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The National R&D Target and implications: 1.5% of GNP by 1985

Introduction

This document is to serve as a comprenhensive planning tool for science planners and policy makers in the federal government. The information also should be useful for other sectors. Although there is a degree of arbitrariness in the distributions adopted, the developing consensus in government, industry and the scientific community is that much more needs to be spent on science by the nation as a whole and that a larger share of both funding and performance of research and development should be done by the private sector. In part, this stance is based on comparisons with other western economies where R&D spending is markedly higher than in Canada and the role of the private sector is much more prominent. The targets presented here, then, are a path to a GERD (Gross Expenditure on R&D) for Canada comparable with other advanced countries.

Historical Context

The following table shows GERD as a share of the total economy since 1963. Data on GNP and prices are from the Bank of Canada. Statistics Canada issues the GERD series. NOTE: The data contained herein refer to R&D in the Natural Sciences in current dollars unless otherwise noted. Target data are based on the economic projections of the October, 1980 budget which projects the real growth of the economy to average less than three percent over the target period, the December, 1981 revision of GERD and the 1982/83 Main Estimates unless otherwise noted.

HISTORICAL CONTEXT

	GNP ($B)	GERD* ($M)	RATIO (%)	REAL GROWTH GNP (%)	REAL GROWTH GERD (%)	INFLATION (%)	PRICE INDEX (1971=100)
1963	46.0	463	1.01	0.0	0.0	0.0	74.8
1964	50.3	554	1.10	6.8	16.9	2.4	76.6
1965	55.4	665	1.20	6.6	16.2	3.3	79.1
1966	61.8	754	1.22	6.9	12.0	4.4	82.6
1967	66.4	854	1.29	3.3	8.9	4.0	85.9
1968	72.6	910	1.25	5.9	3.1	3.3	88.7
1969	79.8	1002	1.26	5.3	5.5	4.4	92.6
1970	85.7	1061	1.24	2.6	1.2	4.6	96.9
1971	94.5	1155	1.22	6.8	5.6	3.2	100.0
1972	105.2	1186	1.13	6.1	-2.5	5.0	105.0
1973	123.6	1271	1.03	7.6	-2.0	9.1	114.6
1974	147.5	1490	1.01	3.6	1.7	15.3	132.1
1975	165.3	1669	1.01	1.2	1.1	10.7	146.3
1976	191.0	1803	0.94	5.5	-1.3	9.5	160.2
1977	208.9	2014	0.96	2.2	4.3	7.0	171.5
1978	230.4	2317	1.00	3.4	9.0	6.4	182.4
1979	262.0	2631	1.00	3.0	2.8	10.4	201.3
1980	289.9	3029	1.04	0.0	3.8	10.6	222.7
1981	328.5	3518	1.07	3.1	5.6	10.0	245.0*

SOURCE: BANK OF CANADA AND STATISTICS CANADA

* Preliminary estimate.

The next three tables show GERD by funder and performer for 1963 to 1981.

GERD BY FUNDER(*)
($ M)

	FED	IND	UNIV	OTHER	TOTAL
1963	225	145	58	35	463
1964	262	176	70	46	554
1965	313	211	77	64	665
1966	346	246	96	66	754
1967	408	273	98	75	854
1968	452	281	94	83	910
1969	475	325	117	85	1,002
1970	497	333	141	90	1,061
1971	539	365	153	98	1,155
1972	566	360	146	114	1,186
1973	606	387	146	132	1,271
1974	663	493	183	151	1,490
1975	699	569	235	166	1,669
1976	740	605	261	197	1,803
1977	815	682	285	232	2,014
1978	919	836	311	251	2,317
1979	936	1,034	344	317	2,631
1980	1,105	1,221	346	357	3,029
1981	1,254	1,481	387	396	3,518

GERD BY FUNDER
ANNUAL GROWTH RATES

(%)

	FED	IND	UNIV	OTHER	TOTAL
1979	2	24	11	26	14
1980	18	18	1	13	15
1981	13	21	12	11	16
TARGET	17	27	9	16	20

SOURCE: STATISTICS CANADA

GERD BY PERFORMER(*)

($ M)

	FED	IND	UNIV	OTHER	TOTAL
1963	175	180	86	22	463
1964	195	227	109	23	554
1965	221	287	130	27	665
1966	241	317	167	29	754
1967	282	336	206	30	854
1968	304	342	229	35	910
1969	305	394	266	37	1,002
1970	317	413	293	38	1,061
1971	341	464	309	41	1,155
1972	369	459	309	49	1,186
1973	395	497	321	58	1,271
1974	444	607	359	70	1,490
1975	472	694	432	71	1,669
1976	500	744	476	83	1,803
1977	546	841	534	93	2,014
1978	626	1000	588	103	2,317
1979	628	1,236	646	121	2,631
1980	713	1,464	710	142	3,029
1981	827	1,752	781	158	3,518

SOURCE: STATISTICS CANADA

NATURAL SCIENCE R&D EXPENDITURES (GERD) IN SELECTED O.E.C.D. COUNTRIES EXPRESSED AS A PERCENTAGE OF G.D.P.(a)

	1969	1971	1973	1975	1977	1979
SPAIN	0.0	0.0	0.0	0.3	0.0	-
IRELAND	0.0	0.0	0.0	0.8	0.7	.7
FINLAND	0.0	0.0	0.0	0.9	1.0	1.0
ITALY	0.8	0.9	-	0.9	0.9	0.8 b
CANADA	1.3	1.2	1.0	1.0	0.9	1.0
DENMARK	0.0	0.0	0.0	1.1	0.9	0.9
NORWAY	0.0	0.0	0.0	1.1	1.2	1.2
BELGIUM	1.1	1.2	1.3	1.2	1.2	1.3
JAPAN	1.5	1.6	1.7	1.7	1.7	1.8
FRANCE	1.9	1.8	1.7	1.8	1.8b	1.8 b
SWEDEN	1.3	1.6	1.6	1.8	1.9b	1.9
NETHERLANDE	2.1	2.0	1.9	1.9	1.8	1.8
GERMANY	1.7	2.1	2.0	2.1	2.0	2.3
U.K.	2.4	2.3	2.1	2.1	0.0	2.1
SWITZERLAND	2.1	1.9	0.0	2.2	2.2	2.4
U.S.	2.8	2.6	2.4	2.3	2.4b	2.4 b

SOURCE: OECD, VARIOUS PUBLICATIONS

(a) GDP IS PREFERRED BY OECD

(b) INCLUDES SOCIAL SCIENCES

INTERNATIONAL COMPARISON (OECD)
R&D FUNDING SHARES (%)
1979

	GOVERNMENT	UNIVERSITY	INDUSTRY	OTHER
AUSTRALIA*	-	-	-	-
DENMARK*	29.6	22.3	44.7	3.4
FINLAND	26.8	12.2	59.3	1.7
FRANCE*	36.6	14.5	43.1	5.8
GERMANY	39.9		57.9	2.1
ICELAND	80.5	5.6	6.3	7.7
IRELAND	43.0	11.7	37.6	7.7
ITALY	-	-	-	-
JAPAN	6.5	17.2	65.8	0.5
NORWAY	32.7	22.3	43.0	2.1
SWEDEN	23.9	14.2	60.4	1.6
SWITZERLAND	21.9		76.6	1.5
USA*	49.3	3.1	46.1	1.5
CANADA (FED/PROV)	42.3 (35.6/6.7)	13.1	39.3	5.4

IN ADDITION TO CANADA'S GERD/GNP RATIO BEING LOW IN COMPARISON TO OTHER OECD COUNTRIES, THE DISTRIBUTION OF FUNDING OF GERD IS CHARACTERISTICALLY DIFFERENT. FUNDING BY INDUSTRY IS GENERALLY LOW IN COMPARISSON TO OTHER MORE INDUSTRIALIZED COUNTRIES.

* INCLUDES SOME OR ALL SSH. ALL OTHERS ARE NSE ONLY

INTERNATIONAL COMPARISON (OECD)
R&D PERFORMING SHARES (%)
1979

	GOVERNMENT	UNIVERSITY	INDUSTRY	OTHER
AUSTRALIA*	44.7	31.0	23.4	0.9
DENMARK	20.9	20.9	57.2	0.9
FINLAND	24.7	15.8	59.0	0.5
FRANCE*	23.6	15.5	59.5	1.4
GERMANY	13.8	13.7	72.3	0.3
ICELAND	62.9	22.9	9.9	4.3
IRELAND	41.2	16.3	40.0	2.5
ITALY*	24.4	17.9	57.6	0.0
JAPAN	13.4	19.5	65.3	1.9
NORWAY	16.6	27.0	56.1	0.3
SWEDEN	8.5	21.7	69.7	0.1
SWITZERLAND	6.0	15.9	77.0	1.1
USA*	14.3	14.5	67.6	3.6
CANADA (FED/PROV)	27.7 (23.9/3.8)	24.6	47.0	0.8

THE PERFORMANCE DISTRIBUTION OF GERD IN CANADA IS ALSO CHARACTERISTICALLY DIFFERENT IN COMPARISON TO OTHER OECD COUNTRIES. PERFORMANCE BY GOVERNMENT IS GENERALLY HIGHER AND PERFORMANCE BY INDUSTRY IS GENERALLY LOW IN COMPARISON TO OTHER MORE INDUSTRIALIZED COUNTRIES.

* INCLUDES SOME OR ALL SOCIAL SCIENCES AND HUMANITIES. ALL OTHERS ARE NSE ONLY

Implications of targets for Federal R&D

Due to definitional and methodological differences, federal R&D spending in the natural sciences as recorded in Main Estimates is not the same as reported by Statistics Canada in GERD tables. Nevertheless, it is possible to convert a GERD-based target for federal R&D into one that is compatible with the budgeting process.

The following table presents the target track for federal R&D (natural science), broken down by intended performer. At this level of detail, targets appear to be exact but should be considered only as general indicators derived from more aggregated projections. It is not possible to be as specific as the figures seem to imply.

FEDERAL R&D BY PERFORMER
(NATURAL SCIENCE)
(TARGET TRACK, MARCH 1981)

		GROWTH (%)	79/80	80/81	81/82	82/83	83/84	84/85	85/86
$M BUDGET YEAR PRICES	INTRAMURAL	(11.5)	587.7	666.0	750.8	841.1	935.9	1,032.5	1,129.0
	INDUSTRY	(26.3)	213.4	269.6	340.6	430.4	543.8	687.0	868.0
	UNIVERSITY	(20.5)	200.6	241.6	291.0	350.6	422.2	508.6	612.6
	OTHER	(5.7)	98.7	104.3	110.2	116.4	123.0	130.0	137.3
	TOTAL	(18.6)	1,100.3	1,281.5	1,492.6	1,738.5	2,024.9	2,358.1	2,746.9
EXPENDITURES NOV 1981			1,100.3	1,240.0	1,533.9	1,784.3			
OVER(UNDER) TRACK			-	(41.5)	41.3	45.8			

(*) MAY NOT ADD TO TOTALS DUE TO ROUNDING

DIFFERENCES BETWEEN REQUIREMENTS FOR RESEARCHERS AND AVAILABILITY OF PH.D.S AND MASTERS, UNDER THE VARIOUS GERD SENARIOS AND ASSUMPTIONS

GERD SCENARIOS

		1978-85		1978-1990		
		0.95/85	1.5/85	0.95/90	1.5/90	2.5/90
1.5% ATTRITION FULL LIFE-TIME R&D CAREER	3.0% GROWTH IN R&D/RESEARCHER	9,815	-4,050	17,345	3,015	-22,515
	1.5% GROWTH IN R&D/RESEARCHER	7,225	-8,090	12,636	-4,380	-34,730
	NO GROWTH IN R&D/RESEARCHER	4,380	-12,630	6,945	-13,315	-49,490
1.5% ATTRITION, 15 YEAR R&D WORK LIFE	3.0% GROWTH IN R&D/RESEARCHER	-915	-14,785	-1,055	-15,380	-40,915
	1.5% GROWTH IN R&D/RESEARCHER	-3,475	-18,820	-5,765	-22,780	-53,130
	NO GROWTH IN R&D/RESEARCHER	-6,355	-23,360	-11,450	-31,710	-67,890

SOURCE: MOSST ESTIMATES

(a) NOTE: (-) INDICATES A SHORTFALL IN THE NUMBER OF AVAILABLE PH.D.S AND M.SC.S.

(b) GERD SCENARIOS: 1.5/85 MEANS THAT GERD IS ASSUMED TO BE 1.5% OF GNP IN 1985, ETC.

DIFFERENCES BETWEEN REQUIREMENTS FOR RESEARCHERS AND AVAILABILITY OF PH.D.S AND MASTERS IN APPLIED AND OTHER THAN APPLIED NATURAL SCIENCES

GERD SCENARIOS

		1978-85		1978-90		
		0.95/85	1.5/85	0.95/90	1.5/90	2.5/90
3% GROWTH IN R&D/RESEARCHER, AND 1.5% ATTRITION	APPLIED NATURAL SCIENCES	4,920	-2,960	9,035	900	-13,610
	OTHER NATURAL SCIENCES	4,895	-1,090	8,310	2,120	-8,905
	TOTAL	9,815	-4,050	17,345	3,020	-22,515
NO GROWTH IN R&D/RESEARCHER, PRODUCTIVITY GROWTH/1.5% ATTRITION & 15 YEAR WORK LIFE	APPLIED NATURAL SCIENCES	-4,035	-13,700	-6,925	-18,435	-38,995
	OTHER NATURAL SCIENCES	-2,320	-9,660	-4,525	-13,275	-26,895
	TOTAL	-6,355	-23,360	-11,450	-31,710	-67,890

SOURCE: MOSST ESTIMATES.

(a) (-) INDICATES A SHORTFALL IN THE NUMBER OF AVAILABLE PH.D.S AND M.SC.S.

(b) GERD SCENARIOS: 1.5/85 MEANS THAT GERD IS ASSUMED TO BE 1.5% OF GNP IN 1985, ETC.

Introduction

1. Part B contains statistics on the federal government's science expenditures over the past five fiscal years (1978/79 to 1982/83).

2. These differ from the totals used in calculating federally federally funded GERD figures (see Part A) in a number of ways:

(a) GERD only takes account of the amounts spent on R & D in the natural sciences and engineering. FSE totals also include amounts spent on human sciences.

(b) FSE totals also include amounts spent on related scientific activities (RSA) such as data collection, museum services, scientific librairies etc.

(c) GERD takes account only of R&D performed inside Canada. FSE includes federal scientific expenditures performed outside the country by such agencies as CIDA, IDRC and DND.

(d) In calculating GERD, internal administrative overhead costs are included, whereas FSE totals exclude overhead.

(e) GERD is based on a survey of performers of R&D. The costs of non-R&D inputs to federal R&D projects are not included not included in GERD. FSE totals include such extramural expenditures.

(f) The GERD report is produced by the Science Statistics Center (Statistics Canada) early each year and covers the previous calendar year.The FSE figures are obtained in conjunction with the preparation of the Main Estimates, normally tabled in the House in February, and therefore they forecast expenditures for the coming fiscal year. Each February the FSE figures for the current fiscal year are adjusted (usually downward) in accordance with departmental expenditure figures provided in conjunction with Main Estimates submissions. The figures for the previous fiscal year's expenditures are also re-adjusted on the basis of actual departmental expenditures reported to the Public Accounts Committee. Although the FSE figures for the previous fiscal year are reasonably firm, the figures for the current year and for the coming fiscal year (based on the Main Estimates) may change because of changes initiated by departmental managers or by Treasury Board. Expenditure additions and deletions are monitored by Program Review and Assessement Division (Government Branch, MOSST) but resource allocation data are treated as confidential until supplementary estimates are tabled in the House, which may take up to ten months or more.

