A study of the feasibility of a National Register of Canadians in Research-Oriented Occupations who are Working and/or Studying out of the Country

A Report for the
Ministry of State, Science and Technology

REVERSING THE "BRAIN DRAIN"

TECHNICAL SERVICE COUNCIL
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TABLE OF CONTENTS

TABLE OF CONTENTS - Cont'd.

Page No.

LIST OF TABLES

LIST OF TABLES - Cont'd.

1. EXECUTIVE SUMMARY

Over 17,000 engineers and scientists emigrated from Canada to the United States between 1960 and 1979. Recently the number increased from 727 in 1982 to 1,433 in 1985.

Over 15,000 Canadians are studying at American universities, about 34% of them in post-graduate courses. Many Canadian university deans say these were their best students. Almost 2,000 more Canadians are studying in Europe while an estimated 10,000 to 20,000 Canadians in research-intensive occupations are working abroad.

Today, more employers are experiencing difficulty recruiting people, particularly engineers and scientists with specialized experience, than at any time since 1981. Canadians living outside the country could be a remarkable pool of talent for some of these jobs.

A national register which would keep track of Canadians abroad in research-intensive occupations could tell them about jobs in Canada and inform employers of their availability for recruitment purposes. But would a register be feasible and cost-effective?

A Canadian studying or working in another country might be eager to return home, but would be unlikely to do so unless a job was in prospect.

A survey of several hundred industrial recruiters and research laboratories reveals that industry considers there is an ample supply of new graduates with Bachelors and Masters degrees or technology diplomas. Many employers are unwilling to pay travel expenses to interviews for candidates 200 miles away, and would be even less interested in new graduates from other countries.

University recruiters are primarily interested in Ph.D.'s and, unlike industry, most will consider candidates from anywhere in the world. Candidates with Ph.D.'s seeking university teaching jobs are likely to out-number jobs 2:1 for each year until 1990, according to the Canadian Higher Education Network. A Natural Sciences and Engineering Research Council study draws similar conclusions, although a few shortages are foreseen.

A surplus of physicians is also projected by the year 2000 and university medical faculties report little difficulty recruiting recent graduates.

Sixty-six percent of the surveyed organizations have experienced some difficulty recruiting, but nearly always for a single experienced specialist rather than for recent graduates. Few specialties were mentioned more than once. Industry would be primarily interested in a register which could provide information on engineers and scientists with specialized experience.

The labour market is likely to be marked by continuing surpluses and small shortages. Employers regularly reject professionals with appropriate qualifications if they lack communication skills and other personal attributes. No large or general shortages are expected.

Job hunters too are selective, often shunning vacancies in small communities, the Atlantic provinces and the Prairies. All these trends could reduce the number of candidates who could get jobs through a register.

Of Canadians who study in the United States, 30% plan to remain there and about 10% are undecided. Perceived better research opportunities, better salaries, better opportunities in their specialty and marriage to a U.S. citizen are among the reasons why students plan to stay.

Although the public would endorse any effort to reverse the "brain drain", not all groups would be as keen. One university dean saw the register as competition for his own graduates. Unemployed graduates in Canada might also complain, as might people whose occupations were excluded from the register.

Sixty-five percent of the organizations contacted have a strong or moderate interest in a register and 70% say they would use it. Universities and directors of government research organizations were the two groups most enthusiastic. But 52% of association executives thought the register would be of little or no value. Some employers asserted that a register would be a waste of public funds and that "anyone with a spark of initiative would apply to Canadian companies on his own."

Other Efforts at Retrieval

A register was operated by the Department of Manpower and Immigration between 1966 and 1971. It was discontinued when the addition of undergraduate students increased the workload and caused adverse comment from graduates in Canada. An over-supply of all graduates contributed to the program's demise.

The Association of Canadian Medical Colleges had its own Operation Retrieval, which also included visits of doctors to Canadians studying in the United States. During a typical year, 900 Canadian graduates training in the United States were invited to return, but only 93 registered for employment. No placements were recorded in five years, so the program was discontinued.

The Swiss Government operates a register for its nationals in North America who wish to come home, but estimates of its cost and effectiveness are not available.

In 1986, a $300,000 advertising campaign by 20 British firms attracted 6,500 replies from British-trained engineers and scientists in the United States. Although 1,800 job-offers were made, only 80 were accepted, in part because of the difference between British and American salaries and living conditions.

Operation of a Register

The names of Canadians studying in other countries could be obtained from graduate schools and professional societies. Thus developing a register of Ph.D's of interest to universities and, to a lesser extent, research laboratories, is straight-forward.

On the other hand, Canadians working abroad are widely dispersed and it would be most expensive and time-consuming to identify and register them. Yet this is the very group of most interest to industry, which reports difficulty finding engineers and scientists with specialized experience. Because employed people are more mobile than graduate students, keeping these candidate files up-to-date would be a continuous and costly task.

Potential users are divided in the way in which a register might operate. Universities generally favour an on-line computer service, while many industrial organizations would prefer periodic booklets of resumes. This preference is so strong that an on-line service would need to be supplemented by resume booklets.

The proposed register does not meet the usual criteria for operating a marketable on-line data-base: large size, frequent changes, customer need to combine different kinds of information.

If an on-line service were provided, CAN/OLE, the National Research Council's on-line service would be a near-ideal way to circulate resumes, but it is not accepting new data bases for a year. Programming would cost $2,000 to $15,000, even for a few dozen candidates. Existing on-line resume services lack sufficient industrial subscribers. Booklets of resumes, circulated periodically, would be more practical.

A register confined to Canadians studying for engineering and science Ph.D.'s in the United States could be operated by part-time staff for $58,000 per year, plus a further $20,000 in start-up expenses. Of 140 to 150 eligible candidates only 9% to 20% could be expected to register. Extending the service to Bachelors and Masters graduates would cost a further $36,000 to $79,000 per year. If employed engineers and scientists in the U.S. alone were added, 720 to 3,200 per year could be expected to register. Additional annual expenses would be in the range of $75,000 to $388,000. A register which would cover all Canadians graduating anywhere in the world plus employed engineers and scientists would require an annual budget of up to $634,000 plus $160,000 start-up expenses.

Only 1% or 2% of candidates would find jobs through the register, according to placement services.

Alternative methods of encouraging Canadians to return such as newsletters on the Canadian job market, subsidizing employers' recruiting abroad, paying candidates' expenses to interviews, giving universities quotas to hire Canadians from abroad and requiring students who receive grants to return are all unappealing.

Giving students who leave Canada for post-graduate study abroad a $13.75 handbook on job hunting in Canada would create goodwill, but might do little to encourage their return.

Neither a register nor these alternatives gets at the basic reasons why many Canadians do not return: among them a perceived lack of opportunities in their specialty and lack of research support in Canada.

The usual criteria for evaluating a placement service -- percentage of candidates placed, percentage of jobs filled, cost per placement -- would not be applicable when a placement would be so difficult to track. It is suggested that the cost per candidate registered be compared to Government's cost of creating a job. An arbitrary figure of $400 is suggested as a maximum.

Conclusion

Although 65% of the organizations contacted have a strong or moderate interest in a register, it would be unlikely to result in the return of many Canadians. Employers will always prefer nearby prospects to out-of-country candidates. Industry is especially reluctant to consider people who are abroad, while most engineering and scientific openings require specialists. Moreover, industrial users would be primarily concerned with engineers and scientists with experience, who would be difficult to track down and expensive to service. Thus a register would be unlikely to be cost-effective.

If it is considered in the public interest to operate one, it is recommended that it be limited to Ph.D.'s graduating in any discipline in any country. The service should be aimed at universities and research laboratories and booklets of resumes could be sold twice a year to recruiters. It is recommended any register be operated by an independent, non-government organization for a three-year trial period. Start-up would take six or eight months and cost $20,000.

Twenty percent of recruiters were unwilling to pay a fee for using a register. Most others would accept a fee of $50 for a booklet of resumes. If the service were confined to Ph.D.'s, annual revenue would be under $7,000, compared to a minimum of $62,400 per year to operate a register.

A register would be unlikely to be self-supporting even in five years.

2. THE PROBLEM

One thousand, eight hundred and seventy-three chemists, 13,541 engineers and 1,987 natural scientists emigrated from Canada to the United States during the 20 years from 1960 to 1979. (Tables 1 and 2). By way of comparison, only 7,000 engineers were graduated from all Canadian universities in 1987. This loss of talent has not diminished. Indeed, the number of engineers, natural scientists, social scientists, mathematical and computer specialists going to the States increased from 727 in 1982 to 1,433 in 1985. Small wonder that the "brain drain" has been a matter for national debate for over 65 years.

The University of Toronto Alumni Association estimates that 21,600 U of T graduates -- 10-12% of the university's total graduates -- are living outside of the country, 4,000 of them in Southern California alone.

Of all the Canadians who emigrated to the United States between 1956 and 1985, the percentage of engineers, scientists and other research-intensive occupations in individual years ranged from 8% to 22%. Research-intensive occupations are defined by the Science Council of Canada as consisting of chemists, computer specialists, engineers, natural scientists, social scientists, teachers, college presidents and deans, technicians and technologists, research workers (where not elsewhere classified), professional, technical and kindred workers (not elsewhere classified).

U.S. immigration statistics understate the number of Canadians moving to the United States because they do not include Canadians transferred to jobs in American organizations or Canadians studying in the United States.

Over 15,000 Canadians were studying in the United States in 1983-84. (Table 3). It's estimated that 34% of these are doing post-graduate study. (Table 4).

Among Canadians awarded doctorates in the United States, over half are in engineering and science. (Table 5). Between 1920 and 1982, over 12,000 Canadians received doctorates in the United States.

