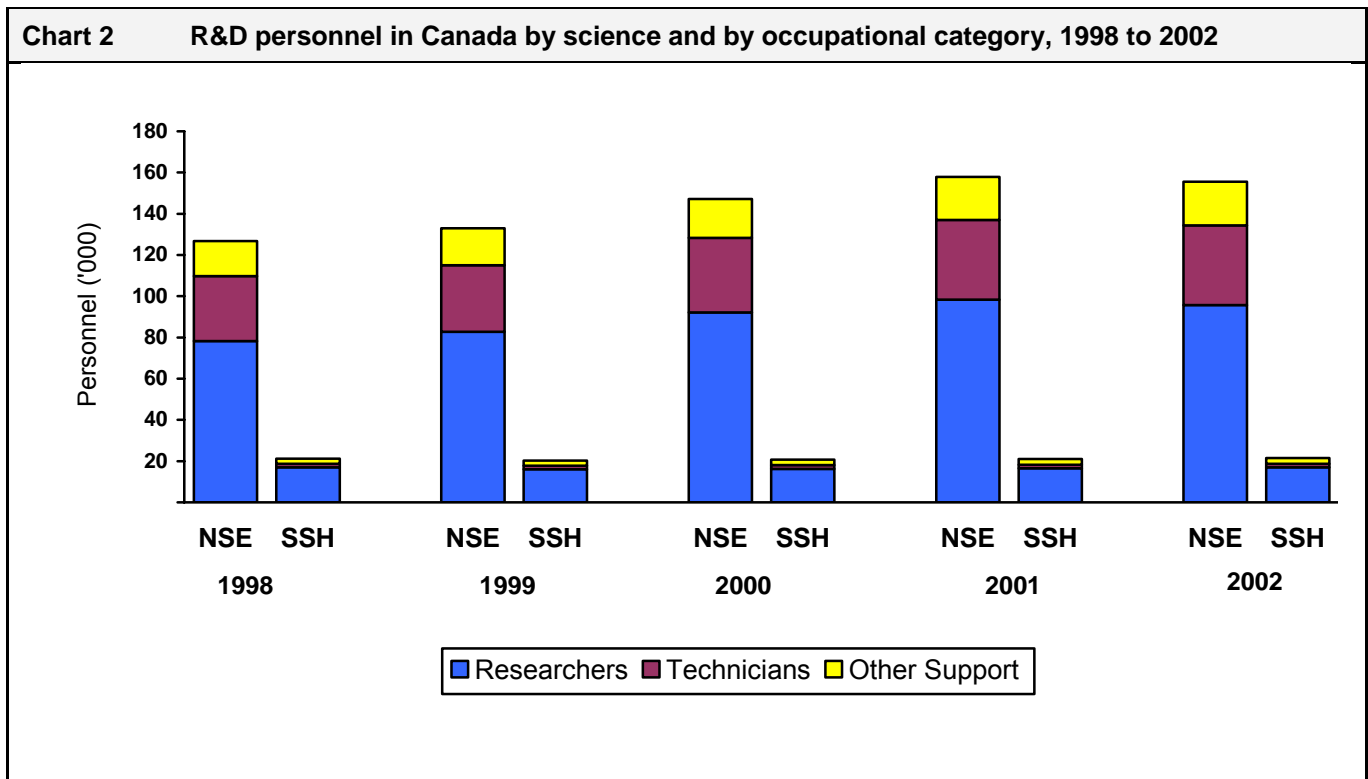


Source: Tables 1.1 and 7.1

Compared to the total labour force in Canada, the number of FTEs engaged in R&D is just over 1%. When you compare the number of Researchers per 1,000 persons in the labour force, Canada ranks in the same area as Germany.

Chart 2 shows the distribution of R&D personnel in Canada, by occupational category for the past five years.

The following tables show R&D personnel by science and by occupational category from 1979 to 2002. Occupational category detail as well as provincial distribution of 2002 R&D personnel is also given in the following tables.





**Table 1.2 Personnel engaged in R&D, by major field of science and sector of performance, 1979 to 2002**

Year	Business enterprise			Higher education			Federal government		
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH	Total
FTE's (rounded to the nearest 10)									
1979	24,870	..	<b>24,870</b>	19,680	16,020	<b>35,700</b>	15,310	870	<b>16,180</b>
1980 <sup>f</sup>	25,640	..	<b>25,640</b>	20,290	16,130	<b>36,420</b>	15,270	760	<b>16,030</b>
1981	32,400	..	<b>32,400</b>	20,630	16,000	<b>36,630</b>	14,990	790	<b>15,780</b>
1982 <sup>f</sup>	34,910	..	<b>34,910</b>	20,730	16,090	<b>36,820</b>	15,600	730	<b>16,330</b>
1983 <sup>f</sup>	36,760	..	<b>36,760</b>	20,810	15,940	<b>36,750</b>	15,730	570	<b>16,300</b>
1984	39,610	..	<b>39,610</b>	21,110	16,140	<b>37,250</b>	15,800	580	<b>16,380</b>
1985 <sup>f</sup>	44,910	..	<b>44,910</b>	20,350	15,880	<b>36,230</b>	15,250	580	<b>15,830</b>
1986 <sup>f</sup>	49,560	..	<b>49,560</b>	20,920	15,950	<b>36,870</b>	16,500	810	<b>17,310</b>
1987 <sup>f</sup>	51,770	..	<b>51,770</b>	21,190	16,580	<b>37,770</b>	15,570	740	<b>16,310</b>
1988 <sup>f</sup>	54,240	..	<b>54,240</b>	21,560	16,960	<b>38,520</b>	16,450	840	<b>17,290</b>
1989 <sup>f</sup>	53,660	..	<b>53,660</b>	22,100	16,940	<b>39,040</b>	16,620	820	<b>17,440</b>
1990	53,920	..	<b>53,920</b>	22,580	17,200	<b>39,780</b>	16,250	710	<b>16,960</b>
1991 <sup>f</sup>	53,790	..	<b>53,790</b>	24,410	16,830	<b>41,240</b>	16,500	700	<b>17,200</b>
1992 <sup>f</sup>	57,460	..	<b>57,460</b>	25,440	17,450	<b>42,890</b>	16,630	640	<b>17,270</b>
1993 <sup>f</sup>	61,530	..	<b>61,530</b>	25,910	17,760	<b>43,670</b>	16,600	640	<b>17,240</b>
1994 <sup>f</sup>	78,880	..	<b>78,880</b>	25,490	17,970	<b>43,460</b>	16,110	620	<b>16,730</b>
1995 <sup>f</sup>	82,010	..	<b>82,010</b>	25,020	18,000	<b>43,020</b>	14,970	580	<b>15,550</b>
1996 <sup>f</sup>	79,340	..	<b>79,340</b>	24,790	20,640	<b>45,430</b>	14,260	580	<b>14,840</b>
1997 <sup>f</sup>	82,690	..	<b>82,690</b>	24,190	20,730	<b>44,920</b>	13,420	530	<b>13,950</b>
1998 <sup>f</sup>	85,990	..	<b>85,990</b>	23,940	20,380	<b>44,320</b>	13,220	510	<b>13,730</b>
1999 <sup>f</sup>	90,890	..	<b>90,890</b>	25,130	19,460	<b>44,590</b>	13,490	590	<b>14,080</b>
2000 <sup>f</sup>	104,030	..	<b>104,030</b>	25,330	19,820	<b>45,150</b>	14,120	580	<b>14,700</b>
2001	115,050	..	<b>115,050</b>	26,190	20,110	<b>46,300</b>	13,040	700	<b>13,740</b>
2002	111,800	..	<b>111,800</b>	26,820	20,520	<b>47,340</b>	13,220	740	<b>13,960</b>
FTE's (rounded to the nearest 10)									
Year	Provincial governments			Private non-profit			Total Canada		
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH	Total
1979	2,950	500	<b>3,450</b>	750	..	<b>750</b>	63,560	17,390	<b>80,950</b>
1980 <sup>f</sup>	3,100	570	<b>3,670</b>	790	..	<b>790</b>	68,090	17,460	<b>82,550</b>
1981	3,060	600	<b>3,660</b>	870	..	<b>870</b>	71,950	17,390	<b>89,340</b>
1982 <sup>f</sup>	3,590	640	<b>4,230</b>	980	..	<b>980</b>	75,810	17,460	<b>93,270</b>
1983 <sup>f</sup>	3,370	780	<b>4,150</b>	1,010	..	<b>1,010</b>	77,680	17,290	<b>94,970</b>
1984	3,310	640	<b>3,950</b>	1,070	..	<b>1,070</b>	80,900	17,360	<b>98,260</b>
1985 <sup>f</sup>	3,290	630	<b>3,920</b>	1,160	..	<b>1,160</b>	84,960	17,090	<b>102,050</b>
1986 <sup>f</sup>	3,140	560	<b>3,700</b>	1,080	..	<b>1,080</b>	91,210	17,320	<b>108,520</b>
1987 <sup>f</sup>	3,210	270	<b>3,480</b>	1,210	..	<b>1,210</b>	92,950	17,590	<b>110,540</b>
1988 <sup>f</sup>	3,330	300	<b>3,630</b>	1,410	..	<b>1,410</b>	96,990	18,100	<b>115,090</b>
1989 <sup>f</sup>	3,360	290	<b>3,650</b>	1,360	..	<b>1,360</b>	97,100	18,050	<b>115,150</b>
1990	3,820	460	<b>4,280</b>	1,460	..	<b>1,460</b>	98,030	18,370	<b>116,400</b>
1991 <sup>f</sup>	3,680	510	<b>4,190</b>	1,230	..	<b>1,230</b>	99,610	18,040	<b>117,650</b>
1992 <sup>f</sup>	3,670	370	<b>4,040</b>	980	..	<b>980</b>	104,180	18,460	<b>122,640</b>
1993 <sup>f</sup>	3,330	380	<b>3,710</b>	1,090	..	<b>1,090</b>	108,460	18,780	<b>127,240</b>
1994 <sup>f</sup>	3,090	360	<b>3,450</b>	1,110	..	<b>1,110</b>	124,680	18,950	<b>143,630</b>
1995 <sup>f</sup>	2,920	310	<b>3,230</b>	1,160	..	<b>1,160</b>	126,080	18,890	<b>144,970</b>
1996 <sup>f</sup>	2,590	290	<b>2,880</b>	1,230	..	<b>1,230</b>	122,210	21,510	<b>143,720</b>
1997 <sup>f</sup>	2,710	260	<b>2,970</b>	1,210	..	<b>1,210</b>	124,220	21,520	<b>145,740</b>
1998 <sup>f</sup>	2,610	240	<b>2,850</b>	1,040	..	<b>1,040</b>	126,800	21,130	<b>147,930</b>
1999 <sup>f</sup>	2,610	170	<b>2,780</b>	860	..	<b>860</b>	132,980	20,220	<b>153,200</b>
2000 <sup>f</sup>	2,880	250	<b>3,130</b>	850	..	<b>850</b>	147,210	20,650	<b>167,860</b>
2001	2,960	220	<b>3,180</b>	710	..	<b>710</b>	157,950	21,030	<b>178,980</b>
2002	3,030	260	<b>3,290</b>	730	..	<b>730</b>	155,600	21,520	<b>177,120</b>