NOTES:

1. Total S & T expenditures for 1981/82 are $2,604 million which is $ 483 million higher than in 1980/81. Estimated expenditures for 1982/83 are $ 2,941 million, an increase of $ 337 million (13%) over 1981/82 or a 39% increase for the two year period. Greater increases occur for R & D in the natural sciences with an estimated expenditure in 1982/83 of $ 1,784 million, a $ 250 million (16%) increase over 1981/82. The two year increase for R & D is 44%.

2. Section 2 provides details of federal spending in universities, in industry, in the foreign sector and in the provincial sector for 1980/81, 1881/82 and 1982/83. Expenditures for R & D in industry (grants and contracts) are estimated for 1982/83 at $ 394 million, a 15% increase over 1981/82 which is forecast to be 42% higher than 1980/81. Expenditures on university research for the three granting councils are estimated to be $ 397 million for 1982/83, a 14% increase over 1981/82 which was 21% higher than 1980/81.
Payments to provinces are estimated to increase to $ 80 million, a 27% increase from 1981/82.

3. Section 3 provides figures for science spending and person-years by departments and by selected application area.
The largest concentration of federal S & T expenditures are for energy ($ 383 million, 13%), food ($ 263 million 9%), health ($ 212 million, 7%), scientific and technological information ($196 million, 7%), natural resources ($ 177 million, 6%) and national security ($ 148 million, 5%).

4. Section 4 gives a breakdown of FSE by region based on figures relating to 1979/80 extramural expenditures. The NCR appears to have received proportionately more than its share based on the corresponding percentage of population 8.3 % of the expenditures compared to 3.1 % of the population.
However, a more reasonable balance exists in terms of some of the other regions, namely Ontario excluding Ottawa (34.1 % vs 33.6 %), Quebec excluding Hull (24.5% vs 25.8%) and the prairies as well as British-Columbia (27.2% vs 27.7%). The Maritimes received a lesser share (5.6% vs 9.4%).

   Based on figures which include regional federal intramural as well as extramural expenditures, the following distribution indicates a greater imbalance of statistics in favor of the NCR (30.9% vs 3.1%). Ontario's share (excludind Ottawa) is 22.8% vs 33.6% ; Quebec excluding Hull (12.6% vs 25.8%); the Maritimes (9.8% vs 9.4%) and the Prairies and British-Columbia (23.6% vs 27.7%)

FEDERAL EXPENDITURES ON SCIENTIFIC ACTIVITY BY PERFORMER

PERFORMER	1978-79		1979-80		1980-81		1981-82		1982-83	
	$M	%	$M	%	$M	%	$M	%	$M	%
TOTAL	1,809.0	100	1,891.8	100	2,121.3	100	2,604.5	100	2,941.4	100
INTRAMURAL	1,188.3	66	1,202.2	64	1,351.0	64	1,618.4	62	1,808.7	61
EXTRAMURAL	620.8	34	689.6	36	770.3	36	986.1	38	1,132.7	39
-IND.	254.3	14	273.4	14	306.1	14	417.1	16	482.9	16
-UNIV.	244.9	14	256.1	14	320.0	15	390.3	15	441.2	15
-PNP	27.4	1	25.7	1	22.5	1	27.0	1	31.2	1
-PROV. & MUN. GOVT.	29.6	2	68.8	4	46.6	2	62.7	2	80.0	3
-OTHER CAN.	17.6	1	16.1	1	17.6	1	21.6	1	22.5	1
-FOREIGN	47.0	3	49.5	3	57.5	3	67.5	3	75.1	3

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

R&D & RSA EXPENDITURES IN THE NATURAL SCIENCES BY PERFORMING SECTOR

	1978-79		1979-80		1980-81		1981-82		1982-83	
	$M	%	$M	%	$M	%	$M	%	$M	%
TOTAL NATURAL SCIENCES	1,397.8	-	1,494.5	-	1,677.6	-	2,025.3	-	2,362.5	-
R&D EXPEND. (TOTAL)	1,011.2	100	1,100.3	100	1,240.0	100	1,533.9	100	1,784.3	100
INTRAMURAL	583.4	58	587.8	53	665.3	54	771.2	50	912.8	51
EXTRAMURAL	427.8	42	512.5	47	574.7	46	762.7	50	871.5	49
-IND	181.8	18	213.4	19	237.2	19	337.3	22	389.4	22
-UNIV	190.3	19	200.6	18	254.1	20	312.6	20	351.2	20
-PNP	8.3	1	8.9	1	8.6	1	11.8	1	15.3	1
-PROV. & MUN. GOVT.	13.8	1	53.8	5	31.7	3	45.9	3	55.7	3
-OTHER CAN.	4.3	0	4.3	0	4.3	0	8.0	1	8.7	0
-FOREIGN	29.3	3	31.7	3	38.8	3	47.0	3	51.3	3
RSA EXPEND. (TOTAL)	386.6	100	394.2	100	437.6	100	491.4	100	578.2	100
INTRAMURAL	296.1	77	313.4	79	342.1	78	381.6	78	448.0	77
EXTRAMURAL	90.4	23	80.8	21	95.5	22	109.8	22	130.2	23
-IND.	58.0	15	45.8	12	55.4	13	63.2	13	74.7	13
-UNIV.	13.7	4	15.0	4	19.9	5	25.4	5	28.3	5
-PNP	2.5	1	2.6	1	3.2	1	3.3	1	3.6	1
-PROV. & MUN. GOVT.	7.5	2	7.4	2	7.4	2	8.4	2	13.9	2
-OTHER CAN.	6.3	2	7.2	2	6.3	1	5.6	1	5.4	1
-FOREIGN	2.4	1	2.8	1	3.2	1	4.0	1	4.4	1

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

R&D & RSA EXPENDITURES IN THE HUMAN SCIENCES BY PERFORMING SECTOR

	1978-79		1979-80		1980-81		1981-82		1982-83	
	$M	%	$M	%	$M	%	$M	%	$M	%
TOTAL HUMAN SCIENCES	411.3	-	397.3	-	443.7	-	579.2	-	578.9	-
R&D EXPEND. (TOTAL)	100.3	100	90.7	100	95.1	100	109.5	100	130.4	100
INTRAMURAL	42.2	42	36.4	40	39.8	42	47.2	43	55.3	42
EXTRAMURAL (TOTAL)	58.1	58	54.3	60	55.3	58	62.3	57	75.1	58
-IND.	4.9	5	4.7	5	3.3	3	4.6	4	5.0	4
-UNIV.	26.0	26	26.9	30	30.5	32	34.6	32	42.4	33
-OTHERS	27.2	27	22.8	25	21.5	23	23.1	21	27.7	21
RSA EXPEND. (TOTAL)	311.1	100	306.6	100	348.6	100	469.7	100	448.5	100
INTRAMURAL	266.6	86	264.7	86	303.7	87	418.3	89	392.5	88
EXTRAMURAL (TOTAL)	44.5	14	41.8	14	44.9	13	51.4	11	56.0	12
-IND.	9.6	3	9.6	3	10.2	3	12.0	3	13.9	3
-UNIV.	14.9	5	13.6	4	15.5	4	17.7	4	19.3	4
-OTHERS	20.0	6	18.6	7	19.2	6	21.7	4	22.7	5

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

FEDERAL SCIENCE EXPENDITURES IN INDUSTRY
(MILLIONS OF DOLLARS)

	1980-81	1981-82	1982-83
TOTAL PAYMENTS TO INDUSTRY	306.1	417.1	482.9
R&D GRANTS AND CONTRACTS (TOTAL)	240.5	341.9	394.3
NATURAL SCIENCES (TOTAL)	237.2	337.3	389.3
R&D CONTRACTS (TOTAL)	100.2	139.3	167.6
-COMM.	7.0	10.4	6.2
-EMR	4.9	10.8	14.4
-AECL	7.7	11.2	12.2
-ENV	9.6	10.5	9.9
-F&O	3.4	5.2	7.1
-DND	23.0	29.7	47.1
-NRC	23.9	38.6	40.1
-DSS (UNSOLICITED PROPOSAL)	10.6	10.7	10.7
-TRANSPORT	3.2	5.8	10.8
-OTHERS	6.9	6.4	9.1
R&D GRANTS AND CONTRIBUTIONS (TOTAL)	137.0	198.0	221.7
-COMM	9.2	11.7	2.3
-EMR	16.3	16.3	11.6
-ITC	84.2	128.1	155.9
-NRC	22.1	35.5	45.7
-NSERC (IRF)	1.6	2.8	3.9
-OTHERS	3.6	3.6	2.3
HUMAN SCIENCES (TOTAL)	3.3	4.6	5.0
RSA GRANTS & CONTRACTS (TOTAL)	65.6	75.2	88.6
NATURAL SCIENCES (TOTAL)	55.4	63.2	74.7
-EMR	5.6	6.7	9.9
-AECL	12.6	12.4	14.7
-ENV	1.4	1.6	1.5
-F&O	2.0	3.4	6.2
-CIDA	22.4	24.6	27.1
-TRANSPORT	3.7	4.1	4.1
-OTHERS	7.7	10.4	11.2
HUMAN SCIENCES (TOTAL)	10.2	12.0	13.9

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

FEDERAL SCIENCE EXPENDITURES IN UNIVERSITIES
(MILLIONS OF DOLLARS)

	1980-81	1981-82	1982-83
TOTAL PAYMENT TO UNIVERSITIES	320.0	390.4	441.2
R&D GRANTS & CONT. (TOTAL)	284.6	347.3	393.6
NATURAL SCIENCES (TOTAL)	254.1	312.6	351.2
R&D GRANTS (TOTAL)	232.9	281.7	314.4
-MRC	72.2	88.1	99.3
-NSERC	136.8	164.8	182.5
-NRC	13.5	17.1	21.2
-OTHERS	10.4	11.7	11.4
R&D CONTRACTS	16.1	21.6	24.9
RESEARCH FELLOWSHIPS	5.1	9.3	11.9
HUMAN SCIENCES (TOTAL)	30.5	34.7	42.4
R & D GRANTS (TOTAL)	22.8	26.3	32.9
-SSHRC	18.2	19.7	26.1
-NHW	3.1	3.5	3.4
-OTHERS	1.5	3.1	3.4
R & D CONTRACTS (TOTAL)	1.7	1.8	2.2
RESEARCH FELLOWSHIPS	6.0	6.6	7.3
RSA GRANTS AND CONT. (TOTAL)	35.4	43.1	47.6
NATURAL SCIENCES (TOTAL)	19.9	25.4	28.3
EDUCATION SUPP. (TOTAL)	16.2	20.9	23.4
-MRC	2.0	2.7	3.0
-NSERC	13.4	17.5	19.5
-OTHERS	.8	.7	.9
OTHER RSA (TOTAL)	3.7	4.5	4.9
HUMAN SCIENCES (TOTAL)	15.5	17.7	19.3
EDUCATION SUPPORT (TOTAL)	11.0	12.4	13.5
-SSHRC	7.1	8.0	8.9
-OTHERS	3.9	4.4	4.6
OTHER RSA (TOTAL)	4.5	5.3	5.8

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

BUDGETS OF THE GRANTING COUNCILS

	1982-83			
	NSERC	MRC	SSHRC	TOTAL
GRANTS TO UNIVERSITIES	182.5	99.3	26.1	307.9
FELLOWSHIPS TO INDIVIDUALS IN UNIVERSITIES	7.4	4.5	6.6	18.5
GRANTS TO NON-UNIVERSITIES	31.5	7.1	18.7	57.3
INTERNAL ADMINISTRATION	5.7	2.0	5.3	13.0
TOTAL COUNCIL BUDGET	227.1	112.9	56.7	396.7

SOURCE: MAIN ESTIMATES SCIENCE ADDENDUM 1982

FEDERAL FUNDS FOR UNIVERSITIES

	78-79	79-80	80-81	81-82	82-83
R&D (NS)	190.3	200.6	254.1	312.6	351.2
R&D (HS)	26.0	26.9	30.5	34.6	42.4
RSA (NS)	13.7	15.0	19.9	25.4	28.3
RSA (HS)	14.9	13.6	15.5	17.7	19.3
TOTAL	244.9	256.1	320.0	390.3	441.2

SOURCE: MAIN ESTIMATES SCIENCE ADDENDUM 1982

FEDERAL SCIENCE EXPENDITURES IN THE FOREIGN SECTOR
(MILLIONS OF DOLLARS)

	1980-81	1981-82	1982-83
TOTAL	57.5	67.5	75.1
COMMUNICATIONS	1.6	3.3	0.0
SOCIAL SCIENCES & HUMANITIES RESEARCH COUNCIL	2.6	3.1	3.5
ENERGY MINES AND RESOURCES	1.4	1.3	3.0
CANADIAN INTERNATIONAL DEVELOPMENT AGENCY	9.6	10.8	12.3
INTERNATIONAL DEVELOPMENT RESEARCH CENTRE	26.7	30.4	36.5
NATIONAL DEFENCE	2.8	2.0	2.6
MEDICAL RESEARCH COUNCIL	2.8	3.2	3.6
SCIENCE AND TECHNOLOGY	1.9	2.0	2.4
NATIONAL RESEARCH COUNCIL	2.0	2.2	2.7
NATURAL SCIENCES & ENGINEERING RESEARCH COUNC.	3.2	3.9	4.3
OTHERS	2.9	5.3	4.2

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

FEDERAL SCIENCE EXPENDITURES IN THE PROVINCIAL SECTOR
(MILLIONS OF DOLLARS)

	1980-81	1981-82	1982-83
TOTAL	46.6	62.7	80.0
ENERGY MINES AND RESOURCES	29.8	46.0	56.9
ENVIRONMENT	4.3	4.8	5.1
NATIONAL HEALTH AND WELFARE	2.0	2.4	2.4
REGIONAL ECONOMIC EXPANSION	1.0	1.2	5.8
NATIONAL MUSEUMS	5.9	6.1	6.6
OTHERS	3.6	2.2	3.2

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

FEDERAL S&T EXPENDITURES BY MAJOR FUNDING DEPARTMENT
(MILLION OF DOLLARS)

DEPARTMENT	1978-79	1979-80	1980-81	1981-82	1982-83
TOTAL SCIENCE	1,809.0	1,891.8	2,121.3	2,604.5	2,941.4
TOTAL MAJOR FUNDERS	1,661.2	1,734.2	1,944.0	2,395.9	2,708.0
AGRICULTURE	127.2	143.9	152.4	168.5	196.1
COMMUNICATIONS	62.5	59.2	66.0	82.3	67.5
NLIB	13.1	14.7	17.2	21.6	25.8
NMUS	55.1	50.1	54.0	58.7	61.8
SSHRC	34.6	36.6	42.4	46.6	56.7
ENERGY, MINES & RESOURCES	124.5	162.7	179.1	229.7	280.5
AECL	92.0	88.9	96.8	114.2	132.4
ENVIRONMENT	206.4	220.1	247.2	279.0	334.1
EXTERNAL AFFAIRS	-	-	-	-	-
CIDA	35.6	37.4	36.5	40.4	45.0
IDRC	36.7	36.5	39.8	46.0	56.6
FISHERIES & OCEANS	122.5	112.7	116.4	130.0	145.8
INDUSTRY, TRADE & COMMERCE	61.4	83.5	97.5	143.5	173.3
NATIONAL DEFENCE	83.3	87.1	102.6	112.0	139.6
NATIONAL HEALTH & WELFARE	58.2	58.0	63.8	72.6	80.9
MRC	64.2	70.1	82.0	100.2	112.9
SCIENCE & TECHNOLOGY	-	-	-	-	-
NRC	197.2	201.4	226.1	297.4	360.7
NSERC	111.9	121.4	162.9	201.8	227.1
SUPPLY AND SERVICES	-	-	-	-	-
SC	133.3	122.2	144.1	230.0	187.2
TRANSPORT CANADA	42.1	27.7	17.2	21.4	24.0
MINOR FUNDERS	147.8	157.6	177.3	208.6	233.4