Many university deans say that the Canadians who do post-graduate study out of the country are their best students. This view is confirmed by The

TABLE 1

IMMIGRANT ALIENS ADMITTED TO THE UNITED STATES, WHOSE COUNTRY OF LAST PERMANENT RESIDENCE WAS CANADA, BY OCCUPATION: 1956 - 1985[1]

OCCUPATION	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1982	1983	1984	1985
CHEMISTS	112	144	135	79	84	109	81	105	121	111	103	144	159	130	150	113	96	39	44	33	39	58	81	73	-	-	-	-
COLLEGE PRESIDENTS AND DEANS	1	8	6	5	2	1	2	1	1	1	2	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
COMPUTER SPECIALISTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	29	30	55	99	95	143[3]	66[3]	61[3]	84[3]
TEACHERS (COLLEGE & UNIVERSITY)	59	70	53	41	57	72	77	112	113	117	137	163	176	127	144	116	150	77	82	82	73	72	174	120	-	159	145	171
TEACHERS (EXCEPT COLLEGE & UNIVERSITY)	362	397	492	424	452	476	559	588	675	679	672	546	732	561	527	419	412	292	192	173	164	195	312	285	-	191	254	242
ENGINEERS	791	1185	969	1076	1073	811	818	894	789	892	852	1196	1402	848	857	622	394	228	196	196	201	288	514	470	391	386	392	447
NATURAL SCIENTISTS	64	89	73	92	84	92	108	104	117	131	96	121	139	78	113	114	129	64	42	67	71	99	120	98	146	110	91	117
SOCIAL SCIENTISTS	21	29	26	33	34	35	40	53	46	65	63	64	76	45	54	61	41	25	43	49	57	71	102	65	47	21	17	39
RESEARCH WORKERS, NOT SPECIFIED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	33	73	32	85	93	-	-	-	-
TECHNICIANS & TECHNOLOGISTS	276	344	337	342	455	494	505	550	608	579	423	417	527	331	344	289	216	171	182	158	145	170	376	329	-	269	299	333
PROFESSIONAL, TECHNICAL & KINDRED WORKERS (N.E.C.)[2]	251	327	304	206	260	235	174	176	166	169	162	151	208	132	162	202	212	142	14	8	10	14	17	80	-	-	-	-
TOTAL OF ABOVE	1947	2593	2395	2298	2501	2325	2364	2584	2636	2744	2510	2804	3420	2253	2352	1937	1651	1039	845	828	863	1054	1880	1708	727[4]	1202	1259	1433

[1] Data not available for 1980-1981
[2] not elsewhere classified
[3] Includes mathematical scientists
[4] Total engineers, natural scientists, social scientists, and mathematical and computer specialists
- Data not available

SOURCE: United States. Department of Justice. Immigration and Naturalization Service. (unpublished data)

TABLE 2

IMMIGRANT ALIENS ADMITTED TO THE UNITED STATES, WHOSE COUNTRY OF LAST PERMANENT RESIDENCE WAS CANADA, BY OCCUPATION: 1956 - 1985[1]

TEACHERS (COLLEGE & UNIVERSITY)	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1982	1983	1984	1985
AGRICULTURE	3	1	3	2	4	2	2	3	2	1	5	5	9	2	1	1	4	0	0	2	0	0	0	0	-	-	-	-
BIOLOGY	4	3	1	2	3	3	5	2	3	4	10	5	9	8	7	5	3	1	1	2	0	3	4	1	-	-	-	-
CHEMISTRY	2	3	1	1	1	3	5	7	3	4	2	12	5	3	5	1	3	1	1	0	3	0	7	6	-	-	-	-
ECONOMICS	1	3	3	3	2	6	1	5	4	4	4	7	2	6	9	3	2	3	0	0	1	0	4	0	-	-	-	-
ENGINEERING	4	9	4	2	6	3	7	3	7	14	6	13	6	7	2	4	6	1	5	1	1	2	7	3	-	-	-	-
HEALTH SPECIALTIES	-	-	2	2	1	1	4	3	6	5	2	5	8	4	2	5	5	3	4	7	6	6	12	4	-	-	-	-
MATHEMATICS	2	2	1	2	3	3	1	6	1	6	5	13	10	3	6	2	5	2	2	4	3	3	2	3	-	-	-	-
LIFE & PHYSICAL SCIENCES (N.E.C.)[2]	3	4	1	1	3	7	6	11	8	6	11	11	18	6	7	3	2	3	3	2	1	1	1	0	-	-	-	-
PHYSICS	2	4	6	-	4	7	5	4	3	2	2	9	7	4	4	2	6	1	4	1	0	1	1	5	-	-	-	-
PSYCHOLOGY	2	1	3	1	-	2	5	11	12	5	5	7	9	13	7	6	4	0	0	2	2	0	2	2	-	-	-	-
STATISTICS	-	-	0	0	0	1	-	1	1	-	-	-	3	1	1	1	0	1	-	-	-	-	-	-	-	-	-	-
SOCIAL SCIENCES (N.E.C.)[2]	1	2	3	3	7	1	3	2	5	3	4	7	13	7	6	5	8	1	2	3	2	1	6	2	-	-	-	-
SUBJECT NOT SPECIFIED	35	38	25	22	23	33	33	54	58	63	81	69	77	63	87	78	102	60	60	58	53	55	128	94	-	-	-	-
TOTAL	59	70	53	41	57	72	77	112	113	117	137	163	176	127	144	116	150	77	82	82	73	72	174	120	-	159	145	171

[1] Data not available for 1980-1981
[2] not elsewhere classified
- Data not available

SOURCE: United States. Department of Justice. Immigration and Naturalization Service. (unpublished data)

TABLE 3

Estimated Number of Canadian Students
Studying in U.S. Higher Education Institutions
By Field of Study
Selected Years 1949/50 - 1983/84

Field of Study	1949/50 #	1949/50 %	1959/60 #	1959/60 %	1969/70 #	1969/70 %	1979/80 #	1979/80 %	1983/84 #	1983/84 %
Agriculture	183	4.2	97	1.7	320	2.4	303	2.0	379	2.5
Business/Management	323	7.4	613	10.8	1518	11.4	1830	12.1	2788	18.4
Education	301	6.9	471	8.3	2064	15.5	1922	12.7	1500	9.9
Engineering	462	10.6	931	16.4	1105	8.3	1150	7.6	1439	9.5
Fine Arts	227	5.2	318	5.6	919	6.9	1513	10.0	364	2.4
Health Studies	567	13.0	505	8.9	613	4.6	999	6.6	1530	10.1
Humanities	707	16.2	920	16.2	1438	10.8	1664	11.0	1485	9.8
Math/Computer Science	N/A	N/A	97	1.7	266	2.0	257	1.7	515	3.4
Physical Sciences	419	9.6	630	11.1	1239	9.3	878	5.8	1212	8.0
Social Sciences	349	8.0	619	10.9	2078	15.6	1619	10.7	1545	10.2
Other	824	18.9	392	6.9	1185	8.9	1543	10.2	1030	6.8
Undeclared	-	-	85	1.5	573	4.3	1452	9.6	1363	9.0
Total all Fields	4362		5678		13318		15130		15150	

N/A: Data not available for this category

Source: "Open Doors 1983/84" Institute of International Education, New York.
"Profiles 1983/84" Institute of International Education, New York.

TABLE 4

Canadians Studying at American Higher Educational Institutions

by Academic Level, 1983-84

Level	No.	%
Associate	882	10
Undergraduate	4,769	53
Master	1,225	14
Doctor	698	8
Professional Training	221	2
Unspecified Graduate-Level	919	10
Subtotal	3,063	34
Other	219	3
Total	8,933	100

The academic level of the remaining several thousand students is not known.

Source: "Open Doors, 1983/84", Institute of International Education, New York.

TABLE 5

United States Doctorates Awarded to Canadian Citizens by Field

Selected Years 1960-1982

	1960-64	1965/69	1970/74	1975/79	1980	1981	1982
Physical Sciences	108	176	213	97	19	18	14
Earth, environmental and marine sciences	65	104	90	57	8	7	8
Engineering	97	238	191	86	20	17	18
Mathematical Sciences	36	92	110	68	15	13	16
Life Sciences	248	307	387	195	36	26	36
Psychology	63	94	203	156	22	29	15
Other Social Sciences	96	216	396	289	30	43	38
Total, Science and Engineering	713	1,227	1,590	948	150	153	145
Total, all other fields	252	606	1,113	868	150	129	143
Total, all fields	965	1,833	2,703	1,816	300	282	288

Source: National Science Foundation (NSF 83-328)
"Science and Engineering Doctorates 1960-1982"

Association of Canadian Medical Colleges, which reports that Canadians who do not accept an offered place in Canadian medical schools in order to study in other countries have substantially higher scores in the Medical College Admission Test than the Canadians who enter Canadian medical colleges.

Of Canadians who study in other countries, about 90-95% go to four countries (Table 6):

- 80-85% in the United States
- 5% in the United Kingdom
- 5% in France
- 1-2% in the Federal Republic of Germany

Canadian Students Outside North America

In 1985, 930 Canadians were studying in the United Kingdom, of whom 261 were under-graduates (in all fields) and 678 were post-graduates. Of the under-graduates, 147 were new entrants in 1985. Of the post-graduates, 464 were new entrants. (Table 7).

According to the Universities Statistical Record, total numbers varied little and in 1984 there were 112 new under-graduate entries and 374 new post-graduate entrants.

TABLE 6

Canadian Post-Secondary Students Abroad by Country,
Selected Years, 1972 to 1982

	1972		1976		1979		1980		1981		1982	
Host Country	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
United States	9,679	78.2	11,120	77.5	15,130	83.6	14,950	84.4	11,967	81.9	11,967	81.0
France	765	6.2	1,011	7.0	954	5.3	798	4.5	798	4.5	855	5.8
Germany	167	1.4	309	2.2	311	1.7	330	1.9	391	2.7	391	2.7
United Kingdom	1,032	8.3	944	6.2	794	4.4	660	3.7	531	3.6	627	4.2
Italy	50	.4	96	.7	93	.5	148	.8	148	1.0	90	.6
Switzerland	111	.9	105	.7	99	.6	103	.6	107	.7	129	.9
Belgium	115	.9	66	.5	58	.3	50	.3	49	.3	58	.4
Austria	40	.3	55	.4	44	.2	32	.2	41	.3	47	.3
The Vatican	47	.4	76	.5	81	.5	107	.6	109	.8	98	.7
Australia	110	.9	123	.9	105	.6	161	.9	99	.7	98	.7
Greece	12	.1	35	.2	52	.3	52	.3	NA	–	38	.3
Japan	18	.1	40	.3	26	.1	29	.2	31	.2	46	.3
Denmark	13	.1	24	.2	23	.1	25	.1	NA	–	31	.2
Poland	18	.1	48	.3	50	.3	36	.2	28	.2	25	.2
New Zealand	19	.2	37	.2	20	.1	22	.1	13	.1	23	.2
Ireland	NA	–	45	.3	57	.3	66	.4	61	.4	61	.4
Israel	107	.9	NA	–	NA	–	NA	–	NA	–		
Sub Total	12,303	99.4	14,134	98.5	17,897	98.9	17,569	99.2	14,373	98.4	14,584	98.7
Other Countries	75	.6	208	1.5	195	1.1	145	.8	233	1.6	198	1.3
Total	12,378	100.0	14,342	100.0	18,092	100.0	17,714	100.0	14,606	100.0	14,472	100.0
No. of countries reported	50		50		45		29		31		33	

Sources: (1) 1972, 1976, 1979: "UNESCO, Statistical Yearbooks, 1974, 1979, 1982"; Table 5 (p. 238) in Thomas H.B. Symons and James E. Page, "Foreign Students, Canadian Self-Knowledge, and Knowledge of Canada Abroad." Chapter X in Some Questions of Balance: Human Resources, Higher Education and Canadian Studies, p.215-53. Volume III of To Know Ourselves: The Report of the Commission on Canadian Studies (Ottawa: Association of Universities and Colleges of Canada, 1984.)

(2) 1981, 1982, 1983: UNESCO, Statistical Yearbooks, 1983, 1984, 1985 (Table 3.16 - "Third level: foreign students by country of origin").