**Table 1.3 Researchers engaged in R&D, by major field of science and sector of performance, 1979 to 2002**

Year	Federal government	Provincial governments	Business enterprise	Higher education	Private non-profit	Total
FTE's (rounded to the nearest 10)						
<b>All sciences</b>						
1979	6,310	1,530	11,310	17,840	220	37,210
1980 <sup>f</sup>	6,260	1,580	11,860	18,210	240	38,150
1981	5,360	1,570	14,880	18,350	260	40,420
1982	5,820	1,860	16,820	19,410	290	44,200
1983	5,790	1,750	17,650	20,200	300	45,690
1984	5,900	1,690	19,560	21,310	360	48,820
1985 <sup>f</sup>	5,720	1,850	22,660	21,880	390	52,500
1986	6,430	1,890	25,520	23,170	310	57,320
1987 <sup>f</sup>	5,930	1,630	27,120	24,250	390	59,320
1988 <sup>f</sup>	6,490	1,620	28,480	25,320	430	62,340
1989 <sup>f</sup>	6,690	1,650	28,660	26,230	470	63,700
1990	6,440	1,970	29,670	27,300	580	65,960
1991 <sup>f</sup>	6,540	1,950	30,120	27,960	510	67,080
1992 <sup>f</sup>	6,570	1,810	33,240	29,320	470	71,410
1993 <sup>f</sup>	6,640	1,760	36,310	30,230	550	75,490
1994 <sup>f</sup>	6,570	1,710	46,860	30,220	540	85,900
1995 <sup>f</sup>	6,230	1,540	48,980	30,150	480	87,380
1996 <sup>f</sup>	6,310	1,420	48,500	33,790	470	90,490
1997 <sup>f</sup>	5,850	1,490	51,990	33,430	450	93,210
1998 <sup>f</sup>	5,850	1,460	54,720	32,840	380	95,250
1999 <sup>f</sup>	6,020	1,420	58,020	33,020	330	98,810
2000 <sup>f</sup>	6,120	1,610	67,160	33,300	300	108,490
2001	5,610	1,580	73,310	34,200	260	114,960
2002	6,190	1,630	69,640	34,910	260	112,630
<b>Natural sciences and engineering</b>						
1979	5,780	1,210	11,310	8,750	220	27,270
1980 <sup>f</sup>	5,800	1,210	11,860	9,030	240	28,140
1981	5,010	1,230	14,880	9,300	260	30,680
1982	5,450	1,510	16,820	9,880	290	33,950
1983	5,470	1,340	17,650	10,410	300	35,170
1984	5,570	1,330	19,560	11,080	360	37,900
1985 <sup>f</sup>	5,390	1,410	22,660	11,480	390	41,330
1986	6,020	1,460	25,520	12,320	310	45,630
1987 <sup>f</sup>	5,590	1,430	27,120	12,840	390	47,370
1988 <sup>f</sup>	6,160	1,400	28,480	13,440	430	49,910
1989 <sup>f</sup>	6,360	1,440	28,660	14,120	470	51,050
1990	6,160	1,680	29,670	14,770	580	52,860
1991 <sup>f</sup>	6,250	1,610	30,120	15,410	510	53,900
1992 <sup>f</sup>	6,310	1,540	33,240	16,210	470	57,770
1993 <sup>f</sup>	6,380	1,480	36,310	16,730	550	61,450
1994 <sup>f</sup>	6,310	1,450	46,860	16,420	540	71,580
1995 <sup>f</sup>	5,990	1,310	48,980	16,160	480	72,920
1996 <sup>f</sup>	6,030	1,210	48,500	17,010	470	73,220
1997 <sup>f</sup>	5,610	1,290	51,990	16,550	450	75,890
1998 <sup>f</sup>	5,620	1,280	54,720	16,250	380	78,250
1999 <sup>f</sup>	5,750	1,290	58,020	17,400	330	82,790
2000 <sup>f</sup>	5,840	1,440	67,160	17,440	300	92,180
2001	5,250	1,410	73,310	18,110	260	98,340
2002	5,800	1,440	69,640	18,530	260	95,670

<b>Table 1.4 Technicians engaged in R&amp;D in the natural sciences and engineering, by sector of performance, 1979 to 2002</b>						
Year	Federal government	Provincial governments	Business enterprise	Higher education	Private non-profit	Total
FTE's (rounded to the nearest 10)						
1979	4,680	1,000	7,910	9,210	340	<b>23,140</b>
1980 <sup>f</sup>	4,680	1,130	8,350	9,480	350	<b>23,990</b>
1981	4,700	1,100	11,000	9,540	390	<b>26,730</b>
1982	4,650	1,280	11,550	9,180	440	<b>27,100</b>
1983 <sup>f</sup>	4,500	1,150	11,600	8,840	520	<b>26,610</b>
1984	4,670	1,110	12,760	8,570	590	<b>27,700</b>
1985	4,420	1,080	14,550	7,550	640	<b>28,240</b>
1986 <sup>f</sup>	4,660	1,080	15,950	7,370	620	<b>29,680</b>
1987 <sup>f</sup>	4,410	1,120	16,550	7,220	640	<b>29,940</b>
1988 <sup>f</sup>	4,220	1,180	17,210	7,080	720	<b>30,410</b>
1989 <sup>f</sup>	4,730	1,170	17,190	6,980	680	<b>30,750</b>
1990	4,340	1,250	16,200	6,850	690	<b>29,330</b>
1991 <sup>f</sup>	4,320	1,160	15,930	5,160	530	<b>27,100</b>
1992 <sup>f</sup>	4,410	1,290	16,540	5,300	380	<b>27,920</b>
1993 <sup>f</sup>	4,450	1,250	17,610	5,270	400	<b>28,980</b>
1994 <sup>f</sup>	4,620	1,070	22,740	5,210	420	<b>34,060</b>
1995 <sup>f</sup>	4,230	1,040	23,280	5,090	510	<b>34,150</b>
1996 <sup>f</sup>	4,040	860	21,580	4,420	540	<b>31,440</b>
1997 <sup>f</sup>	3,830	940	21,580	4,340	510	<b>31,200</b>
1998 <sup>f</sup>	3,760	890	22,020	4,370	430	<b>31,470</b>
1999 <sup>f</sup>	3,790	910	22,830	4,400	340	<b>32,270</b>
2000 <sup>f</sup>	3,750	1,020	26,680	4,490	300	<b>36,240</b>
2001	3,700	1,000	29,400	4,440	190	<b>38,730</b>
2002	3,700	1,040	29,190	4,560	200	<b>38,690</b>

<b>Table 1.5 Technicians engaged in R&amp;D in the social sciences and humanities, by sector of performance, 1991 to 2002</b>						
Year	Federal government	Provincial governments	Business enterprise <sup>1</sup>	Higher education	Private non-profit <sup>1</sup>	Total
FTE's (rounded to the nearest 10)						
1991 <sup>f</sup>	100	90	...	1,870	...	<b>2,060</b>
1992 <sup>f</sup>	80	40	...	1,900	...	<b>2,020</b>
1993 <sup>f</sup>	80	40	...	1,860	...	<b>1,980</b>
1994 <sup>f</sup>	70	40	...	1,820	...	<b>1,930</b>
1995 <sup>f</sup>	70	30	...	1,750	...	<b>1,850</b>
1996 <sup>f</sup>	60	30	...	1,670	...	<b>1,760</b>
1997 <sup>f</sup>	70	20	...	1,660	...	<b>1,760</b>
1998 <sup>f</sup>	60	20	...	1,640	...	<b>1,720</b>
1999 <sup>f</sup>	70	20	...	1,660	...	<b>1,750</b>
2000 <sup>f</sup>	70	50	...	1,710	...	<b>1,830</b>
2001	80	20	...	1,540	...	<b>1,640</b>
2002	70	40	...	1,580	...	<b>1,690</b>

1. R&D surveys of the business enterprise and private non-profit sectors collect only natural science and engineering data.