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

PERCENTAGE DISTRIBUTION OF FEDERAL S&T EXPENDITURES BY DEPARTMENT

DEPARTMENT	1970-71		1982-83	
	S&T %	R&D (NS) %	S&T %	R&D (NS) %
AGRICULTURE	8.8	11.0	6.7	10.4
AECL	13.5	14.5	4.5	6.2
COMMUNICATIONS	1.5	1.9	2.3	3.4
EM&R	7.7	6.1	9.5	11.9
ENVIRONMENT	20.2	12.4	11.4	6.7
IT&C	9.7	12.6	5.9	9.3
NRC	8.5	8.0	12.3	17.5
DND	7.8	9.7	4.7	7.6
NH&W	2.8	3.4	2.8	1.3
TRANSPORT	1.6	0.3	0.8	0.9
NSERC	9.3	11.5	7.7	11.3
MRC	4.6	5.7	3.8	6.1
OTHERS	4.1	3.0	27.6	7.4
TOTAL	100.0	100.0	100.0	100.0

SOURCE: PRA DIVISION

PERSON-YEARS DEVOTED TO ACTIVITIES IN S&T
(PERSON-YEARS)

DEPARTMENT	1978-79	1979-80	1980-81	1981-82	1982-83
TOTAL SCIENCE	34,035	33,124	33,088	34,953	34,926
TOTAL MAJOR FUNDERS	30,590	29,723	29,855	31,325	30,873
AGRICULTURE	4,168	4,057	4,018	4,179	4,026
COMMUNICATIONS	644	649	670	689	733
NLIB	494	500	500	517	526
NMUS	1,026	1,013	1,006	975	1,000
SSHRC	98	105	105	105	105
ENERGY, MINES & RESOURCES	2,458	2,403	2,484	2,467	2,592
AECL	2,363	2,322	2,394	2,512	2,615
ENVIRONMENT	4,989	4,921	4,915	4,924	4,936
EXTERNAL AFFAIRS	-	-	-	-	-
CIDA	56	56	57	57	57
IDRC	217	217	218	239	264
FISHERIES & OCEANS	2,423	2,122	2,143	2,273	2,390
INDUSTRY, TRADE & COMMERCE	170	275	167	167	181
NATIONAL DEFENCE	1,909	1,895	1,870	1,877	1,878
NATIONAL HEALTH & WELFARE	1,099	1,186	1,334	1,398	1,437
MRC	40	40	39	39	39
SCIENCE & TECHNOLOGY	-	-	-	-	-
NRC	3,083	3,160	3,158	3,248	3,341
NSERC	59	61	75	81	98
SUPPLY AND SERVICES	-	-	-	-	-
SC	5,111	4,534	4,619	5,489	4,576
TRANSPORT CANADA	183	207	83	89	79
MINOR FUNDERS	3,618	3,401	3,233	3,628	3,423

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

SUMMARY OF FEDERAL SCIENTIFIC EXPENDITURES IN APPLICATION AREA
(MILLIONS OF DOLLARS)

	1980-81		1981-82		1982-83	
	S&T*	R&D*	S&T	R&D	S&T	R&D
COMMUNICATIONS	46.3	34.8	56.4	44.8	52.2	39.7
DOMESTIC SECURITY	10.0	2.5	14.3	3.3	15.7	2.6
ENERGY	233.7	199.7	306.8	268.5	383.4	338.2
ENVIRONMENTAL ISSUES	57.7	29.8	63.9	34.2	71.9	38.5
FOOD	199.9	164.1	237.4	190.5	263.2	209.0
HEALTH	159.6	117.4	188.7	141.3	212.2	157.8
NATIONAL SECURITY **	109.2	103.5	120.2	112.9	148.3	140.0
NATURAL RESOURCES	129.6	90.5	149.3	107.2	177.2	132.1
OCEANS	57.0	27.4	60.6	29.5	73.4	31.6
SCIENTIFIC AND TECHNICAL INFORMATION ***	143.4	-	166.2	-	196.1	-
SOCIAL DEVELOPMENT	35.2	-	40.1	-	42.6	-
SPACE	59.0	58.4	64.1	63.5	56.6	55.7
TRANSPORTATION	67.5	38.3	73.1	43.5	83.2	53.1

SOURCE: FEDERAL SCIENCE ACTIVITIES, MARCH 1982

* IN THIS AND SUBSEQUENT TABLES IN THIS SECTION ,S&T REFERS TO THE SUM OF R&D AND RSA (RELATED SCIENTIFIC ACTIVITIES) IN BOTH THE NATURAL AND HUMAN SCIENCES, R&D REFERS R&D IN THE NATURAL SCIENCES ONLY.

** 1982/83 S&T EXPENDITURES IN THE AREA OF THE DEPARTMENT OF NATIONAL DEFENCE ALSO CONTRIBUTES DIRECTLY TO ADVANCEMENT IN OTHER AREAS,AS FOLLOWS: COMMUNICATIONS,$4.7 MILLION ; ENERGY,$1.7 MILLION; HEALTH , $6.4 MILLION SPACE, $6.7 MILLION ; TRANSPORTATION, $ 11.3 MILLION.

*** BY DEFINITION, SCIENTIFIC AND TECNICAL INFORMATION IS A RELATED SCIENTIFIC ACTIVITY BUT IS INCLUDED IN THE DISCUSSION OF APPLICATION AREAS BECAUSE OF ITS IMPORTANCE AND OCCURRENCE IN MANY DEPARTMENTS AND AGENCIES

NOTES

1. FEDERAL REGIONAL INTRAMURAL EXPENDITURES ON ACTIVITIES IN THE NATURAL SCIENCES

THE MOST RECENT FINANCIAL YEAR FOR WHICH STATISTICS CANADA REGIONAL DATA ARE AVAILABLE IS 1980/81. IN THAT YEAR THE FEDERAL GOVERNMENT SPENT $59 MILLION IN QUEBEC AND $ 166 MILLION IN ONTARIO; $ 444 MILLION WAS SPENT IN THE NATIONAL CAPITAL REGION (NCR).

$131 M. (79%) OF THE SUM SPENT IN ONTARIO IS ACCOUNTED FOR BY THE REGIONAL ESTABLISHMENT OF ATOMIC ENERGY OF CANADA LTD. (AECL) AND OF THE DEPARTMENT OF THE ENVIRONMENT. DOE SPENT $ 83 M. (50 %) OF ITS INTRAMURAL SPENDING IN ONTARIO AND SPENT $13 MILLION IN QUEBEC (22 % OF THE FEDERAL INTRAMURAL SPENDING IN QUEBEC).

AECL CONDUCTS ITS RESEARCH ACTIVITY ON BEHALF OF ALL CANADIANS AT ITS REGIONAL ESTABLISHMENTS AT CHALK RIVER, ONTARIO AND AT WHITESHELL, MANITOBA, WHICH TOGETHER ACCOUNT FOR ITS TOTAL INTRAMURAL SPENDING.

IN CONTRAST, NRC SPENT 86% OF ITS INTRAMURAL FUNDS IN THE NATIONAL CAPITAL REGION WHERE THE MAJORITY OF ITS FACILITIES ARE LOCATED. THIS IMBALANCE WILL LESSEN AS NRC'S REGIONAL ACTIVITIES DEVELOP.

IT MAY BE NOTED THAT THE SITUATION IN THE DEPARTMENT OF NATIONAL DEFENCE (DND) IS IN CONTRAST. DND SPENT $24 M. IN QUEBEC VERSUS $ 9 M. IN ONTARIO AND $16 M. IN THE NATIONAL CAPITAL REGION.

2. DIFFERENCES BETWEEN DATA GATHERED IN STATISTICS CANADA REGIONAL SURVEYS AND DATA GATHERED IN THE MOSST/TBS/STATS CAN MAIN ESTIMATES SURVEY.

EXPENDITURE DATA COLLECTED BY WAY OF THE MAIN ESTIMATES SCIENCE ADDENDA ILLUSTRATE THE GOVERNMENT'S SPENDING PLANS BY DETAILING AMOUNTS ALLOCATED TO PROGRAMS OF DEPARTMENTS AND AGENCIES. THEY FORECAST THE PROPOSED EXPENDITURES FOR THE PROSPECTIVE FINANCIAL YEAR.

IN THE REGIONAL DATA SURVEYS, DEPARTMENTS REPORT AMOUNTS ACTUALLY SPENT THROUGH THE PROGRAMS IN QUESTION. THUS DISCREPANCIES CAN ARISE BETWEEN THE TWO SURVEYS.

IN ADDITION , STATISTICS CANADA SURVEY THE INDUSTRY SECTOR TO OBTAIN THEIR REPORT OF AMOUNTS SPENT. E.G. ON R&D BY INDUSTRY. THIS IS A SURVEY CARRIED OUT WITH BENEFIT OF HINDSIGHT. HOWEVER, SINCE THE FINANCIAL YEAR FOR COMPANIES RARELY CORRESPONDS WITH THE FEDERAL FISCAL YEAR, ADDITIONAL DISCREPENCIES MAY ARISE FROM THIS CAUSE.

TOTAL EXPENDITURES ON ACTIVITIES IN THE NATURAL SCIENCES
BY REGION AND SECTOR OF PERFORMANCE. 1980/81
(MILLIONS OF DOLLARS AND %)

REGION	FEDERAL GOV'T		CND. INDUSTRY		CND. UNIVERSITIES		OTHER CND. PERFORMERS		TOTAL	
	$	%	$	%	$	%	$	%	$	%
ATLANTIC	112	(11)	23	(9)	19	(7)	7	(12)	161	(10)
QUEBEC EX. HULL	59	(6)	64	(24)	61	(23)	5	(8)	189	(12)
ONTARIO EX. OTTA.	166	(17)	98	(37)	95	(35)	9	(15)	368	(23)
NCR	444	(45)	41	(15)	10	(4)	2	(3)	497	(31)
PRAIRIES	135	(14)	15	(6)	44	(16)	29	(49)	224	(14)
B.C.,YUK. & N.W. T.	73	(7)	26	(10)	41	(15)	7	(12)	147	(9)
TOTAL(a)	990	(100)	268	(100)	270	(100)	59	(100)	1,586	(100)

SOURCE : STATISTICS CANADA, SCIENCE STATISTICS CENTER

(a) DUE TO ROUNDING, TOTALS MAY NOT ADD TO THE SUM OF THEIR COMPONENTS

INTRAMURAL EXPENDITURES ON ACTIVITIES IN THE NATURAL SCIENCES
BY REGION AND SELECTED DEPARTMENTS, 1980-81
(MILLIONS OF DOLLARS AND %)

REGION	AGRIC.		AECL		EMR		ENV.		F&O		NHW		DND		NRC		OTHERS		TOTAL	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
ATLANTIC	18	(13)	_	_	6	(5)	15	(8)	60	(54)	_	_	8	(11)	4	(3)	-	-	112	(11)
QUEBEC	12	(9)	_	_	_	_	13	(7)	3	(3)	1	(3)	24	(33)	4	(3)	2	(2)	59	(6)
ONTARIO	12	(9)	48	(64)	1	(1)	83	(45)	10	(9)	2	(6)	9	(13)	1	(1)	_	_	166	(17)
NCR	46	(33)	_	_	91	(83)	18	(10)	6	(5)	26	(81)	16	(22)	138	(86)	102	(98)	444	(45)
PRAIRIES	42	(30)	27	(36)	9	(8)	35	(19)	6	(5)	1	(3)	9	(13)	7	(4)	_	_	135	(14)
B.C.,YUK. & N.W. T.	10	(7)	_	_	3	(3)	22	(12)	26	(23)	1	(3)	6	(8)	4	(3)	_	_	73	(7)
TOTAL(a)	140	(100)	75	(100)	110	(100)	186	(100)	111	(100)	32	(100)	72	(100)	160	(100)	104	(100)	990	(100)

SOURCE: STATISTICS CANADA,SCIENCE STATISTIC CENTER

(a) DUE TO ROUNDING, TOTALS MAY NOT ADD TO THE SUM OF THEIR COMPONENTS

PERSONNEL ENGAGED IN ACTIVITIES IN THE NATURAL SCIENCES
BY REGION AND SELECTED DEPARTMENTS, 1980-81
(PERSON YEARS AND %)

REGION	AGRIC.		AECL		EMR		ENV.		F&O		NHW		DND		NRC		OTHERS		TOTAL	
	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%	P-Y	%
ATLANTIC	417	(11)	_	_	101	(4)	460	(10)	992	(45)	15	(2)	210	(11)	86	(3)	-	-	2,281	(10)
QUEBEC	339	(9)	_	_	_	_	357	(8)	40	(2)	51	(6)	626	(34)	39	(1)	48	(3)	1,500	(7)
ONTARIO	345	(9)	1,661	(70)	25	(1)	1,761	(40)	214	(10)	77	(8)	245	(13)	40	(1)	_	_	4,368	(19)
NCR	1,332	(34)	_	_	1,859	(83)	383	(9)	270	(12)	721	(79)	468	(25)	2,755	(88)	1,866	(98)	9,654	(42)
PRAIRIES	1,212	(31)	711	(30)	188	(8)	904	(21)	145	(7)	25	(3)	177	(9)	118	(4)	_	_	3,480	(15)
B.C.,YUK. & N.W. T.	287	(7)	_	_	72	(3)	518	(12)	521	(24)	25	(3)	139	(7)	97	(3)	2	(-)	1,661	(7)
TOTAL(a)	3,392	(100)	2,372	(100)	2,245	(100)	4,383	(100)	2,182	(100)	914	(100)	1,865	(100)	3,135	(100)	1,916	(100)	22,944	(100)

SOURCE: STATISTICS CANADA,SCIENCE STATISTIC CENTER

(a) DUE TO ROUNDING, TOTALS MAY NOT ADD TO THE SUM OF THEIR COMPONENTS

EXPENDITURES IN R&D IN THE NATURAL SCIENCES,
BY REGION AND SECTOR OF PERFORMANCE, 1980-81
(MILLIONS OF DOLLARS AND %)

REGION	FEDERAL GOV'T		CND. INDUSTRY		CND. UNIVERSITIES		OTHER CND. PERFORMERS		TOTAL	
	$	%	$	%	$	%	$	%	$	%
ATLANTIC	69	(11)	9	(4)	17	(7)	4	(10)	99	(8)
QUEBEC	47	(7)	51	(23)	57	(23)	3	(7)	155	(13)
ONTARIO	95	(14)	93	(42)	88	(35)	5	(12)	281	(24)
NCR	311	(48)	35	(16)	9	(4)	1	(2)	356	(30)
PRAIRIES	96	(14)	15	(7)	40	(16)	26	(62)	177	(15)
B.C.,YUK. N.W. TER.	38	(6)	19	(9)	39	(16)	2	(5)	98	(8)
TOTAL(a)	653	(100)	222	(100)	251	(100)	42	(100)	1,168	(100)

SOURCE: STATISTICS CANADA, SCIENCE STATISTICS CENTER

(a) DUE TO ROUNDING, TOTALS MAY NOT ADD TO THE SUM OF THEIR COMPONENTS.