TABLE 7

Students with Canadian Domicile Registered at U.K. Universities

	1981		1982		1983		1984	
	Under-grad	Post-grad*	Under-grad	Post-grad	Under-grad	Post-grad	Under-grad	Post-grad
Education	1	17	1	5	1	16	1	22
Medicine	20	20	19	22	24	16	31	17
Engineering, Technology	10	17	12	16	6	28	10	20
Agriculture[1]	3	6	3	1	3	2	7	5
Sciences	14	33	13	32	11	49	13	54
Administration[2]	85	142	90	155	94	217	112	256
Architecture[3]	5	10	3	4	2	8	1	10
Languages	23	38	12	32	12	32	13	47
Arts (other than languages)	36	61	32	65	21	73	20	104
Total	197	344	185	332	174	441	208	535

* Only courses of 9 months or longer
1 Includes Veterinary Medicine, agricultural biology and forestry
2 Includes Accounting, Economics, Law, Public Administration, Psychology, Sociology
3 Includes Town Planning

Source: Universities Statistical Register

Among Canadians studying in France 7% are in engineering and science, of whom more than half are in post-graduate work.

TABLE 8

Canadians Studying in French Universities, 1985-1986
All Levels

Discipline	Undergraduate (Levels 1 and 2)	Post-Graduate (Level 3)	Total
Architecture	5	0	5
Arts	661	161	822
Business	26	0	26
Dentistry	2	0	2
Economics	19	36	55
Engineering	2	0	2
Fine Art	24	0	24
International Studies	1	0	1
Technology	5	0	5
Journalism and Translation	4	0	4
Law	36	39	75
Medicine	28	12	40
Multi-disciplinary	27	1	28
Other Specialties	33	0	33
Pharmacy	1	4	5
Sciences	32	53	85
Veterinary Medicine	8	0	8
	914	306	1,220

Source: Ministry of National Education, Paris.

The Ministry advises that students are often registered in more than one faculty. This break-down over-estimates the actual number of Canadians studying in France.

TABLE 9

Canadians Studying in French Universities

1980	798
1982	855
1984-85	949
1986	780

Source: 1980-1985 UNESCO Statistical Year Books. 1986 Ministry of National Education, Paris.

Canadians Working in Other Countries

Because Canada has no exit visa system, there are no reliable estimates on the number of Canadians working in other countries. Canadian Consular officers in politically unstable countries invite Canadians to register, but not all do and in any event there is no record of their occupation. Rough estimates can be made from the number of Canadians living out of the country who are registered with various professional associations, although this method obviously under-estimates the total.

TABLE 10

Canadians Working Outside the Country
who are Members of Canadian Professional Groups

Group		No. of Members Abroad	Total Members	%
Federation of Biological Societies		300	3,000	10
Canadian Council of Professional Engineers		6,689	122,495	5.5
Social Sciences Register		429	8,917	4.8
Canadian Psychological Association	Estd.	300	5,000	6

Source: Information provided by each group.

Obviously Canadians working in other countries may not be members of Canadian professional societies, and would be inclined to let their memberships drop the longer they worked abroad.

Employers in Canada may also be interested in the Canadians who are teaching in British universities.

TABLE 11

Canadians Teaching in U.K. Universities, 1981-1984

	Men	Women	Total
1981	232	112	344
1982	236	96	332
1983	295	146	441
1984	350	185	535

Source: Universities Statistical Record.

An estimated 785 Canadians of all occupations, some of whom are presumably scientists and engineers, are working with the United Nations and world organizations. The Public Service Commission places 50 Canadians per year with international agencies, often on a three-year contract. Others are overseas with the Canadian International Development Agency.

Thus the number of Canadians in research-intensive occupations working overseas is likely to be 10,000, perhaps twice that number. No information is available on the percentage of those who are in developing countries, where three-year employment contracts are common.

Today, more employers are experiencing difficulty recruiting people, particularly engineers and scientists with specialized experience, than at any time since 1981. The tens of thousands of Canadians who are living outside of the country are a remarkable pool of talent. Can they be brought back to Canada at a reasonable cost? If they could be persuaded to return, would there be jobs for them? Would a national register of talented Canadians studying and working abroad be cost-effective?

The Labour Market Outlook

A Canadian studying or working in another country might be eager to return home, but would be unlikely to do so unless a job was in prospect.

At present and for the next three years, an ample supply of newly graduated bachelor's graduates in most disciplines is available and forecast. In some areas, like the Atlantic provinces, a significant number of graduates do not have positions at graduation time. Some science (and other) graduates are unable to find positions in their specialty even after months of searching, and settle for jobs which do not use their training.

Many of the research laboratories and industrial firms surveyed for this report said they had no trouble recruiting staff, particularly new graduates.

In order to minimize recruiting expenses, most employers first confine their search for staff to nearby areas. When new graduates are so readily available and likely to remain so, there would be little point in maintaining

a register of Canadians who have earned Bachelor's degrees in other countries. Most employers would simply not be prepared to interview them while they were out of the country.

There would be even less value in registering non-resident technicians and technologists, who are usually recruited from even more restricted geographical areas.

Only a minority of industrial vacancies require a Ph.D or even a Master's degree. For example, of 222 openings for graduate engineers and scientists listed with the Technical Service Council between March and June, 1987, only nine employers preferred a Master's degree and three a Ph.D.

Another indication of industry's low interest in Master's degrees is shown in the 1987 salary survey by the Pay Research Bureau. Of 560 1987 engineering graduates employed by 50 major organizations, only 16 had Master's degrees. Since 1981, industrial firms have become unwilling to hire graduates with a master's degree for jobs which require only a bachelor's degree. Increased cost and fear of turnover of an under-employed graduate are the main reasons.

Thus a register's value to industry would depend largely upon its content of experienced graduates, particularly specialists in hard-to-find areas like microelectronics, composite materials, robotics and computer-integrated manufacturing. Apart from the difficulty of locating and registering Canadians working outside the country, such specialties are also in demand in the United States and Britain.

Research laboratories and universities are the main consumers of new Ph.D's. The Canadian Higher Education Research Network predicts a supply of 1,500 doctoral degrees (including returning Canadians) each year, half of whom would be available for university teaching. Thus the supply and demand ratio is 2:1, except in a few disciplines like environmental studies, social work, forestry, dentistry and household science. Significant surpluses are expected of Ph.D's in chemistry, humanities, biology, psychology and botany, among other fields. (Table 12).

Some university deans believe this forecast understates retirement needs. It may be remembered that the Technical Service Council's 1980 study of engineering supply and demand was denounced by deans because it forecast (accurately, as it turned out) a 1982 slump in demand.

Another view of future demand comes from the Natural Sciences, Engineering and Research Council's study. It concluded:

- In the agricultural and biological sciences, there will be many more Ph.D's available than university tenure-track positions until at least the end of the century. The size of the surplus will diminish significantly after the middle 1990's. In engineering and applied science, the number of Ph.D's available is about twice the number of tenure-track vacancies at universities. However, severe shortages in some fields are predicted.

- In mathematical and physical sciences, the present surplus is expected to diminish after the middle 1990's. Shortages in some areas and surpluses in others are expected.

- Demand from industry is likely to be concentrated in microelectronics, space technology, communications, materials science, biotechnology and information processing.

TABLE 12

ESTIMATED SUPPLY OF DOCTORAL DEGREES FOR UNIVERSITY TEACHING RELATED TO THE REPLACEMENT DEMAND, 1986 TO 1990

SELECTED DISCIPLINE	SUPPLY					DEMAND					BALANCE
	DOCTORAL DEGREES AWARDED TO CANADIANS IN CANADA	AVAILABLE FOR UNIVERSITY TEACHING		CANADIANS RECEIVING DOCTORAL DEGREES ABROAD AND RETURNING TO CANADA	TOTAL SUPPLY	ANTICIPATED NUMBER OF RETIREMENTS	MORTALITY (0.5%)	SUB-TOTAL DEMAND	PERCENTAGE REQUIRED WITH A DOCTORAL DEGREE	TOTAL DEMAND	AVERAGE ANNUAL SURPLUS OR DEFICIT
		PERCENTAGE	NUMBER								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EDUCATION	102	38.4	39	15	54	50	16	66	75.0	50	4
MUSIC	6	100.0	6	2	8	6	3	9	35.2	3	5
CLASSICS	4	100.0	4	2	6	4	1	5	76.5	4	2
HISTORY	29	58.0	17	8	25	17	5	22	87.7	19	6
MODERN AND MEDIAEVAL LANGUAGES AND LITERATURE	83	71.9	60	10	70	48	14	62	72.8	45	25
PHILOSOPHY	29	64.0	19	5	24	9	3	12	81.9	10	14
RELIGIOUS STUDIES	17	76.2	13	1	14	7	3	10	74.5	7	7
ANTHROPOLOGY AND ARCHAEOLOGY	19	60.0	11	0	11	5	2	7	88.3	6	5
AREA STUDIES	4	51.2	2	3	5	2	1	3	69.1	2	3
MANAGEMENT AND ADMINISTRATIVE STUDIES	20	88.1	18	9	27	17	10	27	48.8	13	14
ECONOMICS	21	56.8	12	10	22	14	6	20	75.8	15	7
GEOGRAPHY	13	62.5	8	3	11	7	3	10	84.1	8	3
LAW	4	85.7	3	2	5	4	3	7	14.1	1	4
LINGUISTICS	10	68.2	7	1	8	0	1	1	79.8	1	7
ENVIRONMENTAL STUDIES	3	58.3	2	0	2	4	1	5	60.3	3	-1
POLITICAL SCIENCE	17	70.5	12	5	17	10	4	14	79.4	11	6
PSYCHOLOGY	111	32.3	36	15	51	11	7	18	90.1	16	35
SOCIAL WORK	3	81.8	2	1	3	7	2	9	41.0	4	-1
SOCIOLOGY	29	64.7	19	5	24	10	4	14	81.6	11	13
AGRICULTURE	38	37.0	14	6	20	8	2	10	82.2	8	12
BIOCHEMISTRY	19	42.9	8	0	8	1	1	2	96.5	2	6
BIOLOGY	60	32.7	20	5	25	7	4	11	87.0	10	15
BOTANY	9	56.6	5	8	13	2	1	3	89.2	3	10
HOUSEHOLD SCIENCE	7	50.0	4	0	4	4	1	5	53.8	3	1
VETERINARY SCIENCE	7	30.0	2	3	5	2	1	3	48.0	1	4
ZOOLOGY	23	34.9	8	8	16	2	1	3	94.2	3	13
ENGINEERING INCLUDING ENGINEERING SCIENCE	96	30.6	29	14	43	30	11	41	73.4	30	13
FORESTRY	6	33.3	2	1	3	4	0	4	64.2	3	0
DENTISTRY	2	48.2	1	1	2	6	2	8	23.0	2	0
PHARMACY	16	48.2	8	2	10	2	1	3	72.9	2	8
MATHEMATICS AND STATISTICS	25	72.2	18	12	30	15	10	25	80.1	20	10
CHEMISTRY	63	28.3	18	10	28	8	5	13	91.0	12	16
GEOLOGY	26	27.0	7	8	15	4	2	6	92.8	6	9
PHYSICS	52	35.3	18	13	31	17	5	22	91.4	20	11
SUB-TOTAL	973	46.5	452	179	631	354	137	491	72.1	354	277
OTHER DISCIPLINES	163	46.9	76	42	118	65	29	94	42.4	40	78
GRAND TOTAL	1,136	46.5	528	221	749	419	166	585	67.4	394	355

Source: von Zur-Muehlen, Max, "The Fallacy of Faculty Shortages in the Next Decade," Ottawa: Canadian Higher Education Network, 1986.