<b>Table 1.6 Support staff<sup>1</sup> in R&amp;D, by major field of science and sector of performance, 1979 to 2002</b>						
Year	Federal government	Provincial governments	Business enterprise	Higher education	Private non-profit	Total
FTE's (rounded to the nearest 10)						
<b>All sciences</b>						
1979	5,190	920	5,650	8,650	190	<b>20,600</b>
1980 <sup>r</sup>	5,090	960	5,430	8,730	200	<b>20,410</b>
1981	5,720	990	6,520	8,740	220	<b>22,190</b>
1982 <sup>r</sup>	5,860	1,090	6,540	8,230	250	<b>21,970</b>
1983	6,010	1,250	7,510	7,710	190	<b>22,670</b>
1984	5,810	1,150	7,290	7,370	120	<b>21,740</b>
1985	5,690	990	7,700	6,800	130	<b>21,310</b>
1986	6,220	730	8,090	6,330	150	<b>21,520</b>
1987	5,970	730	8,100	6,300	180	<b>21,280</b>
1988	6,580	830	8,550	6,120	260	<b>22,340</b>
1989	6,020	830	7,810	5,830	210	<b>20,700</b>
1990	6,180	1,060	8,050	5,630	190	<b>21,110</b>
1991 <sup>r</sup>	6,240	990	7,740	6,240	190	<b>21,590</b>
1992 <sup>r</sup>	6,210	900	7,680	6,380	130	<b>21,420</b>
1993 <sup>r</sup>	6,070	660	7,610	6,310	140	<b>20,790</b>
1994 <sup>r</sup>	5,470	630	9,280	6,210	150	<b>21,740</b>
1995 <sup>r</sup>	5,020	620	9,750	6,030	170	<b>21,590</b>
1996 <sup>r</sup>	4,430	570	9,260	5,550	220	<b>20,030</b>
1997 <sup>r</sup>	4,200	520	9,120	5,480	250	<b>19,570</b>
1998 <sup>r</sup>	4,060	480	9,250	5,470	230	<b>19,490</b>
1999 <sup>r</sup>	4,200	430	10,040	5,510	190	<b>20,370</b>
2000 <sup>r</sup>	4,760	450	10,190	5,650	250	<b>21,300</b>
2001	4,350	580	12,340	6,120	260	<b>23,650</b>
2002	4,000	580	12,970	6,290	270	<b>24,110</b>
<b>Natural sciences and engineering</b>						
1979	4,850	740	5,650	1,720	190	<b>13,150</b>
1980 <sup>r</sup>	4,790	760	5,430	1,780	200	<b>12,960</b>
1981	5,280	730	6,520	1,790	220	<b>14,540</b>
1982 <sup>r</sup>	5,500	800	6,540	1,670	250	<b>14,760</b>
1983	5,760	880	7,510	1,560	190	<b>15,900</b>
1984	5,560	870	7,290	1,460	120	<b>15,300</b>
1985	5,440	800	7,700	1,320	130	<b>15,390</b>
1986	5,820	600	8,090	1,230	150	<b>15,890</b>
1987	5,570	660	8,100	1,130	180	<b>15,640</b>
1988	6,070	750	8,550	1,040	260	<b>16,670</b>
1989	5,530	750	7,810	1,000	210	<b>15,300</b>
1990	5,750	890	8,050	960	190	<b>15,840</b>
1991 <sup>r</sup>	5,930	910	7,740	3,830	190	<b>18,600</b>
1992 <sup>r</sup>	5,910	840	7,680	3,930	130	<b>18,490</b>
1993 <sup>r</sup>	5,770	600	7,610	3,910	140	<b>18,030</b>
1994 <sup>r</sup>	5,180	570	9,280	3,860	150	<b>19,040</b>
1995 <sup>r</sup>	4,750	570	9,750	3,770	170	<b>19,010</b>
1996 <sup>r</sup>	4,190	520	9,260	3,360	220	<b>17,550</b>
1997 <sup>r</sup>	3,980	480	9,120	3,300	250	<b>17,130</b>
1998 <sup>r</sup>	3,840	440	9,250	3,320	230	<b>17,080</b>
1999 <sup>r</sup>	3,950	410	10,040	3,330	190	<b>17,920</b>
2000 <sup>r</sup>	4,530	420	10,190	3,400	250	<b>18,790</b>
2001	4,090	550	12,340	3,640	260	<b>20,880</b>
2002	3,720	550	12,970	3,730	270	<b>21,240</b>

1. From 1979 to 1990, includes the few technicians engaged in R&D in the social sciences and humanities.

<b>Table 1.7 Provincial distribution of personnel engaged in R&amp;D, by sector and by occupational category, 2002</b>												
Sector of performance	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta	B.C.	Yukon, N.W.T & Nvt	Total
Occupational category	FTE's (rounded to the nearest 10)											
<b>Federal government</b>	<b>210</b>	<b>60</b>	<b>570</b>	<b>220</b>	<b>2,060</b>	<b>2,360</b>	<b>560</b>	<b>420</b>	<b>640</b>	<b>670</b>	<b>20</b>	<b>7,790</b>
Researchers	80	20	220	60	920	1,130	230	160	250	330	10	3,410
Technicians	70	20	180	80	470	760	190	140	220	210	10	2,350
Other	60	20	170	80	670	470	140	120	170	130	0	2,030
<b>Federal government (National Capital Region)</b>	...	...	...	...	<b>370</b>	<b>5,800</b>	...	...	...	...	...	<b>6,170</b>
Researchers	...	...	...	...	230	2,550	...	...	...	...	...	2,780
Technicians	...	...	...	...	40	1,380	...	...	...	...	...	1,420
Other	...	...	...	...	100	1,870	...	...	...	...	...	1,970
<b>Provincial governments</b>	..	..	..	<b>100</b>	<b>920</b>	<b>1,040</b>	<b>40</b>	<b>210</b>	<b>740</b>	<b>210</b>	<b>30</b>	<b>3,290</b>
Researchers	..	..	..	50	450	620	30	100	240	130	10	1,630
Technicians	..	..	..	30	300	310	0	90	280	60	10	1,080
Other	..	..	..	20	170	110	10	20	220	20	10	580
<b>Business enterprise</b>	<b>250</b>	<b>90</b>	<b>990</b>	<b>600</b>	<b>38,990</b>	<b>54,170</b>	<b>1,340</b>	<b>920</b>	<b>5,140</b>	<b>9,310</b>	<b>0</b>	<b>111,800</b>
Researchers	160	60	600	310	22,000	36,400	710	450	3,290	5,660	0	69,640
Technicians <sup>1</sup>	60	20	270	200	11,760	12,300	440	330	1,280	2,530	0	29,190
Other <sup>1</sup>	30	10	120	90	5,230	5,470	190	140	570	1,120	0	12,970
<b>Higher education</b>	<b>840</b>	<b>120</b>	<b>1,560</b>	<b>860</b>	<b>13,180</b>	<b>17,840</b>	<b>1,510</b>	<b>1,400</b>	<b>4,900</b>	<b>5,130</b>	<b>0</b>	<b>47,340</b>
Researchers	510	60	940	530	10,140	13,450	950	880	3,620	3,830	0	34,910
Technicians	160	30	310	160	1,510	2,150	280	260	640	640	0	6,140
Other	170	30	310	170	1,530	2,240	280	260	640	660	0	6,290
<b>Private non-profit organizations</b>	...	...	<b>50</b>	<b>20</b>	<b>40</b>	<b>110</b>	<b>120</b>	...	<b>350</b>	<b>40</b>	<b>0</b>	<b>730</b>
Researchers	...	...	40	10	30	20	30	...	100	30	0	260
Technicians	...	...	0	0	0	50	60	...	80	10	0	200
Other	...	...	10	10	10	40	30	...	170	0	0	270
<b>Total</b>	<b>1,300</b>	<b>270</b>	<b>3,170</b>	<b>1,800</b>	<b>55,560</b>	<b>81,320</b>	<b>3,570</b>	<b>2,950</b>	<b>11,770</b>	<b>15,360</b>	<b>50</b>	<b>177,120</b>
Researchers	750	140	1,800	960	33,770	54,170	1,950	1,590	7,500	9,980	20	112,630
Technicians	290	70	760	470	14,080	16,950	970	820	2,500	3,450	20	40,380
Other	260	60	610	370	7,710	10,200	650	540	1,770	1,930	10	24,110

1. No provincial distribution between technicians and other; estimated proportionally according to national total.

Surveys used to collect R&D personnel data also ask for a regional distribution of R&D activities in Canada. One can see that in 2002 most R&D activity took place in Ontario and Quebec. This is influenced by the heavy concentration of businesses and universities located in the two largest provinces. British Columbia and Alberta are provinces also benefiting from a substantial concentration of R&D activities. Once again businesses and universities are the sectors having the largest R&D activity.

## R&D personnel by sector:

### Federal government sector

This sector comprises all federal departments and organizations. All employees are included (indefinite, temporary and casual status). The data on persons engaged in R&D in the federal government are taken from the annual survey of the Federal science expenditures and personnel. These data are classified into three occupational categories: researchers (scientists and engineers), technicians and support staff. The allocation of personnel to these classes is based on their public service classifications. Due to the nature of the work in the social sciences and humanities it is sometimes difficult to distinguish between technicians and other support staff; for convenience, these two categories have been combined and are shown as support staff up until 1990. From 1991 on, technicians involved in social science activities have been identified.

Distribution of Federal R&D personnel by occupation and by science is shown in Table 2.1.

Table 2.2 shows that the department distribution of R&D personnel is more concentrated in the four major R&D performing departments. In 2002, National Research Council, Natural Resources Canada, Agriculture and Agri-Food Canada and National Defence together accounted for 56% of all federal government R&D personnel. For further information, see "Federal Scientific Activities, 2003-2004" (Statistics Canada, catalogue no. 88-204).