REGIONAL DISTRIBUTION OF 1980-81 FEDERAL SPENDING ON SELECTED PROGRAMS OF SCIENCE RELATED SUPPORT TO INDUSTRY (MILLIONS OF DOLLARS AND %)

REGION	NRC				ITC				TOTALS	
	IRAP		CONTRACTS INC. PILP		EDP		DIPP			
ATLANTIC	0.7	(3)	1.1	(4)	1.2	(3)	0.4	(1)	3.4	(3)
QUEBEC	4.8	(22)	2.2	(9)	6.0	(14)	24.2	(76)	37.2	(31)
ONTARIO	12.2	(55)	15.2	(62)	23.0	(55)	6.3	(20)	56.7	(47)
NCR	1.2	(5)	2.4	(10)	4.8	(11)	1.0	(3)	9.4	(8)
PRAIRIES	1.3	(6)	2.0	(8)	2.9	(7)	-	-	6.2	(5)
B.C.,YUK. N.W. TER.	2.0	(9)	1.7	(7)	4.3	(10)	-	-	8.0	(7)
TOTALS(1)	22.1	(100)	24.6	(100)	42.1	(100)	31.8	(100)	120.9	(100)

SOURCE : STATISTICS CANADA, SCIENCE STATISTICS CENTER
(1) DUE TO ROUNDING, TOTALS MAY NOT ADD TO THE SUM OF THEIR COMPONENTS

Introduction

National estimates of R&D performed by Canadian universities are prepared annually by Statistics Canada. These estimates are based on a methodology which takes account of known direct funders of R&D (from the surveys of federal and provincial governments, industry and private non-profit organizations) and estimates of the value of the "free-time" intramural research performed by university faculty and paid for through the general operating and capital funds of the universities. There is no direct survey of university R&D and thus no way to verify the actual level of R&D performed or the distribution by field of science. This situation is not unusual, however, and the Canadian practice is typical of estimates prepared for university R&D in other countries.

Tables 1, 2 and 3 of section 1 show the sources of funds for university R&D, 1970-1981, for total, natural sciences and human sciences respectively. As a share of GNP, natural sciences R&D at universities has declined from 0.34% in 1970 to 0.24% in 1981. A decline on a slightly larger scale has occurred in the human sciences as well.

Measured in constant dollars, university R&D in the natural sciences has remained essentially flat, 1970-1981, increasing by 0.5% per year over this period. Human sciences R&D in constant dollars has declined by 0.6% per year in the same period.

Federal funding for natural sciences R&D has declined from 40% of the total in 1970 to 35% in 1981. In contrast, the federal share of human sciences R&D increased from 9% to 12% over this period.

Focussing on direct sponsorship of university R&D (natural and human sciences), Table 1 of section 2 shows the amounts involved and the distribution by funder. The federal share has declined from 4.2% in 1971-72 to 8.5% in 1980-81. Provincial governments and other sources (largely gifts and non-government grants) have increased in importance during the decade, growing at annual rates of 24% and 14% respectively. In comparison, Granting Council direct R&D funding has grown at about 11% per year and other federal department funding at about 2% per year.

The regional distribution of assisted research funds is shown in Table 2 of section 2 . Federal support has declined as a share of the total in all regions, except the Atlantic, over the 1972 to 1981 period, but there are wide variations between regions in the relative importance of federal funding. In the Atlantic provinces, the federal government provides some 88% of direct R&D funds compared to Quebec and Ontario with 52% and 57% respectively.

With respect to federal funding only, Table 3 of section 2 shows the distribution of federal funding of scientific activities (including RSA) by province for 1980-81, the most recent year available for the Statistics Canada -MOSST Regional Data Base-.

Table 1 of section 3 also shows federal funding of scientific activities at universities, but by funder. It is noteworthy that there has been a shift in relative importance from the federal departments to the Granting Councils during the 1970s. The Councils account for 82% of federal university support in 1982-83 compared to 74% in 1970-71.

TOTAL UNIVERSITY R&D BY SOURCE OF FUNDS
(HUMAN AND NATURAL SCIENCES)

SOURCE OF FUNDS

		1970	1975	1977	1978	1979	1980	1981
CURRENT DOLLARS (MIL.)	FEDERAL	125.7	159.2	192.7	216.3	227.5	284.2	308.3
	PROVINCIAL	32.2	44.3	61.1	69.8	70.2	77.3	85.0
	TOTAL GOVT.	157.9	203.5	253.8	286.1	297.7	361.5	393.3
	INDUSTRY	0.7	1.6	1.8	1.8	2.0	2.0	2.0
	PRIVATE NON-PROFIT	9.9	21.2	28.6	30.8	39.2	48.4	53.3
	UNIVERSITIES	239.3	368.0	450.9	486.6	540.6	556.3	617.2
	FOREIGN	0.6	3.8	5.8	6.2	7.4	7.4	7.4
	TOTAL	408.4	598.1	740.9	811.5	881.9	975.6	1,073.2
PER CENT DISTRIBUTION	FEDERAL	30.8	26.6	26.0	26.7	25.7	29.1	28.7
	PROVINCIAL	7.9	7.4	8.2	8.6	7.9	7.9	7.9
	TOTAL GOVT.	38.7	34.0	34.3	35.3	33.6	37.1	36.6
	INDUSTRY	0.2	0.3	0.2	0.2	0.2	0.2	0.2
	PRIVATE NON-PROFIT	2.4	3.7	3.9	3.8	4.4	5.0	0.5
	UNIVERSITIES	58.6	61.4	60.9	60.0	61.0	57.0	57.5
	FOREIGN	0.1	0.6	0.8	0.8	0.7	0.8	0.7
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: SCIENCE STATISTICS CENTRE, STATISTICS CANADA, R&D IN THE HIGHER EDUCATION SECTOR 1981 ESTIMATES, MIMEOGRAPHED NOTE, NOV 1981.

NATURAL SCIENCES UNIVERSITY R&D BY SOURCE OF FUNDS

SOURCE OF FUNDS

		1970	1975	1977	1978	1979	1980	1981
CURRENT DOLLARS (MIL.)	FEDERAL	115.9	139.6	171.1	190.3	200.6	253.6	274.3
	PROVINCIAL	24.8	30.9	42.8	48.9	49.2	54.2	59.6
	TOTAL GOVT.	140.7	170.5	213.9	239.2	249.8	307.8	333.9
	INDUSTRY	0.6	1.4	1.6	1.6	1.8	1.8	1.8
	PRIVATE NON-PROFIT	9.8	20.8	28.0	30.1	38.0	46.6	51.3
	UNIVERSITIES	141.3	235.1	284.9	310.5	348.4	346.3	386.5
	FOREIGN	0.6	3.8	5.8	6.2	7.4	7.4	7.4
	TOTAL	293.0	431.6	534.2	587.6	645.4	709.9	780.9
PER CENT DISTRIBUTION	FEDERAL	39.6	32.3	32.0	32.4	31.1	35.7	35.1
	PROVINCIAL	8.5	7.2	8.0	8.3	7.6	7.6	7.6
	TOTAL GOVT.	48.0	39.5	40.0	40.7	38.7	43.4	42.8
	INDUSTRY	0.2	0.3	0.3	0.3	0.3	0.3	0.2
	PRIVATE NON-PROFIT	3.3	4.8	5.2	5.1	5.9	6.6	6.6
	UNIVERSITIES	48.2	54.5	53.3	52.8	54.0	48.8	49.9
	FOREIGN	0.2	0.9	1.1	1.1	1.1	1.0	0.9
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: SCIENCE STATISTICS CENTRE, STATISTICS CANADA, R&D IN THE HIGHER EDUCATION SECTOR - 1981 ESTIMATES, MIMEOGRAPHED NOTE, NOV 1981.

HUMAN SCIENCES UNIVERSITY R&D BY SOURCE OF FUNDS

SOURCE OF FUNDS

		1970	1975	1977	1978	1979	1980	1981
CURRENT DOLLARS (MIL.)	FEDERAL	9.8	19.6	21.6	26.0	26.9	30.6	34.0
	PROVINCIAL	7.4	13.4	18.3	20.9	21.0	23.1	25.4
	TOTAL GOVT.	17.2	33.0	39.9	46.9	47.9	53.7	59.4
	INDUSTRY	0.1	0.2	0.2	0.2	0.2	0.2	0.2
	PRIVATE NON-PROFIT	0.1	0.4	0.6	0.7	1.2	1.8	2.0
	UNIVERSITIES	98.0	132.9	166.0	176.1	192.2	210.0	230.7
	FOREIGN	-	-	-	-	-	-	-
	TOTAL	115.4	166.5	206.7	223.9	241.5	265.7	292.3
PER CENT DISTRIBUTION	FEDERAL	8.5	11.8	10.4	11.6	11.1	11.5	11.6
	PROVINCIAL	6.4	8.0	8.9	9.3	8.7	8.7	8.7
	TOTAL GOVT.	14.9	19.8	19.3	20.9	19.8	20.2	20.3
	INDUSTRY	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	PRIVATE NON-PROFIT	0.1	0.2	0.3	0.3	0.5	0.7	0.7
	UNIVERSITIES	84.9	79.8	80.3	78.7	79.6	79.0	78.9
	FOREIGN	-	-	-	-	-	-	-
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: SCIENCE STATISTICS CENTRE, STATISTICS CANADA, R&D IN THE HIGHER EDUCATION SECTION - 1981 ESTIMATES, MIMEOGRAPHED NOTE, NOV 1981.

SOURCES OF SPONSORED RESEARCH FUNDS TO CANADIAN UNIVERSITIES
($ MILLIONS)

		FEDERAL GOVERNMENT		OTHER FUNDERS		TOTAL
		RESEARCH COUNCILS	DEPART-MENTS	PROVINCIAL GOVERNMENTS	OTHER SOURCES	
FUNDS PROVIDED	1971-72	95.1	38.5	12.2	34.2	180.0
	1972-73	98.4	36.5	18.6	37.5	191.0
	1973-74	104.7	38.1	26.1	38.9	207.8
	1974-75	109.0	41.6	31.4	51.7	233.7
	1975-76	123.4	35.8	41.4	53.0	253.6
	1976-77	142.1	27.8	48.1	61.7	279.7
	1977-78	150.6	42.1	54.1	72.2	319.0
	1978-79	173.9	42.4	63.2	90.3	369.8
	1979-80	188.3	39.2	67.8	109.2	404.5
	1980-81	237.5	47.1	87.0	115.0	486.6
	1981-82	287.9	59.4	-	-	-
	1982-83	326.3	67.3	-	-	-
PER CENT DISTRIBUTION	1971-72	52.8	21.4	6.8	19.0	100.0
	1972-73	51.5	19.1	9.7	19.6	100.0
	1973-74	50.4	18.3	12.6	18.7	100.0
	1974-75	46.6	17.8	13.4	22.1	100.0
	1975-76	48.7	14.1	16.3	20.9	100.0
	1976-77	50.8	9.9	17.2	22.1	100.0
	1977-78	47.2	13.2	17.0	22.6	100.0
	1978-79	47.0	11.5	17.1	24.4	100.0
	1979-80	46.6	9.7	16.8	27.0	100.0
	1980-81	48.8	9.7	17.9	23.6	100.0
	1981-82	-	-	-	-	-
	1982-83	-	-	-	-	-
AVERAGE GROWTH RATE	1972-81	10.7	2.3	24.4	14.4	11.7

SOURCE: MOSST, FEDERAL SCIENCE SURVEY AND CAUBO, UNIVERSITY FINANCIAL STATISTICS.

(a) NOTE: TRIUMF PAYMENTS INCLUDED IN FEDERAL DEPARTMENTS.

(b) (-) INDICATES DATA NOT AVAILABLE.

REGIONAL DISTRIBUTION OF SPONSORD R & D FUNDS
($ MILLIONS)

		ATLANTIC				QUEBEC				ONTARIO				WEST			
		FED.	PROV.	OTHER.	TOTAL	FED.	PROV.	OTHER	TOTAL	FED.	PROV.	OTHER	TOTAL	FED.	PROV.	OTHER	TOTAL
$ MILLIONS	1972	7.0	0.3	1.4	8.7	28.6	6.2	8.4	43.2	48.4	4.1	18.4	70.9	33.5	3.3	7.5	44.4
	1973	6.6	1.1	1.6	9.4	31.8	9.0	6.5	47.3	48.1	4.5	21.2	73.8	34.2	4.2	8.2	46.6
	1974	7.5	0.9	1.9	10.4	34.4	9.1	10.3	53.8	49.2	11.9	16.9	78.0	36.9	4.2	9.8	50.8
	1975	8.5	0.5	3.1	12.1	37.1	10.7	11.7	59.4	56.6	13.8	24.2	94.6	39.3	6.5	12.8	58.6
	1976	12.0	0.4	1.9	14.3	41.9	14.2	12.4	68.5	58.0	17.2	26.1	101.4	43.0	9.7	12.6	65.3
	1977	13.6	0.7	1.7	15.9	40.8	17.1	15.3	73.2	63.1	19.3	30.0	112.5	46.6	11.0	14.7	72.3
	1978	15.8	0.9	2.8	19.4	47.1	17.9	22.2	87.2	75.4	23.4	29.3	128.1	52.3	11.9	17.9	82.1
	1979	20.9	0.6	2.8	24.3	51.4	19.8	22.9	94.1	76.4	28.4	41.7	146.5	59.9	14.4	22.9	97.2
	1980	23.9	0.9	4.2	29.1	55.5	21.7	26.3	103.5	91.9	29.0	48.8	169.7	62.7	16.2	29.8	108.7
	1981	34.7	1.0	3.8	39.6	62.7	26.7	31.1	120.5	112.5	30.4	54.8	197.7	76.5	28.9	25.3	130.7
% DISTRIBUTION	1972	81.1	2.9	16.0	100.0	66.2	14.4	19.4	100.0	68.3	5.7	26.0	100.0	75.5	7.5	17.0	100.0
	1973	71.0	11.9	17.1	100.0	67.2	19.0	13.8	100.0	65.2	6.1	28.8	100.0	73.5	8.9	17.6	100.0
	1974	72.8	8.8	18.4	100.0	64.0	17.0	19.1	100.0	63.0	15.3	21.7	100.0	72.5	8.2	19.3	100.0
	1975	70.7	3.9	25.4	100.0	62.5	17.9	19.6	100.0	59.9	14.6	25.6	100.0	67.0	11.2	21.8	100.0
	1976	83.9	2.6	13.4	100.0	61.2	20.7	18.1	100.0	57.3	17.0	25.8	100.0	65.9	14.8	19.3	100.0
	1977	85.1	4.1	10.8	100.0	55.8	23.4	20.8	100.0	56.1	17.2	26.7	100.0	64.4	15.2	20.3	100.0
	1978	81.0	4.7	14.2	100.0	54.0	20.6	25.5	100.0	58.9	18.2	22.9	100.0	63.7	14.5	21.8	100.0
	1979	85.9	2.4	11.7	100.0	54.6	21.0	24.3	100.0	52.1	19.4	28.5	100.0	61.6	14.8	23.5	100.0
	1980	82.2	3.2	14.6	100.0	53.6	21.0	25.4	100.0	54.2	17.1	28.8	100.0	57.7	14.9	27.5	100.0
	1981	87.8	2.6	9.6	100.0	52.0	22.2	25.8	100.0	56.9	15.4	27.7	100.0	58.5	22.1	19.4	100.0

SOURCE: CAUBO, UNIVERSITY FINANCIAL STATISTICS

(a) NOTE: CAUBO DATA MAY DIFFER IN THE TOTAL NUMBER OF INSTITUTIONS REPORTING EACH YEAR. FEDERAL FUNDS DIFFER FROM FEDERAL SURVEY DATA DUE TO FISCAL YEAR DIFFERENCES AND THE TIMING OF THE RECEIPT OF FUNDS.