A surplus of physicians is projected by the year 2000, according to the Federal-Provincial Advisory Committee on Health Resources. University medical faculties report little difficulty recruiting recent graduates.

The Technical Service Council's job listings with 1,700 industrial employers from coast-to-coast provide a glimpse of the needs of industry. Demand for engineers and scientists has increased steadily since the 1982 recession, but unemployment in both groups is unusually high. Although experienced systems analysts and computer programmers are in greater demand than any other occupation, 3,863 are collecting unemployment insurance.

Thus the market is full of surpluses and shortages. But where the shortages in 1981 were of dozens and scores, today's shortages are of one's and two's. The specific nature of these is underlined by the surveys of professional and trade associations and recruiters (Appendices 2 to 5). Of over 150 occupations employers had trouble recruiting, only 20-odd were mentioned more than once.

Several factors have combined to make employers more selective than ever. Concern about unit costs, foreign competition, free trade and the uncertain economy have combined to encourage employers to hire people who are productive immediately. In engineering and science, this usually means people who have experience not only in the employer's industry but often in some specialty too. Because employers are hiring fewer people than they did in 1981, they are now placing more and more stress on potential, ability to supervise and communications skills. Lack of such talents caused one recruiter to reject every one of 30 junior chemists whom he interviewed. Another firm turned down several science Ph.D's because of lack of "management potential".

Continued publicity about high unemployment encourages companies to set high standards and to write tight specifications. Only when jobs have been open for months do companies belatedly reduce their requirements. For example, of 27 professional job vacancies in Manitoba opened in 1987, 13 took four to six months to fill.

As usual, employers are slow to recognize a tightening in the job market, and act in response to labour-market information which is six to 12

months' old. The anticipated increase in capital expenditures will cause a further tightening of the market and a probable lengthening in recruiting time.

Paradoxically, employers now place more emphasis on general experience when promoting people internally, while insisting upon specialized experience for outside hires.

For over 15 years, job-hunters have shown an increasing reluctance to move to locations they consider unappealing. Quality of life is now more valued by many than career prospects. Openings in small communities, the Atlantic provinces and the Prairies are shunned by many job hunters, as Saskatoon and Halifax electronics manufacturers will testify. A proportion of candidates on any national register would be certain to withdraw from consideration for vacancies in those areas, preferring larger urban centres in Canada or in the country in which they have studied or are working.

Because so many of the vacancies are for specialists, labour-market reports are over-simplifications. In general, there are small shortages of most kinds of electronic engineers and either a surplus or an adequate supply of other kinds of engineers and technologists. There is also an adequate supply of chemists and physicists while industry has little interest in social scientists and life scientists. In almost all of these disciplines, it would not be hard to find a few employers who have difficulty finding a single specialist. Experienced computer scientists and electronic engineers are the two groups most likely to be in demand, or even in short supply, during the next three years. These are the very groups likely to have the greatest employment opportunities in the United States and Britain, from which they may be hard to lure.

But there is no research-oriented occupation for which a general shortage is expected by industry, although small shortages of specialists will persist.

All these factors could conspire to reduce the percentage of candidates who could expect to get jobs through a register.

Industry's Lack of Interest in People Outside of the Country

A Toronto firm seeking a vice-president refused to interview a qualified candidate from Brantford (100 km away) because it did not want to pay interviewing and moving expenses, considering there was an adequate pool of talent in Toronto. For the same reason, it is commonplace for Toronto employers to refuse to interview people from Winnipeg or Fredericton, for Vancouver employers to disregard people from Prince George and so on.

Even when a firm has trouble filling a position, many would prefer to spend another $1,300 on advertising, in the hope of getting a range of prospects, rather than pay $800 in air fare for a single candidate. Thus candidates in the United States and overseas will normally be considered, at least by industry, only for jobs where there is a pronounced shortage in Canada.

A survey of research laboratories and industrial recruiters showed that only 9.0% of the 1,841 engineers and scientists hired during the last 2½ years were hired from out of Canada.

TABLE 13

Recruitment of Professional Staff from Outside Canada
by 143 Research Laboratories and Industrial Firms

	Hirings Outside Canada				Total Hirings	Outside Canada as a % of Total Hirings
	1985	1986	6 mos. 1987	Total		
Computer scientists	6	10	6	22	334	6.6
Engineers	42	37	15	94	1,045	9.0
Physical scientists (incl. chemists, physicists)	7	13	9	29	374	7.7
Life scientists	8	9	4	21	88	23.9
	63	69	34	166	1,841	9.0

Source: Technical Service Council survey, 1987

By way of contrast, universities frequently reported having interviewed candidates from the United Kingdom, Greece, South Africa, Australia and New Zealand.

Industry's attitude is exemplified by the experience of a Canadian Ph.D. in electrical engineering who was living in Switzerland and sought to return to Canada. While at Bell Laboratories, ranked as one of the world's foremost research laboratories, he had written 18 technical papers and been granted 14 patents. His superior research record was supplemented by experience running his own firm, which sold telecommunications equipment to foreign governments. Unlike most Ph.D's, he had both supervisory and marketing experience, a broad business outlook and an outstanding research record.

The Technical Service Council took up his qualifications with 15 Canadian industrial firms, who displayed a notable lack of interest. A major telecommunications manufacturer which has made frequent public statements about the lack of available scientific talent declined to interview this engineer. After several months of attempting to find a job at home, this man was finally placed by the Technical Service Council in Alberta.

This lone example is significant because this researcher had such an outstanding track-record, coupled with the personal attributes which employers say they want. When someone of this calibre has trouble returning to Canada, the job prospects, at least in industry, of less-qualified engineers and scientists on a register, are doubtful.

Current Overseas Recruiting

The availability of many types of engineers and scientists has meant that few companies are recruiting overseas. The Ontario Government estimates that only three or four Canadian companies at most are recruiting engineers and scientists in Britain and these firms are mainly in the aerospace, electronics and other high-tech fields. Spot checks of British newspapers identified no advertisements by Canadian universities and, apart from a couple of vacancies for occupational therapists, no health-science vacancies. (The scientific journals "Nature" and "Science" regularly carry notices of vacancies in Canadian universities.)

This lack of advertisements by industry is yet another indicator of the lack of interest which could be expected in Canadians who are studying or working outside the country.

3. THE IDEAL REGISTER

The main objective of a register should be to increase the number of Canadians working and studying overseas who return to productive jobs in Canada. This aim can be achieved only if the needs of both employers and candidates are satisfied.

An ideal register would:

- keep track of Canadians in research-intensive occupations studying and/or working outside the country;

- provide such Canadians abroad with timely information on opportunities in Canada; and

- inform employers in Canada about people outside the country for recruitment purposes.

Employers would like a register which had such a high percentage of available candidates that they could eliminate some other recruiting sources, thus reducing expenses. The register should have enough information on each candidate's address, education, experience, interests and location preferences to make it easy for the employer to determine if the candidate is suitable. Candidates' specialties should be indexed carefully so that employers can screen prospects quickly. The register should always be up-to-date so that any prospect an employer contacts is still actively job-hunting. The register should retrieve information quickly and be easy for untrained personnel to use.

The register should enable employers to identify experienced Canadians in other countries who would be interested in returning to Canada for senior posts, thus eliminating the present long and expensive searches. The register should cover engineering and scientific disciplines which are in demand, but be uncluttered by unmarketable candidates.

Candidates, on the other hand, would be concerned about a simple, confidential and fast registration system. They want access to the Canadian market, regardless of the level of job-market activity. They would like to be

kept informed of events in Canada and be notified of specific jobs. They would like to apply to these without having to complete additional applications. Resumes of candidates who are employed could not be accessible to their employers or affiliated organizations.

An ideal register would be well-publicized, inexpensive to operate and widely accepted by employers, candidates and the general public. It would place a high percentage of people who register at a low cost per placement.

4. FACTORS IN THE OPERATION OF A REGISTER

Will They Come Back?

The migration of Canadian students to the United States has been studied by Dr. M. Pavalko, now at the University of Wisconsin. He concluded that many Canadians take under-graduate study in the United States because they cannot meet the admission requirements of Canadian universities. Graduate students, on the other hand, are much more likely to be influenced by the reputation of the university, lending credence to the frequent comments by Canadian deans that they lose their best scholars to American graduate schools.

TABLE 14

Percentage of Students Indicating Various Reasons for Coming to the U.S. to Study, by Academic Status and Sex

Reasons for Coming to the U.S.	Undergraduate		Graduate		
	Male	Female	Male	Female	Total
Subject or field more readily available	41.8	48.3	69.2	71.2	58.6
Did not complete senior matriculation	33.4	23.7	*)	*)	14.1
Lacked language requirements of Canadian schools	27.3	8.5	*)	*)	10.6
High school grades too poor for Canadian schools	20.2	9.3	*)	*)	8.1
Friends attending same school	16.2	13.6	4.1	1.5	8.6
Financial aid better than in Canada	15.3	1.7	15.3	12.9	14.1
Reputation of school	4.0	0.0	13.0	7.6	8.6
Reputation of major department	2.5	1.7	7.4	0.8	4.8
Number of Cases	550	118	835	132	1635

*) Not relevant to graduate students.

Source: Tables 14 to 18 are from Pavalko, M., "Talent Migration: Canadian Students in the United States", International Review of Education, Vol.XIV, 1968, No.3, Hamburg: UNESCO Institute for Education.

The same study showed that 30% of students who complete their studies in the United States plan to remain there. Thus an employment register would be most likely to serve only the remaining 70%.

TABLE 15

Student Plans after Completing their Studies in the United States, by Academic Status and Sex, in Per Cent

Plans	Undergraduate		Graduate		Total
	Male	Female	Male	Female	
Remain in the U.S.	27.6	49.2	28.9	29.5	30.0
Return to Canada	59.6	41.5	61.8	60.6	59.5
Undecided	12.7	9.3	9.3	9.8	10.5
Total	99.9	100.0	100.0	99.9	100.0
Number of Cases	550	118	835	132	1635

The perception that research opportunities are better in the United States is an important reason for planning to remain there. Graduate students mentioned this factor nearly twice as often as other graduates. Indeed, male graduate students mentioned better research opportunities as often as they mentioned higher salaries. This is undoubtedly related to the fact that 60% of male graduate students planned academic careers. Clearly, they assumed that research opportunities in Canadian universities compared unfavourably with those in American universities. Other graduate students, particularly those in the physical sciences, felt that research positions and programs in their highly specialized areas were scarce or non-existent in Canada.