<b>Table 2.1 Personnel engaged in R&amp;D in the federal government, by occupational category, 1979 to 2002</b>										
Year	Researchers			Technicians			Support staff			Total
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH <sup>1</sup>	Total	
FTE's (rounded to the nearest 10)										
1979	5,780	530	<b>6,310</b>	4,680	..	<b>4,680</b>	4,850	340	<b>5,190</b>	<b>16,180</b>
1980	5,800	460	<b>6,260</b>	4,680	..	<b>4,680</b>	4,790	300	<b>5,090</b>	<b>16,030</b>
1981	5,010	350	<b>5,360</b>	4,700	..	<b>4,700</b>	5,280	440	<b>5,720</b>	<b>15,780</b>
1982	5,450	370	<b>5,820</b>	4,650	..	<b>4,650</b>	5,500	360	<b>5,860</b>	<b>16,330</b>
1983	5,470	320	<b>5,790</b>	4,500	..	<b>4,500</b>	5,760	250	<b>6,010</b>	<b>16,300</b>
1984	5,570	330	<b>5,900</b>	4,670	..	<b>4,670</b>	5,560	250	<b>5,810</b>	<b>16,380</b>
1985	5,390	330	<b>5,720</b>	4,420	..	<b>4,420</b>	5,440	250	<b>5,690</b>	<b>15,830</b>
1986	6,020	410	<b>6,430</b>	4,660	..	<b>4,660</b>	5,820	400	<b>6,220</b>	<b>17,310</b>
1987	5,590	340	<b>5,930</b>	4,410	..	<b>4,410</b>	5,570	400	<b>5,970</b>	<b>16,310</b>
1988	6,160	330	<b>6,490</b>	4,220	..	<b>4,220</b>	6,070	510	<b>6,580</b>	<b>17,290</b>
1989	6,360	330	<b>6,690</b>	4,730	..	<b>4,730</b>	5,530	490	<b>6,020</b>	<b>17,440</b>
1990	6,160	280	<b>6,440</b>	4,340	..	<b>4,340</b>	5,750	430	<b>6,180</b>	<b>16,960</b>
1991	6,250	290	<b>6,540</b>	4,320	100	<b>4,420</b>	5,930	310	<b>6,240</b>	<b>17,200</b>
1992	6,310	260	<b>6,570</b>	4,410	80	<b>4,490</b>	5,910	300	<b>6,210</b>	<b>17,270</b>
1993	6,380	260	<b>6,640</b>	4,450	80	<b>4,530</b>	5,770	300	<b>6,070</b>	<b>17,240</b>
1994	6,310	260	<b>6,570</b>	4,620	70	<b>4,690</b>	5,180	290	<b>5,470</b>	<b>16,730</b>
1995 <sup>f</sup>	5,990	240	<b>6,230</b>	4,230	70	<b>4,300</b>	4,750	270	<b>5,020</b>	<b>15,550</b>
1996 <sup>f</sup>	6,030	280	<b>6,310</b>	4,040	60	<b>4,100</b>	4,190	240	<b>4,430</b>	<b>14,840</b>
1997 <sup>f</sup>	5,610	240	<b>5,850</b>	3,830	70	<b>3,900</b>	3,980	220	<b>4,200</b>	<b>13,950</b>
1998 <sup>f</sup>	5,620	230	<b>5,850</b>	3,760	60	<b>3,820</b>	3,840	220	<b>4,060</b>	<b>13,730</b>
1999 <sup>f</sup>	5,750	270	<b>6,020</b>	3,790	70	<b>3,860</b>	3,950	250	<b>4,200</b>	<b>14,080</b>
2000 <sup>f</sup>	5,840	280	<b>6,120</b>	3,750	70	<b>3,820</b>	4,530	230	<b>4,760</b>	<b>14,700</b>
2001	5,250	360	<b>5,610</b>	3,700	80	<b>3,780</b>	4,090	260	<b>4,350</b>	<b>13,740</b>
2002	5,800	390	<b>6,190</b>	3,700	70	<b>3,770</b>	3,720	280	<b>4,000</b>	<b>13,960</b>

1. From 1979 to 1990, includes the few technicians engaged in R&D in the social sciences and humanities.

<b>Table 2.2 Federal personnel engaged in R&amp;D by major department or agency, 1994 to 2002</b>									
Department or agency	1994	1995	1996	1997	1998	1999 <sup>r</sup>	2000 <sup>r</sup>	2001	2002
FTE's (rounded to the nearest 10)									
Agriculture and Agri-Food Canada	3,240	3,010	2,820	2,430	2,430	2,410	2,800	2,660	1,810
Atomic Energy of Canada Limited	2,020	2,020	1,700	1,460	1,190	1,170	890	950	1,160
Canadian Institutes for Health Research	..	..	..	..	..	90	140	170	220
Canadian Space Agency	320	340	340	310	290	340	370	420	460
Environment Canada	820	980	830	770	740	830	840	840	890
Fisheries and Oceans Canada	1,000	900	880	800	770	850	900	890	890
Health Canada	330	350	480	540	520	510	520	670	700
Industry Canada	430	410	360	350	400	400	450	420	480
National Defence	1,600	1,180	1,240	1,170	1,300	1,290	1,350	1,300	1,480
National Museums	190	180	140	...	...	...	...	...	...
National Research Council	2,900	2,690	2,650	2,730	2,780	2,810	2,930	2,510	2,720
Natural Resources Canada	2,980	2,650	2,540	2,370	2,280	2,310	2,430	1,690	1,850
Natural Sciences and Engineering Research Council	170	160	160	180	180	210	220	230	250
Statistics Canada	120	130	130	140	140	160	170	190	200
Other departments or agencies	610	550	570	700	710	700	690	800	850
<b>Total</b>	<b>16,730</b>	<b>15,550</b>	<b>14,840</b>	<b>13,950</b>	<b>13,730</b>	<b>14,080</b>	<b>14,700</b>	<b>13,740</b>	<b>13,960</b>

**Table 2.3 Federal personnel engaged in R&D in the natural sciences and engineering and social sciences and humanities, by occupational category and department or agency, 2002**

Department or agency	Researchers	Technicians	Support staff	Total
FTE's <sup>1</sup> (rounded to the nearest 10)				
<b>Natural sciences and engineering</b>				
Agriculture and Agri-Food Canada	510	710	590	<b>1,810</b>
Atomic Energy of Canada Limited	650	370	140	<b>1,160</b>
Canadian Institutes for Health Research	30	0	190	<b>220</b>
Canadian Space Agency	230	10	220	<b>460</b>
Environment Canada	540	220	120	<b>880</b>
Fisheries and Oceans Canada	340	350	200	<b>890</b>
Health Canada	270	250	120	<b>640</b>
Industry Canada	240	50	180	<b>470</b>
National Defence	720	310	410	<b>1,440</b>
National Research Council	1,040	750	930	<b>2,720</b>
Natural Resources Canada	1,030	590	230	<b>1,850</b>
Natural Sciences and Engineering Research Council	10	0	240	<b>250</b>
Other Departments or Agencies	190	90	150	<b>430</b>
<b>Total</b>	<b>5,800</b>	<b>3,700</b>	<b>3,720</b>	<b>13,220</b>
<b>Social sciences and humanities</b>				
Bank of Canada	40	30	10	<b>80</b>
Canadian Museum of Civilization	10	10	30	<b>50</b>
Canada Mortgage and Housing Corporation	20	0	0	<b>20</b>
Health Canada	40	0	20	<b>60</b>
International Development Research Centre	50	0	30	<b>80</b>
National Defence	40	0	0	<b>40</b>
National Gallery of Canada	10	10	30	<b>50</b>
Social Sciences and Humanities Research Council	10	0	80	<b>90</b>
Solicitor General	20	0	10	<b>30</b>
Statistics Canada	130	20	50	<b>200</b>
Other departments or agencies	20	0	20	<b>40</b>
<b>Total</b>	<b>390</b>	<b>70</b>	<b>280</b>	<b>740</b>

1. Including personnel engaged in the administration of extramural R&D programs.

Source: Statistics Canada, Science, Innovation and Electronic Information Division.

### Provincial governments sector

The provincial government sector consists of all provincial government departments, ministries and agencies and provincial research organizations.

### Government departments and agencies

Each year, Science and Innovation Surveys Section, SIEID assists provincial governments to carry out surveys of resources devoted to their scientific and technological activities.

The statistics presented are aggregates of the provincial government science surveys conducted by Statistics Canada under contract with the provinces, and cover the period 1979-1980 to 2002-2003. The surveys currently cover four provinces: Ontario, Manitoba, Alberta and British Columbia. Estimates are made for Saskatchewan and for the Eastern provinces. Quebec conducts their own survey and shares the information with Statistics Canada.

### Provincial research organizations

Statistics on the R&D personnel of provincial research organizations are estimated on the basis of an annual survey of the resources of the provincial research foundations and councils.

R&D is only one of the activities of these provincial research organizations. In the survey conducted by SIEID, the organizations are asked to allocate their expenditures by a number of activities, including R&D. The total number of personnel for all organizations is multiplied by the ratio of R&D to total expenditures in order to produce an estimate of R&D personnel. Since the three occupational categories are already specified in the survey, their relative proportions are applied to the R&D person-year total.