REGIONAL DISTRIBUTION OF FEDERAL UNIVERSITY FUNDS
1980-81

TOTAL SCIENTIFIC ACTIVITIES

	$ MILLIONS					% DISTRIBUTION				
	MRC	NSERC	SSHRC	OTHER	TOTAL	MRC	NSERC	SSHRC	OTHER	TOTAL
NEWFOUNDLAND	1.3	2.8	0.4	0.8	5.3	1.7	1.8	1.2	1.5	1.7
P.E.I.	-	0.1	0.1	-	0.2	-	0.1	0.3	-	0.1
NOVA SCOTIA	2.7	5.9	0.9	2.1	11.5	3.5	3.9	2.8	4.0	3.7
NEW BRUNSWICK	0.0	3.2	0.2	0.8	4.2	0.0	2.1	0.7	1.5	1.3
QUEBEC	25.0	30.3	5.6	9.3	70.1	32.3	19.9	17.5	17.9	22.4
ONTARIO	27.4	58.2	10.1	11.9	107.7	35.5	38.2	31.6	22.9	34.3
MANITOBA	5.1	6.2	0.4	2.6	14.3	6.6	4.1	1.3	5.1	4.6
SASKATCHEWAN	2.0	5.7	0.3	1.2	9.1	2.6	3.7	1.0	2.3	2.9
ALBERTA	6.5	14.0	0.9	1.9	23.3	8.5	9.2	3.0	3.6	7.4
B.C.	5.1	19.4	2.3	17.2	44.0	6.6	12.8	7.2	33.0	14.0
NAT. CAP. REGION	1.9	6.5	1.4	2.4	12.2	2.5	4.3	4.3	4.6	3.9
UNALLOCATED	0.3	0.1	9.3	1.9	11.6	0.4	0.1	29.2	3.7	3.7
TOTAL	77.3	152.3	31.9	52.1	313.6	100.0	100.0	100.0	100.0	100.0

SOURCE: SCIENCE ADDENDA, REGIONAL DATA BASE, 1980-81.

(a) NOTE: REGIONAL DATA BASE MAY DIFFER SLIGHTLY FROM THE MAIN ESTIMATES DATA BASE.

FEDERAL EXPENDITURES ON SCIENTIFIC ACTIVITIES
AT CANADIAN UNIVERSITIES

		1970-71	1979-80	1980-81	1981-82	1982-83
EXPENDITURES (MILL. $)	TOTAL	142.4	256.1	320.0	390.3	441.2
	. FEDERAL DEPARTMENTS (*)	37.1	49.0	56.9	71.0	79.5
	. RESEARCH COUNCILS	105.4	207.1	263.1	319.3	361.7
	. SSHRC	13.7	28.1	33.3	36.6	45.1
	. NSERC	61.7	113.1	152.3	187.7	209.5
	. MRC	30.0	65.9	77.5	95.0	107.1
PER CENT DISTRIBUTION	TOTAL	100.0	100.0	100.0	100.0	100.0
	. FEDERAL DEPARTMENTS (*)	26.1	19.1	17.8	18.2	18.0
	. RESEARCH COUNCILS	74.0	80.9	82.2	81.8	82.0
	. SSHRC	9.6	11.0	10.4	9.4	10.2
	. NSERC	43.3	44.2	47.6	48.1	47.5
	. MRC	21.1	25.7	24.2	24.3	24.3

SOURCE: MOSST, FEDERAL SCIENCE EXPENDITURES AND PERSONNEL, 1970-71 TO 1982-83

(a) * Includes TRIUMF expenditures.

GRANTING COUNCIL BUDGETS
($ MILLIONS)

	MRC		NSERC		SSHRC		TOTAL	
	($)	(% INCR.)	($)	(% INCR.)	($)	(% INCR.)	($)	(% INCR.)
1976-77	51.9	-	87.6	-	28.9	-	168.4	-
1977-78	57.9	11.6	99.3	13.4	30.2	4.5	187.4	11.3
1978-79	64.2	10.9	111.7	12.5	33.7	11.6	209.6	11.8
1979-80	70.1	9.2	121.0	8.3	35.9	6.5	227.0	8.3
1980-81	82.0	17.0	162.6	34.4	41.7	16.2	286.3	26.1
1981-82	100.2	22.2	201.5	23.9	46.6	11.8	348.3	21.7
1982-83	113.0	12.8	226.5	12.4	56.8	21.9	396.3	13.8

SOURCE: MAIN ESTIMATES (BLUE BOOK) AND COUNCIL ANNUAL REPORTS.

COUNCIL PROGRAM BUDGETS IN CURRENT AND CONSTANT DOLLARS
(BUDGETS EXCLUDE ADMINISTRATION)

	NSERC		MRC		SSHRC		TOTAL	
	$ CURRENT	$ 1971	$ CURRENT	$ 1971	$ CURRENT	$ 1971	$ CURRENT	$ 1971
1970-71	65.8	67.9	34.0	35.1	18.2	18.8	118.0	121.8
1971-72	67.5	67.5	35.6	35.6	18.1	18.1	121.2	121.2
1972-73	66.5	63.3	37.5	35.7	18.6	17.7	122.6	116.8
1973-74	68.6	59.9	40.4	35.3	20.3	17.7	129.3	112.8
1974-75	69.3	52.5	42.9	32.5	21.8	16.5	134.0	101.4
1975-76	79.0	54.0	47.4	32.4	24.7	16.9	151.1	103.3
1976-77	86.1	53.7	50.8	31.7	27.2	17.0	164.1	102.4
1977-78	97.7	57.0	56.7	33.1	28.5	16.6	182.9	106.7
1978-79	109.7	60.1	63.0	34.5	30.4	16.7	203.1	111.3
1979-80	118.4	58.8	68.7	34.1	32.3	16.0	219.4	109.0
1980-81	158.9	71.4	80.5	36.1	37.8	17.0	277.1	124.4
1981-82	197.0	81.0	98.4	40.4	42.2	17.3	337.8	138.8
1982-83	220.8	82.7	110.9	41.6	51.4	19.3	383.1	143.5

SOURCE: TABLE 2 SECTION 3.

MRC PROGRAM BUDGETS
($ THOUSANDS)

	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80	80-81
CAPACITY											
Research grants	22,479	23,568	23,837	26,242	27,333	30,318	32,841	39,123	43,179	46,315	55,321
DEVELOPMENT											
Regional schools	1,230	853	988	762	957	1,003	1,245	1,105	1,522	2,100	1,875
General research grants	1,215	815	820	820	624	624	703	703	703	820	820
Areas of national concern	-	-	-	-	-	-	-	-	573	605	609
COLLABORATION:											
Groups	544	941	1,941	2,499	3,626	4,002	4,937	3,923	5,070	4,269	5,399
Program grants	-	-	-	-	-	-	472	1,016	962	1,815	2,109
Workshops	-	-	47	49	24	37	7	14	2	14	34
Visiting professorships	-	11	14	11	10	10	15	14	22	18	19
France/Canada Exchanges	-	-	-	-	-	-	-	-	8	34	43
FACILITIES & SPECIAL OPPORTUNITIES											
Special projects	264	460	511	423	615	664	565	302	260	371	379
Visiting scientists	202	145	163	206	89	83	-	39	65	73	85
President's fund	-	-	-	-	-	-	-	38	25	37	79
Travel grants	15	10	20	15	11	19	18	40	24	22	24
Activities	127	255	123	112	145	157	157	173	173	182	205
MANPOWER											
Career investigators	1,661	1,674	1,723	1,871	1,951	2,215	2,338	2,399	2,479	2,645	2,669
Scholarships	1,776	2,016	2,175	2,372	2,351	2,634	2,486	2,400	2,302	2,612	2,947
Research professorships	-	-	-	-	-	-	-	37	45	9	32
Centennial fellowships	261	274	310	253	311	304	276	246	239	424	402
Fellowships	2,895	3,135	3,463	3,400	3,621	4,099	3,761	3,742	3,724	4,511	5,308
Training grants	-	-	-	53	65	77	57	60	60	67	78
Studentships	1,033	1,086	1,013	963	919	972	970	1,063	1,166	1,359	1,660
Summer scholarships	260	410	312	308	210	215	-	281	376	374	378
TOTAL	33,962	35,653	37,460	40,359	42,862	47,433	50,848	56,718	63,002	68,676	80,475

SOURCE: MRC ANNUAL REPORTS

NSERC PROGRAM BUDGETS
($ MILLIONS)

	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80	80/81
PEER ADJUDICATED GRANTS											
Individual Operating Grants	39.0	39.3	39.5	40.9	42.1	48.9	52.1	62.3	68.4	73.7	83.0
Group Operating Grants	2.3	2.5	2.5	2.5	2.5	3.0	6.9	3.5	3.2	3.1	3.5
Equipment	3.5	3.5	2.6	3.2	2.4	3.0	2.5	4.9	4.1	4.9	12.9
Major Equipment	1.1	1.2	1.5	1.5	0.4	1.2	1.8	1.1	1.4	1.7	7.0
Travel	-	0.3	0.2	0.3	0.4	0.7	0.4	0.2	0.2	0.2	.2
General Research Grants	2.9	3.0	3.0	2.9	3.5	3.5	3.7	3.9	4.7	5.0	5.9
Univ. Research Fellow.	-	-	-	-	-	-	-	-	-	-	1.0
Phys. & Astronm. Specl.	-	-	-	-	-	-	-	-	-	-	0.4
DEVELOPMENTAL GRANTS											
Negotiated Development	3.9	3.8	4.0	4.1	3.7	4.0	3.6	3.1	2.9	0.1	0.5
Strategic Grants	-	-	-	-	-	-	-	2.3	7.4	10.7	17.8
PRAI & Spec. Projects	0.0	0.7	1.1	1.2	1.4	0.8	0.3	0.3	0.5	1.0	1.1
Major Installation	0.3	0.5	0.3	-	0.2	0.1	0.5	0.6	0.9	1.2	1.2
Special CORE Grants	-	-	-	-	-	-	-	-	1.0	1.1	1.2
Forestry & Spec. studies	0.1	0.0	0.1	0.1	0.1	-	0.0	0.2	0.1	0.2	0.1
Regional Development	-	1.0	1.1	1.2	1.6	1.6	1.5	1.9	2.0	1.9	2.1
Spec. Assistance to Small Univ.	-	-	-	0.3	0.3	0.3	0.3	0.3	-	-	-
HIGHLY QUALIFIED MANPOWER TRAINING											
Post-graduate	8.0	7.9	7.0	6.9	7.0	8.3	8.9	9.1	8.9	9.7	13.0
Post-doctoral	1.3	1.5	1.7	2.0	2.1	2.2	2.1	2.4	2.8	2.7	3.2
Senior Level	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	1.3
Undergraduate	-	-	-	-	-	-	-	-	-	-	2.1
NATIONAL &INTERNATIONAL ACTIVITIES											
National	0.8	0.9	0.8	0.9	1.0	1.0	0.8	0.9	0.9	1.0	1.2
International	1.6	1.5	1.1	0.5	0.3	0.3	0.4	0.4	0.2	0.2	0.2
TOTAL	64.8	67.5	66.5	68.6	69.3	79.0	86.1	97.7	109.7	118.4	158.9

SOURCE: NSERC ANNUAL REPORTS

SSHRC PROGRAM BUDGETS
(S THOUSANDS)

	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80	80/81
INDEPENDENT RESEARCH											
Research grants	4,345	3,662	4,171	4,862	5,352	5,696	5,246	6,204	8,273	7,069	8,045
Leave fellowships	1,269	1,712	2,382	2,930	3,267	3,780	3,813	3,995	3,573	4,678	4,279
Negotiated grants	-	-	-	-	-	1,238	3,299	2,202	4,213	4,916	5,629
General research grants	-	-	-	-	289	1,244	1,006	-	1,210	1,292	2,684
Post-doctoral fellowships	-	240	250	270	233	-	-	-	-	-	809
RESERCH CAPACITY:											
Doctoral fellowships	11,316	10,949	8,800	9,125	8,740	8,800	9,736	10,159	9,127	8,344	8,423
M.A. & Leger scholarships	-	-	400	502	573	650	750	703	560	778	822
STRATEGIC PROGRAMS:	-	-	-	-	-	-	-	-	-	1,360	1,876
RESEARCH COMMUNICTIONS:											
Publications	496	745	1,220	1,299	1,785	1,617	1,870	1,945	1,853	2,340	2,502
Learned societies	172	309	467	312	487	559	489	540	614	623	860
Conferences	397	364	470	740	669	517	597	377	633	690	1,092
INTERNATIONAL:	-	-	-	-	-	-	-	-	178	371	615
OTHER:	243	122	418	279	430	572	358	2,355	117	78	120
TOTAL	18,481	18,225	18,996	20,598	22,255	25,245	27,522	30,835	30,468	32,539	37,757

SOURCE: SSHRC ANNUAL REPORTS

ACTIVITIES AT CANADIAN UNIVERSITIES

	(MILLIONS OF CURRENT $)		(CHANGE BASED ON PER CENT PER YEAR)	
	1970-71	1982-83	CURRENT $	CONSTANT $
GRANTING COUNCILS TOTAL	105.4	361.7	10.8	1.9
SSHRC	13.7	45.1	10.4	1.5
NSERC	61.7	209.5	10.7	1.8
MRC	30.0	107.1	11.2	2.2
FEDERAL DEPARTMENTS	37.1	79.5	6.6	-2.1
TOTAL FEDERAL	142.4	441.2	9.9	1.0

SOURCE: TABLE 1 SECTION 3.

GROWTH IN FUNDING OF DIRECT R&D COSTS
AT CANADIAN UNIVERSITIES 1970-71 TO 1979-80

	CHANGE BASED ON	
	CURRENT $	CONSTANT $
FEDERAL SUPPORT (R&D)	8.8	-0.5
PROVINCIAL AND OTHER SUPPORT (R&D)	9.1	-0.1

SOURCE: TABLE 1 SECTION 2.

BUDGETS OF THE GRANTING COUNCILS
($ MILLIONS)

	NSERC			MRC			SSHRC		
	PROGRAM	ADMIN.	TOTAL	PROGRAM	ADMIN.	TOTAL	PROGRAM	ADMIN.	TOTAL
1970-71	65.8	-	65.8	34.0	0.4	34.4	18.2	0.7	18.9
1971-72	67.5	-	67.5	35.6	0.5	36.1	18.1	0.8	18.9
1972-73	66.5	-	66.5	37.5	0.6	38.1	18.6	1.0	19.6
1973-74	68.6	0.9	69.5	40.4	0.7	41.1	20.3	1.5	21.8
1974-75	69.3	1.0	70.3	42.9	1.0	43.9	21.8	1.7	23.5
1975-76	79.0	1.5	80.5	47.4	1.1	48.5	24.7	1.6	26.3
1976-77	86.1	1.5	87.6	50.8	1.1	51.9	27.2	1.7	28.9
1977-78	97.7	1.6	99.3	56.7	1.2	57.9	28.5	1.7	30.2
1978-79	109.7	2.6	111.7	63.0	1.2	64.2	30.4	3.3	33.7
1979-80	118.4	2.3	120.7	68.7	1.4	70.1	32.3	3.6	35.9
1980-81	158.9	3.4	162.3	80.5	1.4	81.9	37.8	3.9	41.7
1981-82	197.0	4.3	201.3	98.4	1.8	100.2	42.2	4.4	45.6
1982-83	220.8	5.7	226.5	110.9	2.0	112.9	51.4	5.3	56.7

SOURCE: MAIN ESTIMATES AND COUNCIL ANNUAL REPORTS.