This view of opportunities in Canada is much the same as that expressed by Canadian students who met the Operational Retrieval teams at U.S. universities, as described later in this report.

TABLE 16

Percentage of Students who Plan to Remain in the United States Indicating Various Reasons for their Decision, by Academic Status and Sex

Reasons for Planning to Remain in the U.S.	Undergraduate		Graduate		
	Male	Female	Male	Female	Total
Better opportunities for work in my field	69.1	65.5	79.3	64.1	73.4
Better salaries	78.3	65.5	62.2	60.7	66.7
Better research opportunities	32.9	24.1	63.9	43.6	48.0
More intellectual and cultural activity in U.S.	19.7	20.7	20.7	15.4	20.0
Have married or plan to marry a U.S. citizen	11.8	31.0	14.5	56.5	18.6
Number of Cases	152	58	241	39	490

The same study concluded that the longer a person is in the United States, the less likely he is to return.

TABLE 17

Percentage of Male Students Planning to Remain in the United States by Number of Years in the United States and Academic Status

Number of Years in the U.S.	Academic Status		
	Undergraduate	Graduate	Total
Less than 1	21.9 (196)*)	17.9 (318)	19.4 (514)
1 - 2	30.4 (148)	24.6 (179)	27.2 (327)
2 - 3	22.2 (108)	35.8 (120)	29.4 (228)
3 - 4	36.8 (57)	30.9 (81)	33.3 (138)
4 or more	48.6 (37)	53.0 (134)	52.0 (171)
No Data	N = 4	N = 3	N = 7
Total	27.6 (550)	28.9 (835)	28.4 (1385)

*) Numbers in parentheses indicate the number of cases on which the percentage is based.

This higher rate of planning to remain in the United States among advanced graduate students may reflect the fact that positions in the United States are the ones they hear most about, Dr. Pavalko concluded.

Of even greater concern is the conclusion that graduate students in engineering are least likely to plan to return to Canada. It is not clear whether this is because there is a greater (real or perceived) discrepancy between American and Canadian salaries and/or opportunities for advancement.

TABLE 18

Percentage of Male Students Planning to Remain in the United States, by Major and Academic Status

Major	Academic Status		
	Undergraduate	Graduate	Total
Physical Sciences	33.3 (48)*)	28.9 (159)	30.0 (207)
Natural Sciences	26.2 (42)	22.8 (70)	24.1 (112)
Engineering	31.7 (145)	42.0 (119)	36.4 (264)
Social Sciences	22.4 (85)	25.3 (150)	24.2 (235)
Business	28.4 (88)	22.8 (105)	25.4 (193)
Education	21.2 (66)	21.5 (79)	21.3 (145)
Humanities	27.8 (36)	31.1 (74)	30.0 (110)
Other	27.5 (40)	34.0 (79)	31.1 (119)
Total	27.6 (550)	28.9 (835)	28.4 (1385)

*) Numbers in parentheses indicate the number of cases on which the percentage is based.

A separate study by the Social Sciences and Humanities Research Council of Canada suggests that a majority of the doctoral fellows who study abroad return to Canada. In 1974, 58% of all SSHRC doctoral fellows studied abroad and 84% of those returned to Canada for employment, while 16% were employed out of Canada. In 1980, 82% returned to jobs in Canada and 18% were employed out of the country.

Public Relations Considerations

The "brain-drain" has so captured public attention that any national register would be bound to be received enthusiastically. However not all groups could be expected to be keen. One university dean felt the register a poor idea because its candidates would compete for jobs with his own university's Ph.D. graduating classes. People in Canada should get preference, he thought. No other deans made this point but graduates of Canadian universities who experienced trouble finding jobs could be expected to complain that Canadians outside the country were getting special treatment. "Why isn't there a national register for us?" would be a likely query. Other complaints could be expected from candidates who are graduating in disciplines which are excluded from the register. "The government is giving special treatment to engineers and doing absolutely nothing about sociologists, who need help more." The worse the job-market in a specific discipline, the less useful

the register would be, and the more vociferous the complaints of graduates who were excluded. Unhappily, there would likely be few off-setting endorsements from graduates who secured positions, who would probably be pre- occupied with moving and/or changing jobs. Private placement services find that a majority of candidates do not notify them of a job-change, even when the placement service effected all the introductions.

A minority of the public might feel that importing graduates from other countries would add to the present uncomfortably high level of unemployment. Some misunderstanding of the program and the fact that it is confined to Canadians might be expected.

Some employers, particularly in industry, would perceive the register as a haven for people who lack initiative. "Anyone with a spark of aggressiveness would apply to Canadian companies on his own", one employer commented. Other employers considered candidates outside the country could find jobs through careers advertisements, placement services and speculative letters without the need for assistance.

But the most vociferous negative reaction to a register might come from the very people it is intended to help. Because the register would be limited to people outside of Canada, it could not offer employers "one-stop" service. At best, it would be a supplementary recruiting aid, if not a source of last resort. Moreover, because registrants could not be screened for marketability, only a small percentage could be expected to be placed. Thus 90% or even 99% of those registered would not find jobs through the register. Their negative comments would be bound to influence other graduate students considering registering. Thus outspoken complaints of students graduating in a discipline in which there was a surplus might deter graduates in another discipline in which there is a shortage from registering. For example, the combined comments of four or five biology Ph.D's who fail to get a job through the register might cause engineering Ph.D's to avoid registering, though the latter would have far better job prospects.

The public is increasingly concerned about any organization which collects data on individuals. Great care would have to be taken to keep data confidential and to protect candidates who are employed from being referred

to organizations affiliated with their employer. Some universities would be reluctant to release the names of their graduates who are studying in other countries, thus requiring slower and more expensive ways of obtaining candidates.

Comments by Various Groups

The 67 associations contacted were divided on the utility of a register. The associations represented both trade associations whose members would be employers and users of the register and associations of professionals whose members (at least those outside Canada) would be potential candidates. Only eight associations (17% of those replying) said they would find the register useful to their organizations. Some organizations which said they would use the register said they would be unwilling to pay a fee for doing so.

Fifty-two percent of association executives thought the register would be of little or no value. Several were emphatic in stating that it would be a waste of public funds, a view echoed by some individual employers.

Universities, on the other hand were much more enthusiastic. Sixty-one percent were strongly or moderately in favour, seeing the register as a potential source of faculty at a time when retirements are expected to increase.

Eighty-seven percent of the directors at government research laboratories were in favour of the register, probably because they were experiencing more difficulty hiring specialized scientists than other groups. Eighty-three percent of government laboratories reported difficulty hiring staff, compared to 66% of industrial research labs.

Among industrial research labs, 63% of their managers were strongly or moderately in favour of a register. However 32% had experienced no difficulty in filling positions and many commented that engineers were easy to find while others proclaimed there was a glut. One company saw the register as an organized raid on staff in other firms.

Canadian medical schools were generally in favour of a register, although many reported no difficulty finding staff. Mount Sinai Hospital had received 300 applications for a single post-doctoral fellowship. One university reported no trouble finding qualified candidates, but had reservations about their personal attributes. Where shortages were reported, they were usually of specialists (microbiology, pathology) or of department heads. Several universities reported they had spent two or three years looking for department heads in specialties such as ophthalmology and medical imaging.

Overall, 70% of the scientific managers and recruiters said they would use a register, while 24% said they would not. The remainder were uncertain.

Other Efforts to Retrieve Graduates

Many of the factors which prompted this study caused the Association of Universities and Colleges in Canada (AUCC) to tackle the same situation in 1964. Its report on what came to be called Operation Retrieval might have been written today: "...that Canada is short of high-level manpower. This is hard for Canadian graduate students abroad to believe, because little effort is made to see that they receive offers of employment at home. Communication between them and possible employers is fantastically poor. Information doesn't flow. Letters remain unanswered. Local employers, especially in the United States, are given practically no competition by Canadian employers."

The president of York University met over 100 Canadian students at the University of California (Berkeley) and recommended that at least one senior university officer visit each of the 15 or 16 largest American and British universities each year with a view to informing Canadians of opportunities in Canadian universities. Visits to six American graduate schools in 1965 were followed by visits the following year to 27 American and 20 British, French and Belgian universities.

The teams concluded that students were grateful, even surprised, for the interest being shown in them; they were out of touch with opportunities at home; they were discouraged by the lack of response to letters to Canadian employers; they regretted the absence of industrial representation; they were

being actively courted by American employers. Most significantly they were prepared to return home, given the opportunity.

As a result of these visits, the AUCC recommended Operation Retrieval be taken over by the Federal Government.

Subsequently, the Department of Manpower and Immigration published a directory of Canadian employers offering employment to Canadians studying at foreign universities. The list also included brief outlines of the economy in various industries and job-prospects in those fields. In addition, lists of graduate students and their specialties were made available to universities and industrial employers.

A resume preparation service was also provided.

The later addition of undergraduate students to the register greatly increased the workload, and caused adverse comment because these students were competing with graduates already in Canada. When the supply of most kinds of students, both graduates and undergraduates, far exceeded demand, the program was discontinued.

The Association of Canadian Medical Colleges (ACMC) carried out its own Operation Retrieval from 1967 to 1971, with financial support from the Department of Manpower and Immigration. Canadian doctors visited major American cities to talk to graduates of Canadian medical schools who were interns or residents in local hospitals. The team provided the graduates with information about new developments and anticipated vacancies in medical schools.

A contemporary report says "virtually all the graduates attending the open meetings indicated an intention to return to Canada... The graduates expressed a fondness for Canada and this was evident in their pleasure at a meeting on 'Canadian' territory. There was concern about educating children in the United States and about high crime rates in U.S. urban centres. On the positive side of the American ledger was a keen enjoyment of an active staff life and a reluctance to return to what is perceived as a more formal Canadian atmosphere." Graduates were also concerned about the lack of financial support for medical education and research in Canada and of the failure

of Canadian medical schools to communicate, even after employment interviews.

"Many of the graduates spoke of firm and aggressive approaches from American medical schools, and contrasted this with what they perceived to be only a luke-warm interest on the part of Canadian schools."

The visits were discontinued as an economy measure after 1971. The Department of Manpower and Immigration translated, printed and mailed to Canadian graduates in the U.S. the ACMC Bulletin, containing news of recent developments in Canadian medical education and practice.

During a typical year, the Bulletin was received by 900 Canadian graduates training in the United States, 93 of whom registered for employment and had their qualifications circulated to prospective employers.

By 1971, only 38 forms were returned, representing 7.8% of the Canadians whose registrations were solicited. A study of Canadians at American universities showed that 10.5% were undecided about whether to return to Canada after graduation. This group is roughly equivalent in size to the small group who used the medical register. It might be assumed that the 60% of graduates who had already decided to return to Canada were making direct contact with Canadian employers or had their own plans to find jobs, while the undecided group viewed the register as a convenient and effortless way to survey the Canadian market.