**Table 3.1 Personnel engaged in R&D in the provincial government sector, by occupational category, 1979 to 2002**

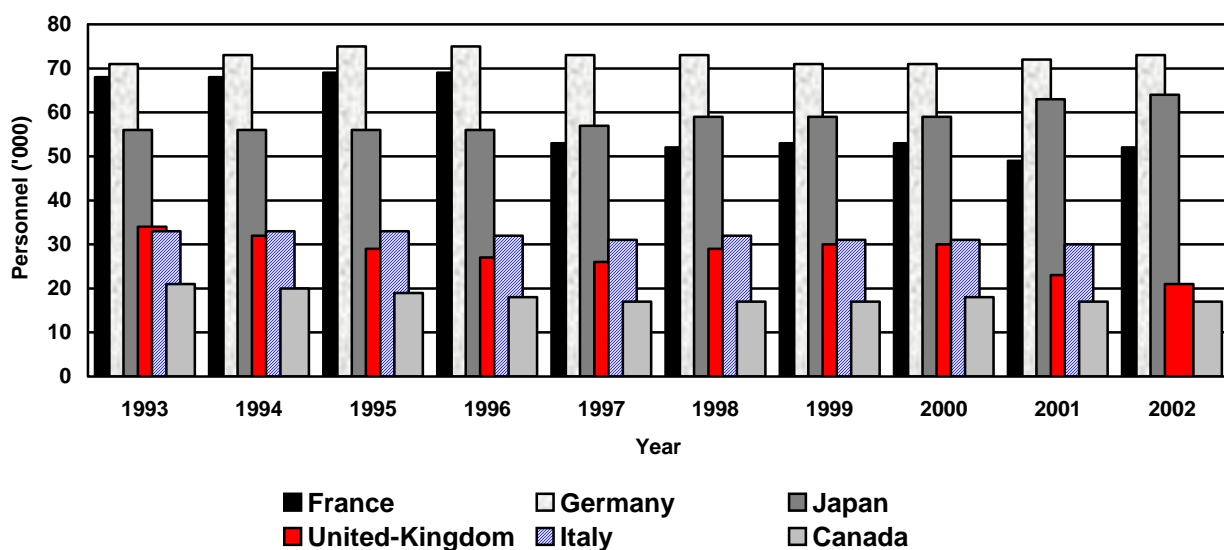
Year	Researchers			Technicians			Support staff			Total
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH <sup>1</sup>	Total	
FTE's (rounded to the nearest 10)										
1979	1,210	320	1,530	1,000	..	1,000	740	180	920	3,450
1980	1,210	370	1,580	1,130	..	1,130	760	200	960	3,670
1981	1,230	340	1,570	1,100	..	1,100	730	260	990	3,660
1982	1,510	350	1,860	1,280	..	1,280	800	290	1,090	4,230
1983	1,340	410	1,750	1,150	..	1,150	880	370	1,250	4,150
1984	1,330	360	1,690	1,110	..	1,110	870	280	1,150	3,950
1985	1,410	440	1,850	1,080	..	1,080	800	190	990	3,920
1986	1,460	430	1,890	1,080	..	1,080	600	130	730	3,700
1987	1,430	200	1,630	1,120	..	1,120	660	70	730	3,480
1988	1,400	220	1,620	1,180	..	1,180	750	80	830	3,630
1989	1,440	210	1,650	1,170	..	1,170	750	80	830	3,650
1990	1,680	290	1,970	1,250	..	1,250	890	170	1,060	4,280
1991	1,610	340	1,950	1,160	90	1,250	910	80	990	4,190
1992	1,540	270	1,810	1,290	40	1,330	840	60	900	4,040
1993	1,480	280	1,760	1,250	40	1,290	600	60	660	3,710
1994	1,450	260	1,710	1,070	40	1,110	570	60	630	3,450
1995	1,310	230	1,540	1,040	30	1,070	570	50	620	3,230
1996	1,210	210	1,420	860	30	890	520	50	570	2,880
1997	1,290	200	1,490	940	20	960	480	40	520	2,970
1998	1,280	180	1,460	890	20	910	440	40	480	2,850
1999	1,290	130	1,420	910	20	930	410	20	430	2,780
2000 <sup>f</sup>	1,440	170	1,610	1,020	50	1,070	420	30	450	3,130
2001	1,410	170	1,580	1,000	20	1,020	550	30	580	3,180
2002	1,440	190	1,630	1,040	40	1,080	550	30	580	3,290

1. From 1979 to 1990, includes the few technicians engaged in R&D in the social sciences and humanities.

Source: Tables 1.3, 1.4 and 1.5.

Note: Historical revisions have not been made to data prior to 1990.

**Chart 3 Governments R&D personnel, in selected OECD countries, 1993 to 2002**



Source: Table 7.2

## Business enterprise sector

The term "business enterprise" encompasses all commercially oriented enterprises (privately or publicly owned), industrial non-profit organizations and industrial research institutes.

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. Estimates for the 1980 R&D personnel were computed by averaging data for 1979 and 1981. From 1982 to 1991, a full survey was conducted annually.

Because of reductions in the science and technology program, in the even-years starting with the 1992 reference year, 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 surveys also include firms having R&D activities in the province of Quebec. In 1995 the industrial R&D survey was re-established as annual under the new S&T project "An information system for science and technology".

The 1998 data reflects a new methodology for estimating R&D expenditure in the business sector in Canada. The essence of the new approach was the use of administrative data from the Canada Revenue Agency (CRA), in place of survey data, for any firm funding or performing less than \$ 1 million worth of R&D. Under the current regulations, firms have up to 18 months to submit a claim for R&D tax credits to CRA. This means that when survey data are ready for publication, not all of the CRA data for that year will have been received. At the time this working paper is released, a portion of the R&D tax credit is still outstanding and their value is estimated. This working paper provides preliminary estimates of R&D personnel in the business enterprise sector. Estimates will be revised in the next edition of the Service bulletin on the Industrial R&D in Canada.

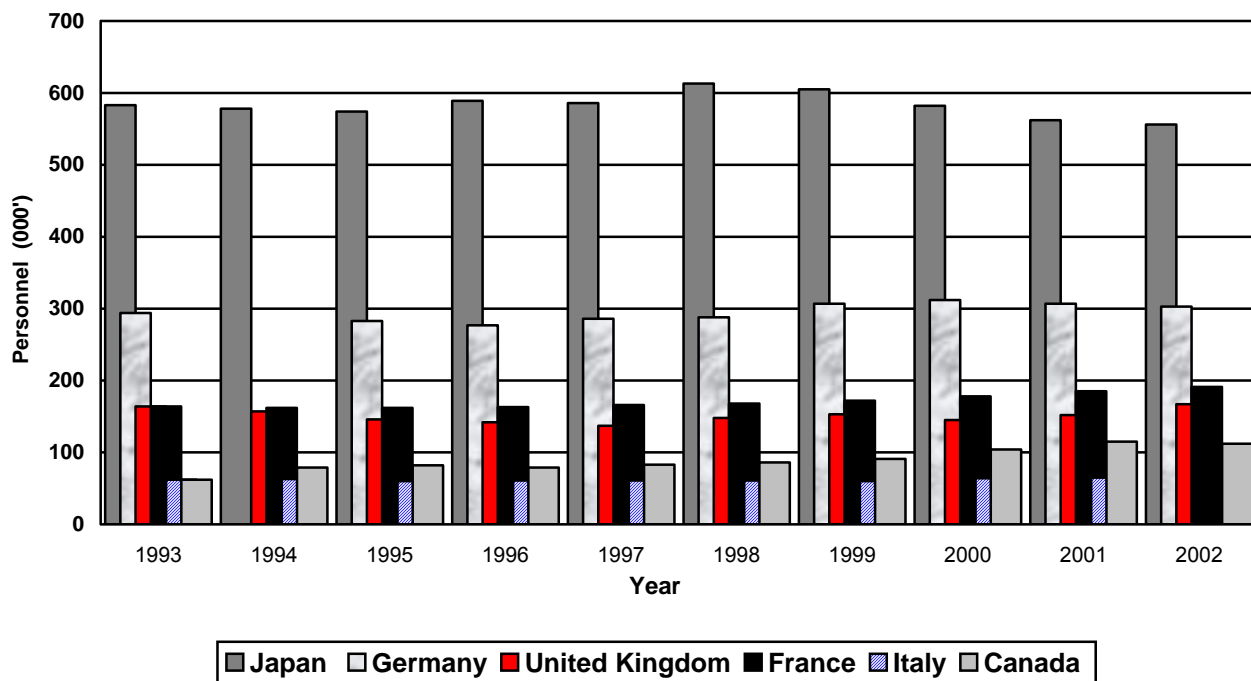
It should be noted that business enterprise data pertain to activities in the natural sciences and engineering only. For further information, see "**Industrial Research and Development**", Statistics Canada, Catalogue No. 88-202.

As in the case of other performing sectors, industrial R&D personnel data are also available by occupational categories. Table 4.1 shows that total R&D personnel more than quadrupled between 1979 and 2002. In addition, there were notable differences in growth among the three occupational categories: Researchers (scientists and engineers) increased by 516%, technicians grew by 269%, and support staff by 130%. In 2002, the researchers accounted for 62% of total R&D personnel, compared with 26% for technicians and 12% for support staff.