GRADUATE DEGREES AWARDED
1972 TO 1980

FIELDS OF STUDY

	1972	1973	1974	1975	1976	1977	1978	1979	1980
EDUCATION	1,830	2,074	2,120	2,333	2,511	2,767	14,454	3,023	3,031
HUMANITIES AND FINE ARTS	2,567	2,599	2,384	2,495	2,328	2,442	2,464	2,382	2,163
SOCIAL SCIENCES	3,569	3,850	3,911	4,404	4,669	4,832	4,859	4,834	5,035
AGRICULTURE AND BIOLOGICAL SCIENCES	826	770	723	773	817	894	924	846	878
ENGINEERING AND APPLIED SCIENCES	1,245	1,263	1,197	1,142	1,172	1,295	1,320	1,343	1,249
MATHEMATICS AND PHYSICAL SCIENCES	1,481	1,482	1,299	1,256	1,245	1,310	1,265	1,116	1,101
HEALTH	464	521	458	504	503	541	642	604	701
MULTIDISCIPLINE	0	0	0	0	0	0	0	6	12
TOTAL	11,982	12,559	12,092	12,907	13,245	14,081	14,454	14,154	14,170

SOURCE: STATISTICS CANADA CAT. NOS. 81-204 AND 81-211 1972-1981

FULL-TIME GRADUATE ENROLMENT
1972-73 TO 1980-81

FIELDS OF STUDY	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
EDUCATION	2,547	2,754	2,728	3,194	3,383	3,442	3,434	3,576	3,515
HUMANITIES & FINE ARTS	6,585	6,395	6,855	6,883	7,029	7,332	7,228	7,227	6,973
SOCIAL SCIENCES	9,312	9,910	10,522	11,267	11,658	12,010	12,142	12,156	12,180
AGRICULTURE & BIOLOGICAL SCIENCES	2,206	2,343	2,241	2,633	3,017	2,992	2,886	3,017	3,138
ENGINEERING & APPLIED SCIENCES	3,016	2,891	3,065	3,304	3,214	3,204	3,046	2,956	3,345
MATHEMATICS & PHYSICAL SCIENCES	4,104	3,834	3,729	3,899	3,918	3,653	3,486	3,565	3,435
HEALTH	1,095	1,154	1,301	1,401	1,482	1,541	1,798	1,968	2,056
OTHER	462	259	855	594	164	224	255	106	100
TOTAL	29,327	29,540	31,296	33,175	33,865	34,398	34,275	34,571	34,742

SOURCE: STATISTICS CANADA CAT. NO. 81-204 1972-1980.

Introduction

The major inputs to the innovation process are the financial and human resources allocated to research and developement. In 1981, the share of R&D performed by the Industry sector accounted for almost 50% of Canada's gross expenditures on R&D . The employment of R&D personnel in industry has varied from one-fifth of one per cent to one-quarter of one percent of the total number of persons employed in the economy. The data presented here are selected to reflected the state of science and technology in Canadian industry.

Section 1 consists of data on R&D expenditures at the total industry level and within manufacturing. Information on the sources of funds as well as on regional distribution are included . Section 2 presents data on R&D personnel and its distribution by region. A brief comparison at the international level is available in section 3.

FUNDING OF INDUSTRIAL R&D
(% DISTRIBUTION)

	GOVT			IDY	FOREIGN	TOTAL
	FED	PROV	TOTAL			
1963	16	-	16	80	4	100
1964	17	-	17	77	6	100
1965	18	-	18	73	9	100
1966	16	-	16	77	7	100
1967	14	-	14	81	5	100
1968	14	0	14	81	4	100
1969	14	0	14	82	4	100
1970	15	0	15	80	5	100
1971	16	0	16	78	6	100
1972	16	0	16	78	6	100
1973	16	0	16	77	6	100
1974	14	0	14	81	5	100
1975	12	1	13	81	6	100
1976	12	2	14	80	6	100
1977	11	3	14	80	6	100
1978	10	3	13	83	5	100
1979	8	2	11	83	7	100
1980	9	2	11	83	6	100
1981	9	2	11	84	6	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, DEC 1981.

The industry sector has generally provided between 77% and 84% of the funds for its own R&D. Federal funds accounted for approximately 17% of industrial R&D funds in the mid-1960's but this has declined to 9% in recent years. Foreign sources have remained in the 5%-7% range over the entire period.**

**From Section 2, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

INDUSTRIAL INTRAMURAL R&D EXPENDITURE AND GNP
(PERCENT OF GNP)

	PRIMARY	MANUFACTURING	SERVICES	TOTAL	GNP
1971	0.02	0.43	0.05	0.50	100.0
1973	0.03	0.37	0.05	0.44	100.0
1973	0.02	0.34	0.04	0.40	100.0
1974	0.02	0.35	0.05	0.41	100.0
1975	0.03	0.34	0.05	0.42	100.0
1976	0.02	0.32	0.05	0.39	100.0
1977	0.02	0.32	0.06	0.40	100.0
1978	0.02	0.34	0.07	0.43	100.0
1979	0.04	0.37	0.06	0.47	100.0
1980	0.04	0.40	0.06	0.51	100.0

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, SEPT 1981 AND CANADIAN STATISTICAL REVIEW, JULY 1981.

The ratio of industrial intramural R&D expenditure to GNP declined from about 0.5% in 1971 to 0.39% in 1976 but then picked up again to reach its 1971 level by 1980. Intramural R&D expenditures by both primary and service industries were fairly stable, accounting for less than 0.1% of GNP. The manufacturing industries' total intramural R&D expenditure dropped from 0.43% of GNP in 1971 to 0.32% in 1976 but finished off strongly in the late 1970's to again account for 0.40% of GNP.**

**From Section 3, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

TOTAL INTRAMURAL R&D EXPENDITURE IN 1979
(% DISTRIBUTION BY REGION)

		QUE	ONT	ALTA	B.C.	OTHER(a)	TOTAL
PRIMARY		4	9	44	4	37	100
MFG	CHEMICAL	19	49	29	0	2	100
	WOOD	41	25	0	29	4	100
	METALS	28	63	4	2	2	100
	MACH & TRANSP	47	47	0	2	4	100
	ELECTRICAL	18	79	0	3	2	100
	OTHER	17	75	0	0	0	100
	TOTAL	29	57	9	3	3	100
SERVICES		20	56	7	10	7	100
TOTAL		25	52	12	4	6	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, AUG 1981.

(a) INCLUDES THE YUKON AND NORTH WEST TERRITORIES.

At the total level, Quebec and Ontario accounted for over 77% of total intramural R&D. This pattern holds in both manufacturing and service industries. However, in primary industries, Alberta and the "other" provinces account for over 80%.

Within manufacturing, the only two industries in which Quebec and Ontario did not totally dominate were chemical and wood based industries. In chemical based industries, Alberta was responsible for 29% of total intramural R&D expenditure. As expected, B.C. accounted for a significant share in the wood based industries.**

**From Section 3, 1981 Science Indicators Manual, Policy Research Group, Industry Branch.

INTRAMURAL R&D EXPENDITURE IN MANUFACTURING
(% DISTRIBUTION)

INDUSTRIES(a)	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
FOOD	4	5	4	4	4	5	4	4	4	4	3
RUBBER	1	-	-	1	-	-	1	1	1	1	1
TEXTILES	1	-	-	-	-	1	1	1	1	-	1
WOOD BASED	5	5	5	5	6	6	5	5	5	6	6
PRI MET(FE)*	2	2	-	2	2	-	-	-	2	2	2
PRI MET(NF)*	7	8	7	7	8	9	7	6	6	7	6
MET FAB	2	2	2	2	-	2	2	2	1	1	1
BUS MACH*	5	6	5	5	4	3	3	3	4	4	3
OTHER MACH*	6	6	6	6	7	6	6	5	5	5	4
AIRC & PTS*	9	11	15	11	10	12	14	16	16	14	14
OTHER TRANS*	2	4	-	3	-	3	-	3	4	3	3
OTHER ELECTR*	c	4	6	5	5	5	4	4	4	4	3
COMMUNIC*	34	24	23	24	23	23	22	22	22	23	23
NON-MET MIN	1	1	1	1	-	-	1	-	1	1	1
PETROLEUM	4	5	5	8	8	8	11	12	12	11	17
DRUGS*	4	5	5	5	4	4	4	4	4	4	3
OTHER CHEM*	8	8	8	8	8	8	7	7	6	7	6
SCI INSTR*	1	-	-	-	-	-	-	1	1	1	1
OTHER MFG*	1	-	-	-	-	-	-	-	-	1	1
TOTAL	100	100	100	100	100	100	100	100	100	100	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, SEPT. 1981.

(a) INCLUDES 3-DIGIT (MARKED WITH *) AS WELL AS 2-DIGIT SIC.
(b) ESTIMATED.
(c) INCLUDED IN COMMUNICATIONS EQUIPMENT.

A substantial portion of manufacturing's R&D is performed by four industries: aircraft and parts; communications equipment; petroleum products; and other chemical products. The most noticeable change in shares between 1971 and 1981 has been the increase which occurred in both aircraft and parts and petroleum products.**

**From Section 4, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

FUNDING OF MANUFACTURING'S INTRAMURAL R&D IN 1979
(% DISTRIBUTION BY SOURCE)

INDUSTRIES (a)	CDN REP CO	FED GOVT	OTHER CDN	FOREIGN	TOTAL
FOOD BEV & TOBAC	82.9	11.4	5.7	0.0	100.0
RUBBER & PLASTIC	92.3	7.7	0.0	0.0	100.0
TEXTILES	100.0	0.0	0.0	0.0	100.0
WOOD BASED	58.8	15.7	23.5	2.0	100.0
PRIM MET (FE)*	94.7	5.3	0.0	0.0	100.0
PRIM MET (NON-FE)*	86.7	3.3	0.0	8.3	100.0
METAL FABRIC	76.9	7.7	7.7	0.0	100.0
BUSINESS MACH*	50.0	11.8	0.0	38.2	100.0
OTHER MACHINERY*	83.0	13.2	0.0	3.8	100.0
AIRCR & PARTS*	71.2	17.6	7.2	3.9	100.0
OTHER TRANS EQ*	94.4	5.6	0.0	0.0	100.0
OTHER ELECT PROD*	80.5	14.6	2.4	2.4	100.0
COMMUNICATIONS*	68.8	8.8	16.7	5.6	100.0
NON-MET MINERALS	85.7	0.0	0.0	14.3	100.0
PETROLEUM PROD	69.8	0.0	14.7	14.7	100.0
DRUGS & MEDICINE*	82.1	2.6	0.0	15.4	100.0
OTHER CHEM PROD*	93.3	3.3	1.7	1.7	100.0
SCI & PROF EQUIP*	60.0	30.0	10.0	0.0	100.0
OTHER MFG*	80.0	20.0	0.0	0.0	100.0
TOTAL	75.3	9.2	8.7	6.9	100.0

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, SEPT. 1981.

(a) INCLUDES 3-DIGIT (MARKED WITH *) AS WELL AS 2-DIGIT SIC.

In 1979, federal funds accounted for 10-20% of R&D in the food; wood based; business machines; other machinery; aircraft and parts; other electrical products; and other manufacturing industries. Federal funds were particularly important for the scientific instruments industry (30%). Foreign funds accounted for about 15% of R&D funds in the non-metallic minerals, petroleum products, and pharmaceuticals industries, and almost 40% in business machinery.**

**From Section 4, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

NUMBER OF PERSONS ENGAGED IN R&D
(% DISTRIBUTION)

	PRIMARY	MANUFACTURING	SERVICES	TOTAL
1961	4	91	5	100
1963	5	89	6	100
1965	4	94	2	100
1967	3	93	3	100
1969	3	93	4	100
1971	4	91	6	100
1973	4	87	9	100
1975	4	86	10	100
1977	4	82	14	100
1979	4	83	13	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE AND STC CAT. 71-001.

In terms of the three industry groups, manufacturing has employed over 80% of total R&D personnel but its share has been declining over the years. Manufacturing's share of R&D personnel dropped from a peak of 93.6% in 1965 to 83% in 1979. The service industries, meanwhile, have climbed from a low of 2.3% in 1965 to 13% in 1979. The primary industries' share of R&D personnel has been relatively steady at 4%.**

**From Section 5, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

R&D PERSONNEL AND TOTAL EMPLOYMENT
(PERCENTAGES)

	PRIMARY	MANUFACTURING	SERVICES	TOTAL	TOTAL EMPL
1961	0.009	0.177	0.010	0.195	100.0
1963	0.011	0.197	0.014	0.222	100.0
1965	0.010	0.215	0.005	0.230	100.0
1967	0.008	0.235	0.008	0.251	100.0
1969	0.008	0.227	0.010	0.245	100.0
1971	0.008	0.212	0.013	0.234	100.0
1973	0.009	0.190	0.019	0.218	100.0
1975	0.010	0.199	0.022	0.232	100.0
1977	0.008	0.183	0.032	0.223	100.0
1979	0.010	0.197	0.031	0.237	100.0

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE AND STC CAT. 71-001.

The number of persons engaged in R&D as a percentage of total employed in the economy has not varied a great deal between 1961 and 1979. The number of R&D employees fluctuated from 0.20% to 0.25% of total employment in the economy. Since the late 1960's, however, this stability at the aggregate level has been characterized by a noticeable decline in manufacturing and an accompanying increase in services.**

**From Section 5, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

R&D PERSONNEL IN MANUFACTURING
(% DISTRIBUTION)

	1961	1963	1965	1967	1969	1971	1973	1975	1977	1979
FOOD	3	4	3	3	3	3	4	5	5	5
RUBBER	1	2	2	2	2	1	1	1	2	2
TEXTILE	1	2	2	2	2	1	1	1	1	1
WOOD	7	7	9	8	7	7	6	6	6	6
PRIM MET	8	9	6	7	9	10	11	11	8	8
MET FAB	2	3	2	2	2	1	2	2	2	2
MACHINERY	5	6	4	5	6	7	9	12	11	10
TRANSP	21	12	16	14	14	11	12	12	14	17
ELECTRIC	22	26	27	30	31	33	29	28	29	30
NON-MET MIN	1	2	1	1	1	1	1	1	1	1
PETROLEUM	3	3	4	4	4	4	4	4	4	5
CHEMICAL	19	19	18	17	15	15	15	14	14	12
MISC	4	6	6	5	5	6	5	2	2	2
TOTAL	100	100	100	100	100	100	100	100	100	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE.

The six manufacturing industries with the largest share of R&D expenditures (electrical products, chemical, transportation equipment, primary metals, machinery, and petroleum industries) employed about 80% of total personnel. The remaining 20% of R&D personnel were distributed across all other manufacturing industries. The electrical products industry's share of total R&D personnel increased from 22% in 1961 to 30% in 1979. The only other industry to show a significant increase in the share of R&D personnel was the machinery industry which employed 5% in 1961 and 10% by 1979.**

**From Section 5, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

REGIONAL DISTRIBUTION OF R&D PERSONNEL IN 1979
(% BY REGION)

		QUE	ONT	ALTA	B.C.	OTHER(a)	TOTAL
PRIMARY		17	28	40	12	4	100
MFG	CHEMICAL	28	61	8	1	3	100
	WOOD	44	27	0	26	2	100
	METALS	30	60	5	3	2	100
	MACH & TRANSP	45	47	0	2	6	100
	ELECTRICAL	19	76	0	4	1	100
	OTHER	22	77	1	1	0	100
	TOTAL	31	60	2	4	3	100
SERVICES		24	56	5	7	8	100
TOTAL		29	58	4	4	4	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, AUG 1981.