The program was discontinued because "no one could demonstrate it was successful," according to the former administrator. She does not recall a single graduate returning to Canada as a result of the four-year program.

Switzerland is the only other country known to have a register to retrieve its graduates. Swiss nationals who come to North America are asked if they wish to hear of jobs in Switzerland. Those who do receive a quarterly booklet about Swiss education, science and research. Two thousand of them have listed their resumes on a "hot list", which is accessible to Swiss employers. The service is available in North America alone, and is operated by the Embassy in Washington, which was not able to estimate the cost or the

effectiveness of the system. However it was described as "really appreciated" because of the difficulty of finding a Swiss job while in North America. Communication with Swiss nationals is simplified because they are required by law to register with their own Embassy, unlike Canadians working outside of Canada.

Great Britain has no formal way of retrieving its highly qualified manpower, but in 1986 about 20 British firms mounted two major advertising campaigns in North America to recruit British-trained engineers and scientists. Advertisements were run in three Canadian and 12 American centres at a cost of over $300,000. These produced 6,500 replies, and ultimately about 1,800 job offers. Some candidates got as many as six offers. Only 80 offers were accepted, in part because of the difference between British and American salaries and living conditions. Because the travel expenses of the interviewers exceeded $300,000, the cost of each person hired was probably over $8,000. Significantly, candidates in Canada were more willing to return home than Britons in the United States.

Canadians in the U.S. seem to have the same attachment to home that Britons have for theirs. But job offers from home could fail because of the difference between Canadian and American salaries and research support, just as a similar differential caused Britons to stay in the U.S.

Who Should Be Included in a Register

A register can be successful only if it provides a service for both employers and job-hunters. Employers must receive suitable resumes or they will not use the service again, while job-hunters must hear of suitable vacancies or they will not recommend the service to fellow graduates. The less active the job-market in a specific area, the more likelihood of unhappy users.

Therefore the register should be confined to listing people who would be marketable, who practically are those people of most value to employers.

Consideration also needs to be given to whether people on the register are recent university graduates, or graduates with experience, or both. Many employers consider there is an ample supply, and in some cases an over-

supply, of recent graduates in most disciplines. The marked reluctance of employers to consider junior candidates living distant from their offices is another reason to exclude recent graduates with Bachelor's and Master's degrees as well as technologists. Practically, a recruiter in Vancouver will not interview a new Bachelor's graduate from New Orleans (or even Toronto) when 30% of the graduating classes in Vancouver are available and without jobs. In most disciplines, the same is true of new graduates with Master's degrees. Both industrial employers and universities are prepared to look at Ph.D's who are farther from interviewing centres. In addition, university deans were emphatic that they were seldom interested in anyone without a Ph.D., and many much preferred several years of post-doctoral experience.

Eliminating new Bachelor's and Master's graduates from the register would greatly reduce its size and increase its practicality. For example, in the United States alone, only about 280 to 360 Ph.D.'s graduate per year, compared to several thousand Bachelors and Masters.

Although industrial research laboratories have some interest in Ph.D's, industry's greatest interest in a register is as a source of hard-to-find experienced engineers, computer scientists, and to a lesser degree, natural scientists. The Technical Service Council studies show demand is greatest for people with three to 10 years' industrial experience. Thus a register which concentrated on new graduates alone would be of very little interest to industry.

Which disciplines should be included in the register is also a function of the job market. Relatively few social scientists are employed in industry and an adequate supply of Ph.D.'s for universities seems in prospect. In addition, the Canadian Register of Research and Researchers in the Social Sciences, administered by the University of Western Ontario, provides an existing on-line data base on which universities and other recruiters can draw. This register had 8,917 participants in 1986, an estimated 60% of all social scientists in Canada. Four hundred and twenty-six of these are Canadians living outside of Canada.

Because this register can be used for recruiting and because of the projected adequate supply of social scientists, an argument can be made for omitting social scientists from the register.

An over-supply of Ph.D.'s in biological science is likely to continue. Few graduates in this discipline are of interest to industry. Although biotechnology is likely to grow rapidly, the few jobs it will generate will be mainly for specialists. Accordingly including biological scientists on the register would not help many find jobs nor be cost-effective.

The demand for medical doctors with research experience is somewhat stronger. Because the medical system is so different in Europe, Canadians who study there need little encouragement to come home. Canadian universities would have some interest in M.D's with research experience who are working in the United States. However, locating Canadian-born M.D's dispersed among in the hundreds of teaching hospitals in the United States could be expensive and time-consuming.

Thirteen of Canada's 16 medical schools were contacted and nine provided estimates of their annual staff requirements. Out of total faculty and clinical staff of over 3,300, these nine universities and their associated teaching hospitals expect to have only 130 professional vacancies per year.

Engineering is the discipline likely to generate the largest number of vacancies among both industry and research laboratories. Universities too are concerned about whether there will be enough Ph.D's available, in spite of contrary forecasts. The way in which engineering is expected to dominate industrial demands can be seen in the following table. (Table 19).

TABLE 19

Recent and Forecast Hirings of Professionals by 143 Research Laboratories and Industrial Firms

	1985	1986	6 mos. 1987	1988	1989	1990	Total
Computer scientists	108	138	88	153	179	191	857
Engineers	438	390	217	334	360	315	2,054
Physical scientists (incl. chemists, physicists)	158	130	86	123	102	97	696
Life scientists	31	34	23	65	42	80	275
Total	735	692	414	675	683	683	3,882

Source: Technical Service Council Survey, 1987

Industrial demands for computer scientists are not as numerous, but shortages are already evident both in industry and in universities. Including this discipline in a register would provide a service to both employers and individuals.

Ph.D.'s in business and in accounting may not be viewed as research-oriented occupations but Canadian universities already report intense competition for them. They are of little interest to industry, but they could be added to a register at a modest additional cost.

The number of physical scientists (chemists, physicists, etc.), which industry anticipates hiring is second only to the number of engineers. However far fewer shortages of physical scientists are evident, even of specialists, and von Zur-Muehlen anticipates an over-supply of Ph.D.'s interested in university teaching in these disciplines.

Like engineers, physical scientists have a significant impact on Canada's competitiveness and thus create jobs and wealth. Although the market for many kinds of physical scientists is expected to be much more competitive than for engineers, the retrieval of one of two budding Polyani's would justify their inclusion in a register.

Operating costs of a register could be minimized if the register dealt only with people who were in demand. The Pics register, financed by Western Union, is said to have gone out of business because it listed so many unmarketable candidates.

Predicting and monitoring the labour market for the entire range of research-intensive occupations would be very difficult. It would also be difficult for a government organization to tell geology Ph.D.'s who were registered that service is being discontinued because of a slack labour market, and then attempt to re-register the same kinds of people five years later when the market revived. It will be difficult for a small operation with a limited budget to make an impact on the hundreds of potential employers of highly qualified manpower and the thousands of geographically dispersed Canadians studying and working in other countries. Such an organization must project a clear-cut image. Its name and logo should convey an

instant image of an organization specializing in retrieving certain kinds of people. It would be a marketing mistake to continually change the disciplines which the register covered.

Over 90% of Canadians studying outside the country do so in only three countries: the United States, the United Kingdom and France. It would be economical and cost-effective to confine solicitation to these areas, but accept student applications from any geographical location.

The type of experience industry is seeking is most likely to be gained in highly developed countries, using the most modern technology. Again, the United States, United Kingdom and France are likely to have not only the largest number of Canadians but also those with the most sought-after experience. Therefore solicitation should be confined to people in these countries, although people in any country should be able to register.

Practically, a majority of Canadians undertaking graduate study in the United States are likely to be at the 30 largest research universities. It would be cost-effective to concentrate on solicitations at these schools.

Practical Considerations in the Operation of a Register

Advertising is such an accepted recruiting medium that employers are loathe to do without it, although they frequently complain of its cost and indifferent results. Thus any new recruiting resource is viewed as an additional expense, rather than a potential saving, and thus evaluated critically. The financial failure of several data banks of engineers and scientists in both Canada and the United Kingdom indicates that many organizations are unwilling to give up established, if not always effective, methods. An Ottawa-based on-line source of engineers, scientists and data-processing staff, has attracted only 15 employer-subscribers after a year of operation. Recently it listed only 45 jobs and is thought to be losing money.

Listing jobs with a register or retrieving candidates from it takes recruiters' time, while not reducing the need to exploit traditional sources. Employers would evaluate a register on the basis of the quantity and quality of suitable candidates retrieved. Even if the register were free, recruiters

would be reluctant to spend the time needed to scan it if the first few trials did not produce promising results.

Although employers want the best person available, many still consider there is an ample pool of talent available in Canada, at present unemployment rates. Many recruiters would be reluctant to consider candidates outside the country until efforts in Canada suggested qualified people were not readily available here. Surveys of both universities and industry suggest that people employers are having trouble finding are almost always specialists.

Because a register would be confined to people living outside the country while employers prefer people inside Canada, the register would inevitably be regarded as a recruiting resource of last resort. There is no hope it could displace existing recruiting sources. Moreover, because it would be used mainly to fill openings for specialists, and because of the delays and risks inevitable in overseas recruitment, the register could expect to fill a smaller percentage of jobs than other sources.

Working exclusively with local candidates, placement services find jobs for 10 to 14 percent of the candidates they register. However, candidates who do not seem marketable are simply not listed (or counted in their statistics). When the economy is slack, the percentage of candidates placed slumps to five percent or even less. Thus a register which accepts everyone in specific disciplines, all of whom are out of Canada, could expect much lower success rates.

Any lack of success would also influence employers' continued use of the service. Studies of contingent placement services suggest a register would fill fewer than 10% of the jobs listed with it, a record which would discourage repeat business.

A new register faces the classic chicken-and-egg dilemma. If few jobs are listed, there is no incentive for candidates to register and those who did would tell their friends of their lack of success. If few candidates are registered, employers are unlikely to find suitable prospects, which in turn discourages subsequent job listings.

The establishment of a register could, with judicious public relations, be expected to provoke numerous enquiries. Other potential candidates could come from lists from the three granting councils, promotional letters to the main graduate schools in the United States, Great Britain and France. Some professional societies would be willing to circularize their members overseas if the register were to pay out-of-pocket expenses. Some universities would be prepared to send lists of their graduates studying out of the country, although others are concerned about privacy laws.

Universities are interested in hearing of new Ph.D. graduates a year before graduation. Therefore such candidates should be registered in time for the two main university recruiting seasons of Fall and Spring.

If the register were confined to Ph.D.'s in engineering and science and assuming 50% of those who are undecided or wanted to return to Canada listed with a register, about 13 to 30 people would register per year.

Locating and registering Canadians who are working in other countries would be very much more difficult. Some might be attracted through news releases to professional journals, but advertising in more than a sample of these would be prohibitively expensive because so many occupations and specialties would be involved.

This is the very group of most interest to industrial employers, but it is unlikely that enough specialists could be found and registered at reasonable cost to meet their needs.