**Table 4.1 Personnel engaged in R&D in the business enterprise sector, by occupational category, 1979 to 2002**

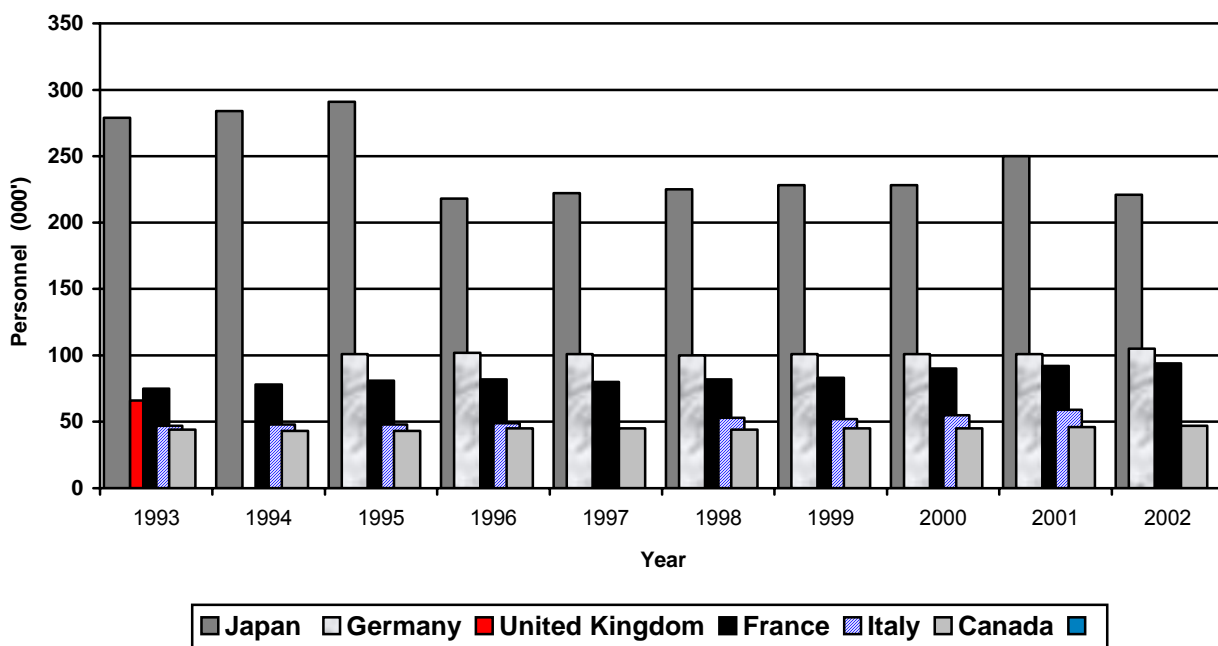
Year	Researchers	Technicians	Support staff	Total
FTE's (rounded to the nearest 10)				
1979	11,310	7,910	5,650	<b>24,870</b>
1980 <sup>f</sup>	11,860	8,350	5,430	<b>25,640</b>
1981	14,880	11,000	6,520	<b>32,400</b>
1982 <sup>f</sup>	16,820	11,550	6,540	<b>34,910</b>
1983 <sup>f</sup>	17,650	11,600	7,510	<b>36,760</b>
1984	19,560	12,760	7,290	<b>39,610</b>
1985 <sup>f</sup>	22,660	14,550	7,700	<b>44,910</b>
1986 <sup>f</sup>	25,520	15,950	8,090	<b>49,560</b>
1987 <sup>f</sup>	27,120	16,550	8,100	<b>51,770</b>
1988 <sup>f</sup>	28,480	17,210	8,550	<b>54,240</b>
1989 <sup>f</sup>	28,660	17,190	7,810	<b>53,660</b>
1990	29,670	16,200	8,050	<b>53,920</b>
1991	30,120	15,930	7,740	<b>53,790</b>
1992	33,240	16,540	7,680	<b>57,460</b>
1993	36,310	17,610	7,610	<b>61,530</b>
1994	46,860	22,740	9,280	<b>78,880</b>
1995 <sup>f</sup>	48,980	23,280	9,750	<b>82,010</b>
1996 <sup>f</sup>	48,500	21,580	9,260	<b>79,340</b>
1997 <sup>f</sup>	51,990	21,580	9,120	<b>82,690</b>
1998 <sup>f</sup>	54,720	22,020	9,250	<b>85,990</b>
1999 <sup>f</sup>	58,020	22,830	10,040	<b>90,890</b>
2000 <sup>f</sup>	67,160	26,680	10,190	<b>104,030</b>
2001 <sup>f</sup>	73,310	29,400	12,340	<b>115,050</b>
2002	69,640	29,190	12,970	<b>111,800</b>

**Chart 4 Business enterprise R&D personnel, in selected OECD countries, 1993 to 2002**



Source: Table 7.2

**Chart 5 Higher education R&D personnel, in selected OECD countries, 1993 to 2002**



Source: Table 7.2

## Higher education sector

This sector includes universities, colleges of technology and other institutions of post-secondary education. Since existing surveys of this sector do not provide information on the R&D activities of staff, it is necessary to estimate R&D personnel. When completing estimates for 2002 R&D personnel, the methodology was updated. A description of the method used follows.

As in other sectors of performance, we are interested in determining the full-time equivalent by three occupational categories (researchers, technicians and support staff) and by science type (NSE and SSH). The first step we take is to determine “researchers”.

It is common knowledge that university professors are involved in other activities besides research (teaching and community service work). Doctoral students and postdoctoral research fellows also do research. The level of education held by these persons would qualify them as researchers. But, how much of their time is actually spent doing R&D?

When estimating R&D expenditures in the higher education sector, universities are classified into small, medium and large based on 1) sponsored research expenditures; 2) sponsored research as a percentage of general operating expenditures and 3) the number of doctoral programs. This is based on the assumption that, depending on the size of the university, some universities spend more time on R&D than others. The same size classification is used to estimate R&D personnel.

Also, when estimating R&D expenditures, we use the full-time teachers field of study to determine science type. Science type of R&D personnel is based on the same field of study classification. Crossing the size classification of institutions with the science type and personnel category, we arrive at percentages used to determine how much time is spent on R&D (Table 5.1).

<b>Table 5.1 Proportion of time devoted to R&amp;D, by field of science</b>		
Classification of institutions and personnel category	NSE	SSH
	Percentage	
<b>Large Universities</b>		
Full-time teachers	0.35	0.25
Doctoral students	0.85	0.85
Postdoctoral research fellows	0.80	0.65
<b>Medium Universities</b>		
Full-time teachers	0.30	0.20
Doctoral students	0.85	0.85
Postdoctoral research fellows	0.80	0.65
<b>Small Universities</b>		
Full-time teachers	0.25	0.15
Doctoral students	0.85	0.85
Postdoctoral research fellows	0.80	0.65

Now, we apply this methodology to full-time teacher, doctoral student and Ph.D. fellows information. The Centre for Education Statistics provides us with full-time teacher and doctoral students data by institution and by field of study. Postdoctoral fellows information is received from the three granting councils, Natural Sciences and Engineering Research Council, Social Sciences and Humanities Research Council and the Canadian Institutes for Health Research. These data are organized by university size and by field of study. To arrive at the amount of time these persons spend doing R&D in FTE's, we multiply the full-time teachers, doctoral students and Ph.D. fellows by the percentages in Table 5.1. As mentioned before, these persons are all considered to be researchers.

In addition to full-time university professors, doctorate students and Ph.D. fellows; there are part-time teachers, technicians and other support staff involved in R&D. Estimates for these classifications of R&D personnel are based on information provided by the Census.

The Census labour market statistics provide data on sector of employment, occupation (based on the National Occupational Classification for Statistics, 2001 (NOC-S), level of education and gender of the employed labour force. The division was able to purchase 1991, 1996 and 2001 Census data with funds made available through our memorandum of understanding (MOU) with Industry Canada. Census data prior to 1991 was not purchased and therefore no revisions to the higher education R&D personnel were made prior to 1991. Estimates previous to 1991 used coefficients based on the older Standard Occupational Classification, 1980 (SOC).

In order to use the Census data, the occupations had to be classified into our three categories – Researchers, Technicians and Other. In order to do this, we have attempted a concordance of NOCS 2001 to the Frascati Manual's (2002) categories of R&D personnel by occupation, which are based on the International Standard Classification of Occupations, 1988 (ISCO). Once this concordance was completed, detailed analysis was made on Canada's employed labour force who work in the university industry (SIC 8531) in order to arrive at the Occupational Coefficients listed in Table 5.2. What the coefficients imply are that for every full-time teacher, there is 0.14 part-time teachers, 0.83 technicians and 0.68 other support staff doing R&D.

<b>Table 5.2 Occupational coefficients, by category and field of science<sup>1</sup>, 1979 to 2002</b>								
Year	NSE				SSH			
	Full-time university teachers	Part-time university teachers	Technicians	Other support staff	Full-time university teachers	Part-time university teachers	Technicians	Other support staff
	FTE's							
1979	1	0.13	2.03	0.38	1	0.15	..	1.83
1980	1	0.13	2.03	0.38	1	0.15	..	1.83
1981	1	0.13	2.03	0.38	1	0.15	..	1.83
1982	1	0.13	1.92	0.35	1	0.15	..	1.72
1983	1	0.13	1.81	0.32	1	0.16	..	1.61
1984	1	0.14	1.70	0.29	1	0.16	..	1.50
1985	1	0.14	1.48	0.26	1	0.17	..	1.39
1986	1	0.14	1.44	0.24	1	0.18	..	1.28
1987	1	0.15	1.40	0.22	1	0.18	..	1.24
1988	1	0.15	1.36	0.20	1	0.18	..	1.19
1989	1	0.15	1.32	0.19	1	0.19	..	1.15
1990	1	0.15	1.28	0.18	1	0.19	..	1.10
1991 <sup>r</sup>	1	0.11	0.97	0.72	1	0.08	0.45	0.58
1992 <sup>r</sup>	1	0.11	0.97	0.72	1	0.08	0.45	0.58
1993 <sup>r</sup>	1	0.11	0.97	0.72	1	0.08	0.45	0.58
1994 <sup>r</sup>	1	0.11	0.97	0.72	1	0.08	0.45	0.58
1995 <sup>r</sup>	1	0.11	0.97	0.72	1	0.08	0.45	0.58
1996 <sup>r</sup>	1	0.15	0.87	0.66	1	0.13	0.45	0.59
1997 <sup>r</sup>	1	0.15	0.87	0.66	1	0.13	0.45	0.59
1998 <sup>r</sup>	1	0.15	0.87	0.66	1	0.13	0.45	0.59
1999 <sup>r</sup>	1	0.15	0.87	0.66	1	0.13	0.45	0.59
2000 <sup>r</sup>	1	0.15	0.87	0.66	1	0.13	0.45	0.59
2001 <sup>r</sup>	1	0.14	0.83	0.68	1	0.12	0.39	0.63
2002 <sup>r</sup>	1	0.14	0.83	0.68	1	0.12	0.39	0.63

1. For example, in 2002, in the NSE, for every 1.0 full-time teacher doing R&D, there was 0.14 part-time teacher, 0.83 technician and 0.68 other support staff.