(a) INCLUDES OTHER REMAINING PROVINCES, YUKON, AND NORTH WEST TERRITORIES.

The employment of R&D personnel is concentrated in Quebec and Ontario. In both manufacturing and service industries, these two provinces accounted for over 80% of total R&D personnel. In primary industries, Alberta accounted for 40% while Ontario had 28%.

As mentioned above, Quebec and Ontario had the largest share of R&D personnel in the manufacturing industries. In particular, Ontario generally accounted for over 60% of each industry's total R&D personnel. Notable exceptions occurred in wood based industries where British Columbia employed 26% and in machinery and transportation equipment industries where Quebec and Ontario each had about 45%.**

**From Section 5, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

REGIONAL DISTRIBUTION OF R&D PERSONNEL IN 1979
(% DISTRIBUTION BY INDUSTRY)

		QUE	ONT	ALTA	B.C.	OTHER(a)	TOTAL
PRIMARY		2	2	38	11	5	4
MFG	CHEMICAL	19	21	36	5	14	20
	WOOD	7	2	0	28	3	5
	METALS	8	8	9	5	3	8
	MACH & TRANSP	35	19	2	8	41	23
	ELECTRICAL	17	34	0	22	7	26
	OTHER	1	2	0	0	0	1
	TOTAL	87	85	48	68	67	83
SERVICES		11	13	14	21	28	13
TOTAL		100	100	100	100	100	100

SOURCE: BASED ON DATA FROM SCIENCE STATISTICS CENTRE, AUG 1981.

(a) INCLUDES OTHER REMAINING PROVINCES, YUKON, AND NORTH WEST TERRITORIES.

For Canada as a whole, 83% of R&D personnel are employed in manufacturing industries. This same distribution is reflected in both Quebec and Ontario. Likewise, manufacturing accounts for the bulk of R&D employment in B.C. and the other remaining provinces. However, there is a noticeable difference in Alberta where a substantial proportion (38%) is employed in primary industries.**

**From Section 5, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

% DISTRIBUTION BY PERFORMING SECTOR (a)

		CAN	DEN	FRA (b)	GER	JAP	NOR	SWE	U.K.	U.S. (b)
1967	IDY	38	40	54	68	63	45	70	66	69
	GOVT	36	21	32	5	13	21	14	23	15
	OTHER	27	38	14	27	24	34	16	11	16
1969	IDY	37	47	56	68	67	48	66	65	69
	GOVT	34	26	29	5	12	20	15	25	14
	OTHER	29	27	15	27	21	32	19	11	16
1971	IDY	38	48	56	67	66	50	65	64	67
	GOVT	35	25	28	10	14	20	12	24	16
	OTHER	27	28	16	22	20	30	23	11	18
1973	IDY	36	45	59	65	66	50	67	63	66
	GOVT	33	25	25	15	13	19	8	26	16
	OTHER	31	29	16	20	21	31	25	11	19
1975	IDY	40	41	61	66	64	51	69	63	67
	GOVT	32	26	23	16	13	20	8	27	16
	OTHER	28	33	16	18	22	29	23	11	18
1977	IDY	42	56	60	68	65	54	71	x	67
	GOVT	31	21	23	15	13	16	9	x	15
	OTHER	27	23	17	16	22	30	20	x	18

SOURCE: BASED ON DATA FROM "INTERNATIONAL STATISTICAL YEARS" 1967-1977, OECD.

(a) DUE TO ROUNDING, SECTORS MAY NOT ADD TO 100%.
(b) INCLUDES SOCIAL SCIENCES AND HUMANITIES.
x DATA NOT AVAILABLE.

The industry sector has performed between 40% and 55% of total R&D in Norway and Denmark and between 35% and 45% in Canada. In France, the share of industrial R&D has grown from 54% to 60% while in the five remaining countries, it has been well above 60%. The share of government-performed R&D has consistently been highest in Canada, accounting for about one-third of total R&D and has tended to exceed 20% in four other countries.**

**From Section 9, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

GERD FUNDED BY GOVERNMENT
(% OF TOTAL R&D)

	1967	1969	1971	1973	1975	1977
CANADA	54.9	55.2	63.5	53.5	48.3	46.2
DENMARK	55.8	50.5	49.8	28.5	28.0	27.4
FRANCE	55.3	52.0	61.7	44.8	42.4	37.7
GERMANY (a)	41.5	39.2	44.1	47.7	45.7	41.3
JAPAN	30.2	13.7	33.1	16.5	16.2	16.1
NORWAY	59.9	58.7	56.8	34.5	34.5	31.9
SWEDEN	42.5	40.8	41.6	42.8	39.8	25.6
U.K.	51.6	52.5	53.6	51.5	54.3	x
U.S.	62.9	57.6	55.2	54.3	51.5	51.0

SOURCE: BASED ON DATA FROM INTERNATIONAL STATISTICAL YEARS 1967-1977.

(a) INCLUDES FUNDING THROUGH UNIVERSITIES.
x DATA NOT AVAILABLE.

The bulk of funds for each country's GERD originate from national sources. In Canada, foreign funds account for less than 3% of R&D funds. In terms of national sources, the government has generally accounted for over 40% of GERD in the United States, Canada, France, Germany, and the United Kingdom. Except for the United Kingdom, the share of government funding has declined since 1967. Government funding in Norway, Denmark, Sweden, and Japan also showed a marked decline.**

**From Section 9, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

INDUSTRIAL R&D FUNDED BY GOVERNMENT
(% OF TOTAL INDUSTRIAL R&D)

	1967	1969	1971	1973	1975	1977
CANADA	14.7	15.2	16.2	17.0	12.4	11.6
DENMARK	0.4	1.3	1.3	2.4	6.8	8.2
FRANCE	40.5	38.1	34.6	33.0	30.4	25.3
GERMANY	17.5	13.2	18.4	19.6	18.5	15.8
JAPAN	0.9	1.2	2.0	2.0	1.7	1.9
NORWAY	18.6	18.4	18.6	24.6	23.5	23.8
SWEDEN	22.1	14.5	14.4	18.8	16.2	15.3
U.K.	33.4	33.2	34.3	35.5	33.0	x
U.S.	53.3	46.7	41.9	39.3	35.6	35.2

SOURCE: BASED ON DATA FROM INTERNATIONAL STATISTICAL YEARS 1967-1977.

x DATA NOT AVAILABLE.

In the United States, France, and United Kingdom, the government finances over 30% of industrial R&D. However, both the United States and France showed significant declines in government support of industrial R&D between 1967 and 1977. Government funding varies between 10% and 20% of industrial R&D in Norway, Germany, Sweden, and Canada, while in Japan, government funds were barely noticeable. Denmark, meanwhile, showed a significant increase after 1973.**

**From Section 9, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

GOVERNMENT FUNDS AS SHARE OF R&D IN 1977
(% OF TOTAL R&D IN EACH INDUSTRY)

	ELECTR	CHEM	PETRO	AIRCR	OTHER TRANSP	METALS	MACH	OTHER MFG	TOTAL MFG
CANADA	14.0	5.5	2.2	27.0	12.2	6.0	13.4	12.4	12.5
DENMARK	1.5	1.8	x	x	1.0	1.1	1.9	4.9	2.8
FRANCE	22.9	6.8	7.5	62.8	0.9	5.9	6.7	4.5	21.8
GERMANY	12.8	3.1	1.3	56.2	2.1	30.6	10.2	10.1	12.0
JAPAN	0.9	0.2	0.2	x	6.8	1.4	1.3	0.3	1.8
NORWAY	15.2	9.2	30.9	x	23.5	10.8	18.6	21.7	15.9
SWEDEN	7.7	1.1	x	x	37.7	2.9	9.3	6.4	13.3
U.K. (a)	44.3	x	x	82.2	x	2.2	8.2	x	x
U.S.	45.3	9.0	8.1	77.6	13.8	7.7	14.5	12.4	34.9

SOURCE: BASED ON DATA FROM "INTERNATIONAL STATISTICAL YEAR 1977", OECD.

(a) DATA FOR 1975.

x DATA NOT AVAILABLE.

The extent of government support varies a great deal across the selected countries. However, Japan does stand out in that a very small share of its R&D is financed by the government, regardless of the industry. In comparing different industries, government funds account for a significantly higher proportion of R&D in the aircraft industry across all countries, with the highest ratios occurring in the U.K. (82.2%) and the U.S. (77.6%).**

**From Section 9, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

1977 DISTRIBUTION OF GOVERNMENT R&D FUNDS IN MANUFACTURING
(% DISTRIBUTION BY INDUSTRY)

	ELECTR	CHEM	PETRO	AIRCR	OTHER TRANSP	METALS	MACH	OTHER MFG	TOTAL MFG
CANADA	30.6	5.1	1.7	31.1	2.1	5.3	10.3	13.7	100
DENMARK	7.6	14.5	x	x	2.3	0.7	13.5	61.4	100
FRANCE	31.3	5.1	1.2	57.6	0.5	1.1	1.2	2.0	100
GERMANY	30.4	7.4	0.1	36.5	2.3	7.8	11.5	4.1	100
JAPAN	13.1	2.6	0.1	x	68.6	7.0	6.4	2.2	100
NORWAY	26.8	9.4	2.5	x	9.1	9.7	22.6	19.9	100
SWEDEN	12.7	1.0	x	x	63.9	2.0	13.7	6.7	100
U.K. (a)	34.4	1.8	x	58.7	2.2	0.2	1.9	0.5	100
U.S.	26.7	2.9	0.7	54.4	4.7	0.7	5.7	4.2	100

SOURCE: BASED ON DATA FROM "INTERNATIONAL STATISTICAL YEAR 1977", OECD.

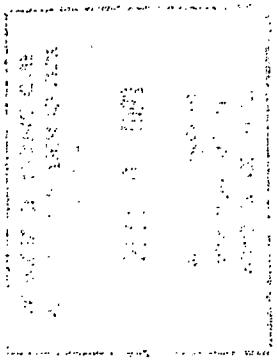
(a) DATA FOR 1975.

x DATA NOT AVAILABLE.

The distribution of government R&D funds in manufacturing follows a similar pattern across all selected countries. Government funds are concentrated in two industries: electrical/electronics and transportation equipment (primarily in aircraft). In France, the United Kingdom, and the United States, over 90% of government funds went to the electrical/electronics and transportation equipment industries. These same industries received over 60% of government R&D expenditures in Canada, France, and Germany.**

**From Section 9, 1981 Science Indicators Manual, Policy Research Group, Industry Branch, MOSST.

The Provincial Research Organizations, 1980



Eight provincial research institutes are surveyed: the Nova Scotia Research Foundation; the New Brunswick Research and productivity Council; the Centre de Recherche industrielle du Quebec; the Ontario Research Foundation; the Manitoba Research Council; the Saskatchewan Research Council; the Alberta Research Council; and the British Columbia Research Council. All are non-profit organizations and have been established by their respective provincial governments to provide technical support to primary and secondary industries and assist in the exploitation of provincial natural resources.

In 1980, as has been the case since data on the activities of the research institutes have been collected (1965), provincial governments are the largest single source of funds for most institutes.

Canadian industry is a significant source of funds for several institutes, especially the New Brunswick Research and Productivity Council, the Saskatchewan Research Council, the Ontario Research Foundation and the British Columbia Research Council.

The research organizations account for a small proportion of the total scientific activities conducted in Canada, less than 1% of the estimates expenditures for R&D in 1980. It would be a mistake, however, to measure their importance in purely monetary terms. These organizations play a significant role in the transfer of technology from laboratory to production unit, acting as an interface between science and business.

TOTAL EXPENDITURES ON SCIENTIFIC ACTIVITIES (1973-1981)
BY THE PROVINCIAL RESEARCH ORGANIZATIONS

EXPENDITURES

(MILLIONS OF DOLLARS)

		1973	1974	1975	1976	1977	1978	1979	1980	1981
CURRENT EXP.	INTRAMURAL	0	0	0	0	0	0	0	0	0
	WAGES AND SALARIES	14	16	20	23	25	29	35	41	50
	OTHER	8	11	12	13	11	16	21	25	29
	SUB-TOTAL	22	27	32	36	36	45	56	67	79
	EXTRAMURAL	1	0	1	0	6	1	1	1	2
CAPITAL EXP.	LAND AND BUILDINGS	0	1	2	0	1	1	1	2	3
	EQUIPMENT	2	2	2	4	2	4	6	6	8
	SUB-TOTAL	2	3	4	4	3	5	7	8	11
	TOTAL	25	30	37	40	45	51	64	75	92

SOURCE:

CURRENT EXPENDITURES BY APPLICATION, 1973-1981

APPLICATION

(PER CENT)

	1973	1974	1975	1976	1977	1978	1979	1980	1981
NATURAL RESOURCES	13	14	11	11	11	11	11	11	14
PRIMARY INDUSTRIES	12	12	16	20	22	22	25	25	25
SECONDARY INDUSTRIES	45	40	41	37	34	34	32	37	36
CONSTRUCTION INDUSTRIES	2	2	2	3	3	2	3	3	3
SERVICE INDUSTRIES	2	3	2	3	3	3	4	5	4
UTILITIES	6	6	6	5	4	6	6	5	5
ENVIRONMENT	16	18	18	18	16	14	11	11	10
OTHER	4	5	4	3	7	8	8	3	3
TOTAL	100	100	100	100	100	100	100	100	100

SOURCE:

CURRENT EXPENDITURES BY SCIENTIFIC ACTIVITY, 1972-1981

ACTIVITY

(PER CENT)

	1973	1974	1975	1976	1977	1978	1979	1980	1981
SCIENTIFIC RESEARCH	25	24	21	25	26	24	22	21	20
DEVELOPMENT	32	30	33	33	33	30	32	36	38
RESOURCE SURVEYS	9	12	12	8	7	5	6	6	7
ANALYSIS AND TESTING	10	10	12	13	13	19	19	19	18
INDUSTRIAL ENGINEERING	8	7	6	5	5	5	5	5	5
OTHER	16	17	16	16	16	17	16	13	12
TOTAL	100	100	100	100	100	100	100	100	100

SOURCE:

CURRENT EXPENDITURES, BY SCIENTIFIC ACTIVITY, BY INSTITUTE, 1980

PROVINCIAL
RESEARCH
ORGANIZATION

(THOUSANDS OF DOLLARS)

	SCIENTIFIC RESEARCH	DEVEL-OPMENT	RESOURCE SURVEYS	ANALYS. & TESTING	INDST. ENGIN.	OTHER (a)	TOTAL
NOVA SCOTIA	362	1085	394	526	329	591	3,287
NEW BRUNSWICK	728	422	0	1,237	121	508	3,016
QUEBEC	818	7,394	0	2,384	115	806	11,517
ONTARIO	3,400	5,200	0	4,730	316	750	14,396
MANITOBA	222	667	0	445	445	445	2,224
SASKATCHEWAN	2,551	921	779	1,275	496	1,064	7,096
ALBERTA	4,752	7,327	2,970	1,386	1,188	2,179	19,802
BRITISH COLUMBIA	1,516	1,026	0	885	359	2,619	6,405
TOTAL, CANADA	14,349	24,042	4,143	12,868	3,369	8,962	67,733

SOURCE: SSC BULLETIN

(a) FEASIBILITY STUDIES, $3,642 THOUSAND; LIBRARY AND TECHNICAL INFORMATION $3,037 THOUSAND; INDUSTRIAL INNOVATION, $1,925 THOUSAND; AND OTHER, $358 THOUSAND.