An executive recruiter faced with an opening for a specialist will sometimes scrutinize thousands of names in the professional engineers' list or hundreds of university calendars to find a few prospects. Such labour-intensive work would not be justified simply to solicit the registration of an individual, who might never be of interest to a prospective employer.

All placement services experience difficulty keeping their files up-to-date. Employers do not notify them when jobs are filled nor do candidates tell them when they have accepted a position. Thus the availability of both jobs and candidates would have to be confirmed constantly. Job listings would have to be confirmed at least once a month while the availability of

candidates would have to be confirmed every six months, much more often in the case of fast-moving occupations like computer science. Fifty to 75% of candidates could be expected to ignore check letters. Thus the register operator would have to send out expensive follow-ups or allow his only resource to dwindle. Recent experience by the Technical Service Council suggests that percentage returns can be increased by sending candidates job-market information they view as helpful, but any register would inevitably contain candidates in specialties which are not readily marketable. Because of this and because employers prefer candidates living in Canada, probably over 50% of candidates would not have a single employer enquiry in a year. Thus a majority of candidates would likely view the register as not useful, even though their qualifications might have been viewed, either through an on-line register or a published list, a number of times since they registered. Notifying candidates of each employer enquiry would counter this problem, but at considerable increase in expense and an unavoidable increase in candidate expectations.

Some universities and a few employers seek referrals from the three Granting Councils. Surprisingly, the Natural Sciences and Engineering Research Council estimates it receives only a few hundred requests for suitable candidates per year from employers. If a register were established, it would be desirable to incorporate the Granting Councils' lists of post-doctoral and doctoral fellows in it. Perhaps the register operator could make arrangements to issue a joint list with all three Granting Councils, thus avoiding expensive duplication.

Both industrial employers and universities would want detailed information on candidates' graduation field and year, thesis subject, specialty, interest, location preferences, languages, scholarships and awards, professional memberships and publications. This information would have to be classified so that people with very specific experience could be easily and quickly identified and retrieved.

Financing A Register

It would be reasonable to attempt to recover a portion of the cost of running a register. Many organizations which were surveyed had no views on how this might be done, but of the over 100 who did, a job-listing fee was

favoured by 58%. Many organizations which were prepared to pay a job-listing fee were unwilling to consider a placement fee, and vice versa. Although government research laboratories were the most enthusiastic supporters of a register, they were also the largest group unwilling to pay any fee.

TABLE 20

Financing a Register
Views of Potential Users

	No.	
1. Preferred Method of Charging		
Fee for listing a job	58	53%
Placement fee	40	36%
Subscription*	12	11%
	110	
2. Acceptable Fees		
(a) For Listing a Job		
Nothing	22	20%
$10 to $25	27	24%
$26 to $50	28	25%
$51 to $100	35	31%
	112	
(b) If a Placement Fee		
Nothing#	9	13%
1% to 3% of starting salary	32	47%
4% to 6% of starting salary	15	22%
7% to 10% of starting salary	12	18%
	68	

*This option was not listed in the survey, but was suggested by participants.

#Excludes those who were prepared to pay a job-listing fee, but not a placement fee. Many other participants had no opinion.

Source: Technical Service Council survey, 1987

It would be unwise to charge a fee until the data bank was large enough to encourage employers to return. Thus the first six or nine months of operation might be offered without charge.

A $5.00 registration fee might be useful to deter frivolous candidates, or to encourage registration before a date which would allow resumes to be sent to universities before their main recruiting season. On the other hand, a fee might reduce the number of candidates registering, when the register needs numbers to have credibility.

The lack of willingness to pay fees which relate to the costs of running a register probably reflects uncertainty about the register's value. A register which proved to be useful and easy to use could probably increase fees later. The fee structure should also be related to the state of the labour market. If employers were having trouble finding candidates and advertisements were ineffective, they would be more willing to pay higher fees in the hope of finding suitable prospects.

Criteria for Evaluating a Register

Commercial placement services judge their success by their dollar billings per consultant, a criterion which could not apply to a register. Less frequently used standards such as the percentage of jobs filled or the percentage of candidates placed also do not lend themselves to a register. It would be expensive and time-consuming to track referrals of candidates, particularly when the time between the referral of the candidate to a university and his date of starting work might be almost a year. Commercial placement agencies will testify that candidates cannot be counted on to report when they are hired, even when they receive personal service. Therefore, cost per placement could also be difficult to track, but rough estimates might be made.

Commercial placement agencies are careful to register only people whom they consider marketable and often do not keep records of applicants whom they choose not to list. Even with this select group, it would not be uncommon for an agency to place only five or ten percent of its registrants. A register of Canadians listed Overseas could expect even poorer results because employers would prefer to hire local candidates if they were available and it would not be in a position to screen out less marketable candidates, such as Ph.D's in biology, a discipline in over-supply.

In practice, it may be difficult to place more than one or two percent of the registrants. An extremely rough criterion could be established by dividing annual costs of operation by two percent of the number of registrants. This cost might then be compared with the government's average cost of creating a new position through employment subsidies or training or industry's out-of-pocket costs for recruiting a professional. (A recent survey estimated this figure at over U.S. $10,000).

Any Canadians returning to Canada obviously contribute to income and other taxes as well as making intangible contributions to the community. During boom times, the lack of a key engineer or scientist can delay expansion plans and associated employment. A register's role in increasing these benefits cannot be measured.

There is no really satisfactory quantitative method of evaluating a register but it is suggested the cost per person registered should not exceed $400 at the outside, and preferably be under $100.

5. ALTERNATIVES

Ways in Which a Register Could Operate

Information on candidates could be sent to employers in several ways. Universities were uniformly enthusiastic about a computerized on-line service, on which they could type in a key word and retrieve candidates with appropriate experience. Industry was far less interested in an on-line service, even among organizations which had suitable hardware. Indeed, there was enough interest in receiving printed resumes of candidates that a register which was confined to an on-line service would miss a significant portion of the market. Thus if it were decided to operate an on-line service, it would be prudent to offer the alternative of printed resumes.

Practically all universities and many research laboratories already subscribe to CAN/OLE, an on-line service operated by the Canadian Institute for Scientific and Technical Information of the National Research Council. CAN/OLE contains about 40 data bases, many of which are used by industrial and university researchers, the very people who would be prospects to use a national register of Canadians. Thus CAN/OLE would be a near-ideal way of distributing information on Canadians studying and working out of the country.

Unfortunately, CAN/OLE is in the process of converting to a new computer system. Thus no new data bases will be added for a year. The estimated cost of programming is $2,000 to $15,000, a high figure considering the potentially small number of files.

Another major advantage of having the data base on CAN/OLE is the organization's continuing marketing program, which would automatically encompass many of the likely users of a national register. Users of the register could be charged a royalty of $10 to $50 per connect-hour, which would generate but a few hundred dollars a year.

It would be much less expensive to put the resumes on an existing data base operated by a placement service. Unfortunately, none matches the market penetration of CAN/OLE and one of the best known has been able to obtain only 15 recruiting companies in a year's operation. Such poor penetration would defeat the purpose of the register.

Canada Systems Group (CSG), a leading marketer of on-line data-bases, estimates start-up charges of $3,750 for a data-base of up to 350 resumes, plus a charge of $10 per resume for either entry or updating. Storage costs would be $2,400 per year, provided maintenance and marketing of the data-base were both done by the register operator. These expenses would be in addition to the register's basic operating cost of $58,000 per year. (Table 21).

CSG considers that a marketable on-line data-base should meet three criteria: large size, frequent changes, and customer need to combine different kinds of data. The proposed register of Canadians in research-intensive occupations would not meet one of these standards.

Another alternative would be to send candidates who were registered descriptions of available jobs, perhaps both those listed with the register by employers as well as those advertised in the papers. This service would depend so much upon the mails that response would be slow and placements unlikely. Mailings would have to be frequent, perhaps once every two weeks, to ensure jobs were reasonably current, thus increasing costs. Even so, candidates would inevitably complain that they had applied to jobs which had been filled. Employers would also object to receiving resumes after they had notified the service that the position was no longer open.

A published list of candidates thus becomes the only alternative. It is strongly favoured by some employers, but would be regarded as useless by others, who say they do not scan the Natural Sciences and Engineering Research Council lists or that they receive too many such lists.

During the 1960's, the Technical Service Council circulated the resumes of Canadians graduating at the Harvard Business School to all its member companies and to other employers. Although some Canadian banks were interviewing at Harvard at that time, the response of other employers was poor. Most felt there was an ample supply of MBA's available locally, while the few organizations which did show interest mostly withdrew when they learned the graduates' salary requirements. During the three years of the experiment, no more than one placement resulted.

A register which would be confined to Canadians studying for Ph.D's in engineering or science in the United States would not be cost-effective because so few people would be prospects. The cost of registering and processing the candidates would be tiny compared to the cost of soliciting applications from universities across the U.S., selling both Canadian universities and industry on the service, and distributing resumes.

Although the job prospects of Ph.D's in other disciplines are more limited and their likely impact on Canadian industry less, they could be included in a register at minimal cost. So too could Canadians studying for Ph.D's in Europe. All three groups could be serviced for about $61,000 per year. (Table 21 and 22).

A fee of $50 per resume book would be readily accepted but revenue would be unlikely to exceed $3,000 in the first year. A $5.00 fee could be charged each candidate, although registration could be made free for the first six months as an incentive to get the maximum number of people registered and thus encourage usage by employers. It is unlikely the service could be self-supporting even after five years.

Bachelor's and master's graduates are so readily available in Canada that there is likely to be little interest in Canadians outside the country, at least until they were in Canada available for an interview. Their inclusion in the register would greatly increase operating costs without any corresponding improvement in placement rates. Universities, perhaps the most enthusiastic potential users, are almost uniformly disinterested in these candidates, or else have access to a ready supply now.

The inclusion of employed people, particularly engineers and scientists, would be of great interest to industry, but they are so widely dispersed that it would be extremely expensive to alert them to the existence of the service. In addition, checks on their availability would have to be frequent to ensure out-of-date resumes were not sent to prospective employers. Graduate students are so stable that booklets of their resumes could go to universities only twice a year. The resumes of employed people, on the other hand, would have to be sent to employers much more frequently, at least quarterly and perhaps monthly. Great care would have to be taken either to ensure candidates were not referred to their present employer or to camouflage their

TABLE 21

PROJECTED ANNUAL OPERATING COSTS FOR A NATIONAL REGISTER OF CANADIANS STUDYING FOR ENGINEERING AND SCIENCE PH.D.'S IN THE UNITED STATES

Salaries and benefits	$ 34,000
Accounting and audit	600
Advertising and public relations	2,000
Office expenses	7,800
Rent	7,500
Telephone	800
Travel	2,500
Contingencies	2,800
	$ 58,000

Start-up expenses (largely equipment and furniture purchase)	$ 15,000

Basis: 140 - 150 eligible candidates per year of whom 13 to 30 register.

Projected staff: part-time manager plus part-time secretary.

experience. These additional resume booklets, the need for frequent checking, the high advertising expenses needed to attract candidates, and high overseas postage costs all combine to make this a high-cost, high-risk operation. (Table 22).