We have determined that “researchers” constitute the R&D full-time equivalent of full-time teachers, doctoral students and Ph.D. fellows. In addition to these we add part-time teachers using the appropriate occupational coefficient provided by the Census data (Table 5.2). The total of these occupations equal “Researchers”.

<b>Table 5.3 Researchers engaged in R&amp;D in the higher education sector, by category, 1979 to 2002</b>										
Year	Full-time teachers		Part-time teachers		Doctoral students		Postdoctoral fellowships		Total researchers	
	NSE	SSH	NSE	SSH	NSE	SSH	NSE	SSH	NSE	SSH
	FTE's									
1979	4,535	3,785	590	568	3,524	4,712	0	0	<b>8,649</b>	<b>9,065</b>
1980	4,670	3,799	607	570	3,635	4,788	0	0	<b>8,913</b>	<b>9,157</b>
1981	4,700	3,797	611	570	3,857	4,661	0	0	<b>9,169</b>	<b>9,027</b>
1982	4,780	3,810	621	572	4,356	5,114	0	0	<b>9,758</b>	<b>9,496</b>
1983	4,883	3,822	635	612	4,768	5,328	0	0	<b>10,285</b>	<b>9,762</b>
1984	5,042	3,935	706	630	5,183	5,636	0	0	<b>10,932</b>	<b>10,201</b>
1985	5,101	3,942	714	670	5,522	5,753	0	0	<b>11,337</b>	<b>10,364</b>
1986	5,117	3,987	716	718	6,071	6,021	420	120	<b>12,324</b>	<b>10,846</b>
1987	5,156	4,165	773	750	6,463	6,367	450	129	<b>12,842</b>	<b>11,410</b>
1988	5,208	4,269	781	768	6,990	6,714	458	131	<b>13,438</b>	<b>11,882</b>
1989	5,287	4,198	793	798	7,556	6,975	487	139	<b>14,122</b>	<b>12,110</b>
1990	5,347	4,245	802	806	8,114	7,339	506	144	<b>14,770</b>	<b>12,534</b>
1991	5,324	4,156	586	333	8,844	7,882	654	176	<b>15,408</b>	<b>12,547</b>
1992	5,460	4,216	601	337	9,461	8,373	692	182	<b>16,213</b>	<b>13,108</b>
1993	5,433	4,130	598	330	10,033	8,854	664	189	<b>16,728</b>	<b>13,503</b>
1994	5,367	4,053	590	324	9,868	9,225	598	193	<b>16,423</b>	<b>13,795</b>
1995	5,243	3,898	577	312	9,845	9,599	497	177	<b>16,162</b>	<b>13,986</b>
1996	5,086	3,716	763	483	10,774	12,504	382	74	<b>17,005</b>	<b>16,777</b>
1997	4,990	3,701	749	481	10,423	12,610	391	86	<b>16,553</b>	<b>16,878</b>
1998	5,024	3,640	754	473	10,043	12,409	428	73	<b>16,249</b>	<b>16,595</b>
1999	5,051	3,692	758	480	11,156	11,363	434	89	<b>17,399</b>	<b>15,624</b>
2000	5,156	3,806	773	495	11,092	11,487	422	73	<b>17,443</b>	<b>15,861</b>
2001	5,349	3,942	749	473	11,625	11,614	391	65	<b>18,114</b>	<b>16,094</b>
2002	5,489	4,061	768	487	11,877	11,753	398	81	<b>18,532</b>	<b>16,382</b>

Technicians and Other Support staff are determined by applying the coefficient derived from the census data. That coefficient considers both the occupation specified, the highest level of education achieved as well as the field in which the person works (natural sciences and engineering or social sciences and humanities).

As a result of the analysis completed on the Census data, we have been able to identify technicians in the social sciences and humanities back as far as 1991. Previous to that year the distinction between technicians and other support staff is unclear in the social sciences and humanities, these two categories have been combined and are shown as support staff.

<b>Table 5.4 Personnel engaged in R&amp;D in the higher education sector, by occupational category, 1979 to 2002</b>										
Year	Researchers			Technicians			Support staff			Total
	NSE	SSH	Total	NSE	SSH	Total	NSE	SSH <sup>1</sup>	Total	
FTE's (rounded to the nearest 10)										
1979	8,750	9,090	<b>17,840</b>	9,210	..	<b>9,210</b>	1,720	6,930	<b>8,650</b>	<b>35,700</b>
1980	9,030	9,180	<b>18,210</b>	9,480	..	<b>9,480</b>	1,780	6,950	<b>8,730</b>	<b>36,420</b>
1981	9,300	9,050	<b>18,350</b>	9,540	..	<b>9,540</b>	1,790	6,950	<b>8,740</b>	<b>36,630</b>
1982	9,880	9,530	<b>19,410</b>	9,180	..	<b>9,180</b>	1,670	6,560	<b>8,230</b>	<b>36,820</b>
1983	10,410	9,790	<b>20,200</b>	8,840	..	<b>8,840</b>	1,560	6,150	<b>7,710</b>	<b>36,750</b>
1984	11,080	10,230	<b>21,310</b>	8,570	..	<b>8,570</b>	1,460	5,910	<b>7,370</b>	<b>37,250</b>
1985	11,480	10,400	<b>21,880</b>	7,550	..	<b>7,550</b>	1,320	5,480	<b>6,800</b>	<b>36,230</b>
1986	12,320	10,850	<b>23,170</b>	7,370	..	<b>7,370</b>	1,230	5,100	<b>6,330</b>	<b>36,870</b>
1987	12,840	11,410	<b>24,250</b>	7,220	..	<b>7,220</b>	1,130	5,170	<b>6,300</b>	<b>37,770</b>
1988	13,440	11,880	<b>25,320</b>	7,080	..	<b>7,080</b>	1,040	5,080	<b>6,120</b>	<b>38,520</b>
1989	14,120	12,110	<b>26,230</b>	6,980	..	<b>6,980</b>	1,000	4,830	<b>5,830</b>	<b>39,040</b>
1990 <sup>f</sup>	14,770	12,530	<b>27,300</b>	6,850	..	<b>6,850</b>	960	4,670	<b>5,630</b>	<b>39,780</b>
1991 <sup>f</sup>	15,410	12,550	<b>27,960</b>	5,160	1,870	<b>7,030</b>	3,830	2,410	<b>6,240</b>	<b>41,240</b>
1992 <sup>f</sup>	16,210	13,110	<b>29,320</b>	5,300	1,900	<b>7,200</b>	3,930	2,450	<b>6,380</b>	<b>42,890</b>
1993 <sup>f</sup>	16,730	13,500	<b>30,230</b>	5,270	1,860	<b>7,130</b>	3,910	2,400	<b>6,310</b>	<b>43,670</b>
1994 <sup>f</sup>	16,420	13,800	<b>30,220</b>	5,210	1,820	<b>7,030</b>	3,860	2,350	<b>6,210</b>	<b>43,460</b>
1995 <sup>f</sup>	16,160	13,990	<b>30,150</b>	5,090	1,750	<b>6,840</b>	3,770	2,260	<b>6,030</b>	<b>43,020</b>
1996 <sup>f</sup>	17,010	16,780	<b>33,790</b>	4,420	1,670	<b>6,090</b>	3,360	2,190	<b>5,550</b>	<b>45,430</b>
1997 <sup>f</sup>	16,550	16,880	<b>33,430</b>	4,340	1,670	<b>6,010</b>	3,300	2,180	<b>5,480</b>	<b>44,920</b>
1998 <sup>f</sup>	16,250	16,590	<b>32,840</b>	4,370	1,640	<b>6,010</b>	3,320	2,150	<b>5,470</b>	<b>44,320</b>
1999 <sup>f</sup>	17,400	15,620	<b>33,020</b>	4,400	1,660	<b>6,060</b>	3,330	2,180	<b>5,510</b>	<b>44,590</b>
2000 <sup>f</sup>	17,440	15,860	<b>33,300</b>	4,490	1,710	<b>6,200</b>	3,400	2,250	<b>5,650</b>	<b>45,150</b>
2001 <sup>f</sup>	18,110	16,090	<b>34,200</b>	4,440	1,540	<b>5,980</b>	3,640	2,480	<b>6,120</b>	<b>46,300</b>
2002	18,530	16,380	<b>34,910</b>	4,560	1,580	<b>6,140</b>	3,730	2,560	<b>6,290</b>	<b>47,340</b>

1. From 1979 to 1990, includes the few technicians engaged in R&D in the social sciences and humanities.

The use of large-scale estimates naturally causes data reliability problems. Nevertheless, in the absence of more reliable data, these estimates provide us with a general idea of the situation in this sector, given certain assumptions. Caution should be used when comparing them with other sectors or with expenditure estimates.



## Private non-profit organizations sector

This sector is comprised of private and semipublic organizations and entities for which profit-making is not a primary goal. There are four main types of organizations included: private philanthropic foundations, scientific societies and associations, voluntary health organizations, and research institutes which do not belong to other sectors.

Since 1983, SIEID has been collecting personnel data through its survey of R&D performed by private non-profit organizations in Canada. In this survey, respondents are asked to estimate the number of employees engaged in R&D by occupational category.<sup>1</sup>

Since no statistics on R&D personnel in these organizations for the years prior to 1983 are available, estimates were made on the 1983 relationships of personnel, R&D expenditures and occupational categories. Finally, since R&D in this sector is carried out basically in the health sciences, there are no estimates for personnel engaged in R&D in the social sciences and humanities.