TYPES AND SOURCES OF FUNDS, 1973-1980

TYPE AND SOURCE OF FUNDS

(PER CENT)

		1973	1974	1975	1976	1977	1978	1979	1980
PROV. GOV.	SUBSIDIES & GRANTS	56	54	38	47	45	43	37	44
	CONTRACTS	9	12	11	17	16	19	21	16
FED. GOV.	SUBSIDIES & GRANTS	1	1	2	0	0	1	0	0
	CONTRACTS	11	8	7	6	7	7	5	7
	CANADIAN INDUSTRY CONTRACTS	19	19	21	22	25	23	26	24
	OTHER CANADIAN SOURCES	2	4	20	6	5	7	8	6
	FOREIGN CONTRACTS	2	2	1	2	2	0	3	3
	TOTAL	100	100	100	100	100	100	100	100

SOURCE: SSC BULLETIN

SOURCES AND TYPES OF FUNDS, BY INSTITUTE, 1980

(THOUSANDS OF DOLLARS)

	SUBSIDIES AND GRANTS		CONTRACTS					
	PROVINCIAL GOVERNMENT	FEDERAL GOVERNMENT	PROVINCIAL GOVERNMENT	FEDERAL GOVERNMENT	CANADIAN INDUSTRY	OTHER CANADIAN SOURCES (a)	FOREIGN SOURCES (b)	TOTAL
NOVA SCOTIA	1,300	0	315	630	778	212	378	3,613
NEW BRUNSWICK	600	0	479	641	1,329	19	114	3,182
QUEBEC	8,082	0	680	351	1,971	1,127	0	12,211
ONTARIO	3,291	0	355	2,088	6,594	3,110	1,160	16,798
MANITOBA	4,080	0	0	0	81	0	0	4,161
SASKATCHEWAN	2,728	0	468	493	3,678	124	0	7,491
ALBERTA	11,561	0	8,744	230	848	0	239	21,622
BRITISH COLUMBIA	1,481	0	855	679	2,878	503	388	6,784
TOTAL CANADA	33,123	0	12,096	5,112	18,157	5,095	2,279	75,862

SOURCE: SSC BULLETIN

(a) MAINLY OWN FUNDS, OTHER CONTRACTS AND ROYALTIES.

(b) MAINLY CONTRACTS FROM FOREIGN INDUSTRY.

EMPLOYEES OF THE PROVINCIAL RESEARCH ORGANIZATIONS
BY PROVINCE, 1973-1980

PROVINCE

	1973	1974	1975	1976	1977	1978	1979	1980
NOVA SCOTIA	80	86	86	94	92	99	104	109
NEW BRUNSWK.	61	61	66	62	62	74	74	79
QUEBEC	190	169	185	203	215	243	286	298
ONTARIO	297	283	280	284	287	313	340	358
MANITOBA	6	7	10	10	8	8	22	23
SASKATCHEWN.	98	120	123	119	139	177	175	225
ALBERTA	250	279	314	337	337	392	443	461
BRITISH COL.	138	151	138	137	134	123	130	157
TOTAL	1,120	1,156	1,202	1,246	1,273	1,429	1,574	1,710

SOURCE: SSC BULLETIN DECEMBER 1980

DISTRIBUTION OF PERSONNEL, 1980

PROVINCIAL RESEARCH ORGANIZATION

(NUMBER OF PEOPLE)

	SCIENTIST AND ENGINEERS				SUPPORTING PERSONNEL			TOTAL PERS.
	BACHELORS	MASTERS	DOCTORS	TOTAL	TECHNICIANS	WORKERS	ADMINISTRATIVE	
NOVA SCOTIA	18	11	11	40	36	15	18	109
NEW BRUNSWICK	10	5	12	27	29	15	16	79
QUEBEC	94	22	10	126	78	39	55	298
ONTARIO	50	22	36	108	137	38	75	358
MANITOBA	9	1	5	15	3	0	5	23
SASKATCHEWAN	29	32	17	78	128	0	19	225
ALBERTA	55	65	78	198	166	10	87	461
BRITISH COLB.	50	17	17	84	34	5	34	157
TOTAL, CANADA	315	175	186	676	611	114	309	1,710
1979	291	153	186	630	559	98	287	1,574
1978	236	116	151	503	528	59	339	1,429
1977	215	118	156	489	421	35	328	1,273
1976	196	125	155	476	411	40	319	1,246
1975	178	131	140	449	401	37	315	1,202
1974	185	104	157	446	381	31	298	1,156
1973	190	112	140	442	363	29	286	1,120
1972	157	107	137	401	329	16	291	1,037

SOURCE: SSC BULLETIN

THE SURVEY OF PRIVATE NON-PROFIT ORGANIZATIONS

THE PRIVATE NON-PROFIT SECTOR IS THE SMALLEST OF THOSE USED IN CALCULATING THE TOTAL NATIONAL EXPENDITURES ON SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D). FOR EXAMPLE, IN 1979 TOTAL NATIONAL EXPENDITURES ON R&D ARE ESTIMATED TO HAVE BEEN ABOUT 2.6 BILLION. THE PRIVATE NON-PROFIT SECTOR PERFORMED LESS THAN 1% OF THAT TOTAL, ALTHOUGH IT PROBABLY FUNDS NEARLY 13% OF THE R&D CARRIED OUT IN THE HEALTH FIELD IN THE UNIVERSITIES.

THE INSTITUTIONS ASSIGNED TO THIS SECTOR ARE GROUPED INTO FOUR TYPES: PRIVATE PHILANTHROPIC FOUNDATIONS, VOLUNTARY HEALTH ORGANIZATIONS, ASSOCIATIONS AND SOCIETIES AND RESEARCH INSTITUTES AND OPERATING FOUNDATIONS. ONLY THOSE WHICH SUPPORT R&D ARE INCLUDED.

THE PRIVATE PHILANTHROPIC FOUNDATIONS (SHOWN AS TYPE 1 ORGANIZATIONS IN THE TABLES) ARE ALMOST ENTIRELY SELF-FUNDED. THEY ARE MORE ACTIVE IN CHARITABLE AND EDUCATIONAL WORK IN R&D, WHICH IS SUPPORTED ENTIRELY IN OTHER SECTORS.

THE LARGER VOLUNTARY HEALTH ORGANIZATIONS (TYPE 2 ORGANIZATIONS) ARE GENERALLY CONCERNED WITH A SPECIFIC TOPIC (E.G., CANCER TREATMENT AND RESEARCH). MOST OF THEIR FUNDS COME FROM INDIVIDUALS AND ORGANIZATIONS THROUGH PERIODIC CAMPAIGNS OR BEQUEST THE SUPPORT OF MEDICAL R&D IN THE UNIVERSITIES ACCOUNTS FOR 85% OF THEIR EXPENDITURES.

ASSOCIATIONS AND SOCIETIES (TYPE 3 ORGANIZATIONS) ARE NOT USUALLY INVOLVED IN R&D. THE SURVEY FOUND ONLY TEN WHOCH DID SUPPORT R&D, LARGELY IN THE NON-MEDICAL FIELDS.

SEMI-PROVINCIAL GOVERNMENT ORGANIZATIONS, RESEARCH INSTITUTES AND OPERATING FOUNDATIONS (TYPE 4 ORGANIZATIONS) CONDUCT 98% OF THE INTRAMURAL R&D IN THE SECTOR, LARGELY IN THE MEDICAL SCIENCES.

IN ALL, 109 QUESTIONAIRES WERE MAILED TO ALL PRIVATE NON-PROFIT ORGANIZATIONS THOUGHT POSSIBLY SUPPORTING R&D. SEVENTY-SIX OF THE 102 RESPONDENTS DECLARED THAT THEY WERE INVOLVED IN R&D. THERE ARE 30 TYPE 1, 26 TYPE 2, 6 TYPE 3, AND 14 TYPE 4 ORGANIZATIONS WHOSE RETURNS WERE USED IN THE FOLLOWING TABLES.

PRIVATE NON-PROFIT ORGANIZATION SOURCES OF FUNDS
BY TYPE OF ORGANIZATION, 1980

	ORGANIZATION				
	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TOTAL
INTRAMURAL	29.0	11.9	3.4	7.6	51.9
FEDERAL GOVERNMENT	0.9	1.1	0.1	2.9	4.1
PROVINCIAL GOVERNMENTS	0.0	31.8	0.0	42.9	74.7
BUSINESS ENTERPRISES	0.0	26.0	0.6	0.8	4.0
OTHER	2.3	74.8	6.3	18.4	101.8
TOTAL FUNDING(a)	31.3	122.3	10.4	72.6	236.5
LESS UNSPENT FUNDING	-11.4	-25.6	-0.2	-0.6	-37.7
TOTAL EXPENDITURES	19.9	96.7	10.2	72.0	198.9

SOURCE: SSC BULLETIN

(a) FUNDS DUE TO INTERTYPE TRANSACTIONS HAVE BEEN EXCLUDED FROM THIS TABLE

TOTAL EXPENDITURES OF PNP ORGANIZATION ON SCIENTIFIC ACTIVITIES
BY TYPE OF ORGANIZATION AND ACTIVITY, 1980

		ORGANIZATION ($'000,000)				
		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TOTAL
INTRAMURAL EXPENDITURES	R&D	0.0	6.5	0.5	17.2	24.2
	OTHER	2.3	26.3	9.4	48.2	86.2
	TOTAL	2.3	32.8	9.9	65.4	110.4
EXTRAMURAL EXPENDITURES(a)	R&D	4.6	42.6	0.1	1.1	48.4
	OTHER	13.0	21.3	0.2	5.5	40.0
	TOTAL	17.6	63.9	0.3	6.6	88.4
TOTAL EXPENDITURES	R&D	4.6	49.1	0.6	18.3	72.6
	OTHER	19.9	96.7	10.2	72.0	198.9
	TOTAL	19.9	96.7	10.2	72.0	198.9

SOURCE: SSC BULLETIN

(a) EXCLUDING PAYMENTS TO OTHER PRIVATE NON-PROFIT ORGANIZATIONS.

EXPENDITURES OF PNP ORGANIZATIONS ON R&D,
BY FIELD OF R&D, AND BY SECTOR OF PERFORMANCE, 1980

		ORGANIZATION ($000,000)				
		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TOTAL
CURRENT EXPENDITURES (MEDICAL SCIENCES)	PRIVATE NON-PROFIT ORGANIZATIONS	0.0	6.0	0.0	15.7	21.7
	UNIVERSITIES	2.8	41.9	0.1	0.4	45.2
	TOTAL	2.8	47.9	0.1	16.1	66.9
(SOCIAL SCIENCES AND HUMANITIES)	PRIVATE NON-PROFIT ORGANIZATIONS	0.0	0.0	0.4	0.5	0.9
	UNIVERSITIES	1.0	0.0	0.0	0.4	1.5
	TOTAL	1.0	0.0	0.4	0.9	2.4
(OTHER SCIENCES)	PRIVATE NON-PROFIT ORGANIZATIONS	0.0	0.0	0.1	0.4	0.5
	UNIVERSITIES	0.1	0.0	0.0	0.0	0.1
	TOTAL	0.1	0.0	0.1	0.4	0.6
CAPITAL EXPENDITURES	PRIVATE NON-PROFIT ORGANIZATIONS	0.0	0.5	0.0	0.6	1.1
	UNIVERSITIES	0.7	0.7	0.0	0.2	1.6
	TOTAL	0.7	1.2	0.0	0.8	2.7
TOTAL EXPENDITURES	PRIVATE NON-PROFIT ORGANIZATIONS	0.0	6.5	0.5	17.2	24.2
	UNIVERSITIES	4.6	42.6	0.1	1.1	48.4
	TOTAL	4.6	49.1	0.6	18.3	72.6

SOURCE: SCC BULLETIN

G L O S S A R Y

Capital Expenditures
Includes acquisition of land, buildings and major equipment and renovations. It excluded depreciation. Covers actual purchases regardless of the period of financing or whether the item is a replacement or an addition to assets.

Contracts (R&D)
Payments to organizations outside the reporting sectors for the conduct of R&D and intended to benefit directly the reporting sector.

Current Expenditures
Includes salaries, personnel benefits, materials, minor equipment, utilities, maintenance, rents, proportional share of administrative overhead and computer services. It excludes depreciation.

Extramural Expenditure
Flow of funds from one sector (e.g. federal government, provincial government, industry, universities, private non-profit organization, foreign) to another. It is measured by the amount a performing sector reports having received from another sector(as in GERD) or by the amount a funding sector reports having paid to a performing sector (as in MOSST Federal Science Activities publication).

Foreign Sector
Institutions located outside Canada plus facilities of international organizations situated within the country. Canadian facilities (publicly or privately owned) located abroad are not include.

GERD (Gross Expenditures on Research and Development)
Total expenditures on R&D in the Natural Science (i.e.excluding R&D in the human sciences and all related scientific activities) performed over the calendar year within the country, including R&D funded by the foreign sector. It excludes payments abroad for the performance of R&D and the R&D performance of international organizations within the country.

Grants (R&D)
Awards to organizations outside the reporting sector for the conduct of R&D and intended to benefit the recipients rather than provide the reporting sector with goods, services or information.

Human Sciences
Disciplines concerned with human activities and conditions, e.g. political science, economics, commerce, sociology, anthropology, criminology, geography, history, psychology...

Innovation
Introduction of new things or methods; the alteration of what is established by the introduction of new elements or forms. The key stage in the process leading to the full evaluation and utilization of an invention.

Intramural Expenditures

Total expenditures for the performance of S&T within an organization, irrespective of the source of funds. It includes current and capital expenditures

Natural Sciences

Disciplines concerned with the natural world, e.g.mathematics, physics (mechanics, electronics, astronomy), chemistry, biology, botany, zoology, geology, meteorology, life (medicine, dentistry, pharmacy) and engineering (mining, mechanical, civil, electrical, chemical, geological aeronautical).

Non-program Costs

The proportional cost of central overhead or administrative services chargeable to an S&T activity. Examples are accommodation rental, maintenance, telecommunications, computer services, personnel management. The Federal Government's intramural expenditures quoted in our Federal Science Activities publication excludes non-program costs, whereas the corresponding figure in GERD includes them.

Performers

Sectors in which the S&T activity is conducted:(1) industry (including government corporations and public utilities); (2) universities (including associate industrial research institutes); (3) federal government; (4) provincial governments (including the provincial research councils and municipal governments; (5) Canadian non-profit institutions such as charitable foundations, scientific societies, and voluntary health organizations); (6)foreign performers (including foreign subsidiaries of Canadian firms - this category of performance is not included in GERD).

Related Scientific Activities

Activities which generally complement and extend R&D such as data collecting, testing and standardization, feasibility studies, education support, museum services, scientific libraries, patent offices, scientific publications, scientific conferences and scientific advisory services.

R&D (Research and Development)

Creative work undertaken on a systematic basis to increase the stock of of scientific and technical knowledge and to use such knoeledge in new applications. The work normally contains considerable novelty and uncertainty and seeks to develop a new product or process. it includes costs of non-R&D facilities such as testing grounds,specialized equip ment and materials. Although it is normally performed by specialized R&D units, it may also be performed by other organizations (e.g. a marine survey ship used for hydrological research or a geological survey team providing data for a geophysical research project).

Research Fellowships

Awards to individuals for advanced research training and experience. Awards intended primarily to support the education of the recipient should be reported as RSA.

Research Intensity

Amount of R&D performed within a compl[any or industry measured (a) as a percentage of shipments or value added, (b) by the number of R&D personnel in proportion to total employment, or (c) by the average skill level of employees.

Technology Intensity

Level of technology embodied in an industry's product lines indicated by (a) the proportion of sales associated with the introduction of new products, (b) the number of invention patents received, and (c) the number of significant innovations pioneered.

University Sector

All post-secondary educational institutions and all research institutes, experimental stations and clinics associated with these institutions.