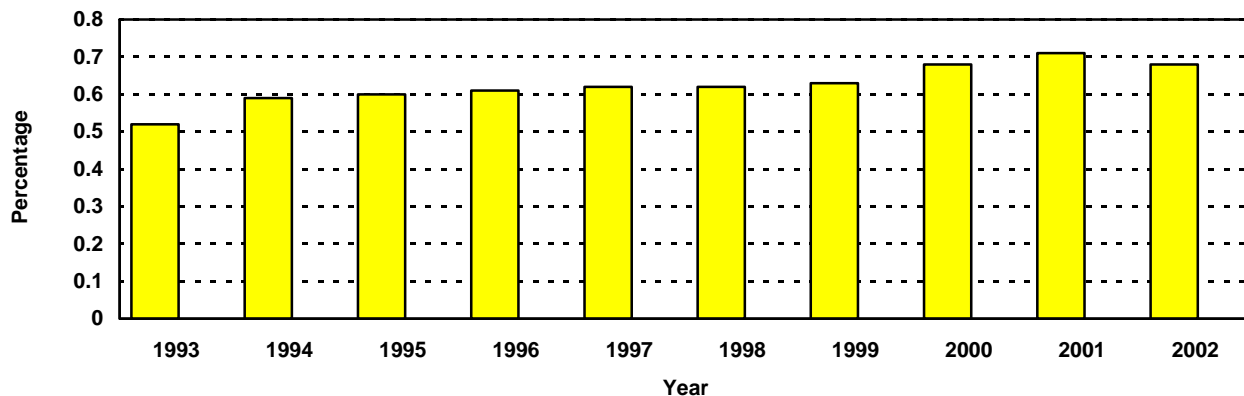
<b>Table 6.1 Personnel engaged in R&amp;D in the private non-profit sector, by occupational category, 1979 to 2002</b>				
Year	Researchers	Technicians	Support staff	Total
FTE's (rounded to the nearest 10)				
1979	220	340	190	<b>750</b>
1980	240	350	200	<b>790</b>
1981	260	390	220	<b>870</b>
1982	290	440	250	<b>980</b>
1983	300	520	190	<b>1,010</b>
1984	360	590	120	<b>1,070</b>
1985	390	640	130	<b>1,160</b>
1986	310	620	150	<b>1,080</b>
1987	390	640	180	<b>1,210</b>
1988	430	720	260	<b>1,410</b>
1989	470	680	210	<b>1,360</b>
1990	580	690	190	<b>1,460</b>
1991	510	530	190	<b>1,230</b>
1992	470	380	130	<b>980</b>
1993	550	400	140	<b>1,090</b>
1994	540	420	150	<b>1,110</b>
1995	480	510	170	<b>1,160</b>
1996	470	540	220	<b>1,230</b>
1997	450	510	250	<b>1,210</b>
1998 <sup>1</sup>	380	430	230	<b>1,040</b>
1999	330	340	190	<b>860</b>
2000	300	300	250	<b>850</b>
2001	260	190	260	<b>710</b>
2002	260	200	270	<b>730</b>

1. See "Research and Development (R&D) Expenditures of Private Non-profit Organizations, 2002" **Science Statistics**, Vol. 28, No.4, Statistics Canada, Catalogue No. 88-001-XIE, April 2004

## International comparisons

In 2001 in Canada, there were 7.1 scientists and engineers engaged in R&D for every 1,000 members of the labour force, compared with 10.2 in Japan (over estimated), 10.6 in Sweden and 7.2 in France.

**Chart 6 Canadian researchers expressed as a percent of the labour force, 1993 to 2002**



Source: Table 7.1

**Table 7.1 Researchers engaged in R&D in selected OECD countries, 1993 to 2002**

Country	1993 <sup>f</sup>	1994 <sup>f</sup>	1995 <sup>f</sup>	1996 <sup>f</sup>	1997 <sup>f</sup>	1998 <sup>f</sup>	1999 <sup>f</sup>	2000 <sup>f</sup>	2001 <sup>f</sup>	2002
<b>Researchers</b> ('000 FTE)										
United States	965	..	988	..	1,160	..	1,261	..	..	..
Japan <sup>1</sup>	641	659	673	617	625	653	659	648	676	647
Germany	..	..	231	230	236	238	255	258	264	266
United Kingdom	135	142	147	145	146	158	..	..	..	..
France	146	149	151	155	155	156	160	172	177	186
Italy	74	76	76	76	66	65	65	66	67	..
<b>Canada</b>	<b>75</b>	<b>86</b>	<b>87</b>	<b>90</b>	<b>93</b>	<b>95</b>	<b>99</b>	<b>108</b>	<b>115</b>	<b>113</b>
Netherlands	32	34	34	34	38	39	40	42	45	..
Sweden	29	..	34	..	37	..	40	..	46	..
<b>Total Labour Force</b> ('000,000)										
United States	131	133	134	138	141	144	147	149	149	148
Japan <sup>1</sup>	66	66	67	67	68	67	67	67	66	65
Germany	40	40	39	37	37	38	38	39	39	39
United Kingdom	28	28	29	28	28	29	29	29	30	30
France	25	25	25	23	23	23	24	24	25	25
Italy	23	23	23	22	22	22	23	23	24	24
<b>Canada</b>	<b>14</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>17</b>
Netherlands	7	7	7	7	8	8	8	8	8	8
Sweden	4	4	4	4	4	4	4	4	4	4
<b>Researchers per 1,000 persons in the labour force</b> ratio										
United States	7.4	..	7.4	..	8.2	..	8.6	..	..	..
Japan <sup>1</sup>	9.7	9.9	10.1	9.2	9.2	9.7	9.9	9.7	10.2	9.9
Germany	..	..	5.9	6.2	6.3	6.3	6.7	6.7	6.8	6.9
United Kingdom	4.7	5.0	5.1	5.2	5.2	5.5	..	..	..	..
France	5.8	5.9	6.0	6.8	6.8	6.7	6.8	7.1	7.2	7.5
Italy	3.2	3.3	3.3	3.5	3.0	2.9	2.9	2.9	2.8	..
<b>Canada</b>	<b>5.2</b>	<b>5.9</b>	<b>6.0</b>	<b>6.1</b>	<b>6.2</b>	<b>6.2</b>	<b>6.3</b>	<b>6.8</b>	<b>7.1</b>	<b>6.8</b>
Netherlands	4.5	4.8	4.6	4.7	5.0	5.0	5.1	5.2	5.5	..
Sweden	6.7	..	7.7	..	9.2	..	9.6	..	10.6	..

1. Overestimated (not in full-time equivalent).

Source; OECD, Main Science and Technology Indicators, 2004/2.

<b>Table 7.2 Personnel engaged in R&amp;D in selected OECD countries, by major sector, 1993 to 2002</b>										
Sector of performance	1993 <sup>f</sup>	1994 <sup>f</sup>	1995 <sup>f</sup>	1996 <sup>f</sup>	1997 <sup>f</sup>	1998 <sup>fr</sup>	1999 <sup>f</sup>	2000 <sup>f</sup>	2001 <sup>f</sup>	2002
FTE's ('000)										
<b>Total R&amp;D Personnel</b>										
Japan <sup>1</sup>	947	946	948	892	894	926	919	897	892	857
Germany	..	..	459	454	460	462	480	485	481	480
United Kingdom	270	..	..	..	..	..	..	..	..	..
France	314	315	318	321	306	309	314	327	334	344
Italy	142	144	142	142	..	146	143	150	154	..
<b>Canada</b>	<b>127</b>	<b>144</b>	<b>145</b>	<b>144</b>	<b>146</b>	<b>148</b>	<b>153</b>	<b>168</b>	<b>179</b>	<b>177</b>
Netherlands	74	79	79	81	84	85	87	89	90	..
Sweden	57	..	63	..	65	..	67	..	72	..
<b>Government</b>										
Japan <sup>1</sup>	56	56	56	56	57	59	59	59	63	64
Germany	71	73	75	75	73	73	71	71	72	73
United Kingdom	34	32	29	27	26	29	30	30	23	21
France	68	68	69	69	53	52	53	53	49	52
Italy	33	33	33	32	31	32	31	31	30	..
<b>Canada</b>	<b>21</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>18</b>	<b>17</b>	<b>17</b>
Netherlands	15	16	16	16	16	16	17	13	14	13
Sweden	3	..	4	..	3	..	3	..	3	..
<b>Business Enterprise</b>										
Japan <sup>1</sup>	583	578	574	589	586	613	605	582	562	556
Germany	294	..	283	277	286	288	307	312	307	303
United Kingdom	164	157	146	142	137	148	153	145	152	167
France	164	162	162	163	166	168	172	178	185	191
Italy	62	63	60	61	61	61	60	64	65	..
<b>Canada</b>	<b>62</b>	<b>79</b>	<b>82</b>	<b>79</b>	<b>83</b>	<b>86</b>	<b>91</b>	<b>104</b>	<b>115</b>	<b>112</b>
Netherlands	31	36	37	39	42	44	45	48	48	47
Sweden	35	..	42	..	44	..	44	..	49	..
<b>Higher Education</b>										
Japan <sup>1</sup>	279	284	291	218	222	225	228	228	250	221
Germany	..	..	101	102	101	100	101	101	101	105
United Kingdom	66	..	..	..	..	..	..	..	..	..
France	75	78	81	82	80	82	83	90	92	94
Italy	47	48	48	49	..	53	52	55	59	..
<b>Canada</b>	<b>44</b>	<b>43</b>	<b>43</b>	<b>45</b>	<b>45</b>	<b>44</b>	<b>45</b>	<b>45</b>	<b>46</b>	<b>47</b>
Netherlands	27	26	25	24	24	24	24	27	27	..
Sweden	17	..	17	..	18	..	19	..	20	..

1. Overestimated (not in full-time equivalent).

Source: OECD, Main Science and Technology Indicators, 2004/2.

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No. 11 Federal government expenditures on scientific activities, 2004-2005<sup>p</sup>, (November 2004)

No. 12 Total spending on research and development in Canada, 1990 to 2004<sup>p</sup>, and provinces, 1990 to 2002 (December 2004)

### **Working papers – 2005**

- ST-05-01E Federal government expenditures and personnel in the natural and social sciences 1995-96 to 2004-05 (January 2005)
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