Alternatives to a Register

Canadians out of the country might be encouraged to return by other methods, most of them unpromising. These could include a newsletter about Canadian scientific research, the economy, changes in research grants and related subjects. Such communication would be appreciated, but it would be unlikely to have a strong influence on people's decisions to return to Canada. Listing recently advertised jobs would have more impact, but these become dated quickly. In addition, magazines reprinting jobs from Canadian papers across the country are sold commercially.

Another possibility would be to subsidize job-hunting trips to Canada, for example by paying travel expenses. In practice, the odds of an individual obtaining a position from a single interview are not strong enough to justify an expenditure of $1,000 or so. In addition, employers' requirements are so specific and sporadic that it would be difficult to organize a recruiting trip where a graduate student, except in a few high-demand occupations, could see three or five employers on a single visit.

The specialized nature of employers' needs also makes it difficult for employers to co-operate on overseas recruiting trips. A subsidy to employers who are prepared to recruit Canadians out of the country would be hard to justify when there are Canadians unemployed at home.

There is evidence that many university graduates do not know how to look for a job and postpone consideration of a career until near graduation time. Most are unaware of how the job market operates and of the many, many vacancies which are never advertised. The highly acclaimed Technical Service Council handbook, "How To Job Hunt Effectively", could be given to Canadian graduates who are leaving for graduate study in other countries. The handbook contains information on the Canadian labour market as well as practical hints on how to tackle it, how to write a resume, broadcast letters, prepare

TABLE 22

INCREMENTAL ANNUAL OPERATING EXPENSES TO ADD SPECIFIED GROUPS OF CANDIDATES TO A NATIONAL REGISTER OF CANADIANS STUDYING FOR PH.D'S IN ENGINEERING AND SCIENCE IN THE UNITED STATES

Group	Estimated Group Size per Year	Estimated Number Registering per Year	Additional Annual Expenses	Additional Start-up Costs
All other Ph.D's graduating in the U.S.	140	13 - 28	$ 1,800 - 2,800	-
B.Sc's and M.Sc's graduating in the U.S.	600	54 - 120	$ 6,000 - 13,200	$ 5,000
Bachelor's and master's graduates, in other than engineering and science in the U.S.	3,000	270 - 600	$29,700 - 66,000	$15,000
Ph.D's in all other countries	70	7 - 14	$ 1,000 - 1,600	-
Employed engineers and scientists, U.S. only	8000 - 16000	720 - 3200	$74,700 - 387,500*	$95,000
Employed engineers and scientists, all other countries	2000 - 4000	180 - 800	$43,000 - 105,000*	$25,000

*Includes $67,000 for advertising in the U.S. and $25,000 in other countries.

A register which would cover engineering and science Ph.D.'s in the U.S. plus all the groups above would need an annual expense budget of from $204,000 to $634,000 plus $160,000 start-up expenses.

for interviews and negotiate with employers. These 138-page books could be put in the hands of graduates for $13.75, including distribution costs.

Some American companies are said to pay university professors to refer graduates to them. A government-operated register could hardly compete in this way.

Canadians graduating in other countries could be offered monetary incentives to come back to Canada. In practice, these would not be effective unless an attractive job were available.

Universities would object strenuously to any system which required them to fill a certain percentage of their faculty vacancies by Canadians who graduated out of the country. Such a system would not only unnecessarily limit freedom, but would distort the labour market.

Students who receive funding from one of the Granting Councils could be required to return to Canada. Fulbright scholars, at least, are required to return to their native country so such a provision would not be unique. However the proviso could not be enforced and is therefore unattractive.

Perhaps more could be done to make graduates leaving Canada aware of the job listings in the "CAUT Bulletin" and "University Affairs". These would be even more effective if they contained a higher percentage of available vacancies. Although many universities have labour contracts which require them to advertise tenure-track vacancies in these publications, both Memorial University and the University of Calgary are excluded from advertising in the "CAUT Bulletin". In addition, some universities estimate that only 50% of their vacancies, many of which may be temporary, are advertised in these bulletins. Perhaps more could be done to make graduates leaving Canada for study in other countries aware of the job listings in these publications. Similarly, universities could be encouraged to use the publications more frequently.

Neither a register nor any of these alternatives gets at the basic reasons why Canadians do not return: among them the perceived lack of opportunities in their specialty and lack of research support available in Canada.

6. CONCLUSIONS

Sixty-five percent of the organizations contacted have a strong or moderate interest in a register and 70% say they would use it. Thus there is substantial support for the idea, although the number of potential candidates is so small and cost-consciousness among employers so great that the register would not likely be self-supporting, even after three years.

Moreover, job vacancies likely to be listed on it are those which employers have had trouble filling. Thus practically all vacancies are likely to be for specialists, which will prove difficult to fill.

If the register were able to attract every Canadian Ph.D. graduating in the U.S., the United Kingdom, France and West Germany each year, only 350 people would be available for employers to chose from. Today, it would not be unusual for a placement service to consider 350 candidates without finding the specialist the typical industrial employer is seeking. When registrations are likely to be 10% of those graduating, and 20% at most, the chances of meeting employers' expectations are poor.

Therefore it is considered that a national register of Canadians in research-oriented occupations working and/or studying out of the country would not be cost-effective. (Table 23).

If it is considered in the public interest to have such a register, it is recommended that it be limited to Canadian Ph.D's graduating in any discipline in any country. Practically, the solicitation of potential graduates from the United States, the United Kingdom, France and West Germany would attract over 90% of prospective graduates. The service should aimed at universities and research laboratories, the most enthusiastic supporters of the concept. The booklets of resumes could be produced twice a year and sold to potential recruiters.

Much favourable publicity could be generated by having the register manager give talks to service clubs and professional organizations. Each talk could be expected to result in widespread coverage not only in the local media but also on the wire services. However, the part-time manager envisaged would not have time to undertake such public relations. The publicity

TABLE 23

PROJECTED ANNUAL OPERATING COSTS FOR A NATIONAL REGISTER OF CANADIANS STUDYING FOR Ph.D.'s IN ALL COUNTRIES

INCOME	1988	1989	1990
Sale of Resume Books*	$ 3,000	$ 6,000	$ 6,200
Candidate registrations	100	100	100
	$ 3,100	$ 6,100	$ 6,300
EXPENSES#			
Salaries and benefits	$ 36,200	$ 36,200	$ 36,200
Accounting and audit	600	650	650
Advertising and public relations	2,000	2,000	2,000
Office expenses	10,000	10,000	10,000
Rent	7,500	7,500	7,500
Telephone	800	800	800
Travel	2,500	2,500	2,500
Contingencies	2,800	2,800	2,800
	$ 62,400	$ 62,450	$ 62,450
Operating Loss	(59,000)	(56,300)	(56,100)
Start-up expenses (largely equipment and furniture purchase)	$ 15,000	$ 15,000	$ 15,000

Basis: 140 - 150 eligible candidates per year of whom 13 to 30 register. Candidates restricted to Canadians studying for a Doctor's degree in any country.

Projected staff: part-time manager plus part-time secretary.

*No fees charged for first six months. Thereafter, $50 charged for first copy of each resume book, $25 for additional copies. $5 charged for each candidate registration after six months.

#No allowance made for inflation.

such talks would generate would encourage registrations in later years but the project would be unlikely to increase placements sufficiently to justify the expense.

It is recommended that the register be operated on a government contract by an independent organization, either profit-making or non-profit, for a 3-year trial period. The organization could be paid a management fee, with an incentive for improved performance. Any organization chosen should meet the following criteria:

1. Knowledge of the Canadian job market for the types of people to be registered and placed.

2. Contacts with Canadian professional associations.

3. Financial stability.

4. Contacts with universities, research laboratories, industrial organizations and other potential users of the candidates.

5. A record of success.

6. A record of innovation.

The first task of a register operator would be to recruit a manager. This action would be followed by the development of a business plan, hiring and training staff, establishing an advisory committee of users from universities and industry, setting up an office, establishing liaison with employers, universities, the Granting Councils, the Canada Student Loan Program, The College Placement Council, The National Association for Foreign Student Affairs, The American Association of Collegiate Registrars and Admissions Officers, The American Council of Education, The National Center for Education Statistics, The Association of Commonwealth Universities, the British Council, individual university graduate departments, Canadian professional associations, and other organizations likely to be sources of jobs or candidates.

Other tasks would be to identify and program suitable software, hire a public relations agency (because a few news releases would likely generate far more candidate enquiries than a similar amount spent on advertising), solicit registrations and publicize the service with employers.

Starting up the operation would take six or eight months but there is little prospect of financial self-sufficiency even with an efficiently operated system.

APPENDIX 1

ORGANIZATIONS CONTACTED

Aerospace Industries Association of Canada
Alberta Heritage Foundation for Medical Research
Association of Canadian Medical Colleges
Association of Consulting Engineers of Canada
Association of Universities and Colleges in Canada
Biological Council of Canada
+ Business Council on National Issues
Canadian Advanced Technology Association
Canadian Association for Information Science
Canadian Association of Graduate Schools
Canadian Association of Physicists
Canadian Association of University Teachers
The Canadian Bankers' Association
Canadian Chemical Producers' Association
Canadian Council of Professional Engineers
Canadian Council of University Biology Chairmen
+ Canadian Education Association
Canadian Federation for the Humanities
Canadian Federation of Biological Societies, Inc.
Canadian Federation of Deans of Management and Administrative Studies
Canadian Federation of Independent Business
Canadian Federation of Students
Canadian Gas Research Institute
Canadian Information Processing Society
Canadian Institute for Advanced Research
Canadian Institute of Chartered Accountants
Canadian Labour Market & Productivity Council
Canadian Mathematical Society
Canadian Manufacturers' Association
The Canadian Medical Association
Canadian Nuclear Association
Canadian Psychological Association
Canadian Pulp and Paper Association

+ Canadian Research Management Association
Canadian Society for Clinical Investigation
Canadians for Health Research
Chemical Institute of Canada
Conseil du patronat du Québec
Council of Canadian University Chemistry Chairmen
Economists', Sociologists' and Statisticians' Association
Engineering Institute of Canada
Engineering Personnel Managers' Association
Formation de chercheurs et l'aide à la recherche
Independent Petroleum Association of Canada
Information Technology Association of Canada
Mining Association of Canada
National Cancer Institute of Canada
National Research Council of Canada
Personnel Association of Ontario
Pharmaceutical Manufacturers Association of Canada
Public Service Commission
Royal College of Physicians and Surgeons of Canada
Social Science and Humanities Research Council
Society of Plastics Industry of Canada
+ Society of Philosophy and Social Science
Statistical Society of Canada
@ University and College Placement Association

+ Did not wish to express an opinion
@ Supplied list of 248 industrial members for a survey

APPENDIX 2

SHORTAGES REPORTED BY ASSOCIATIONS

Applied mathematicians (mentioned twice)
Avionics engineer
Biotechnologist
Botanist, bilingual (vacant for two years)
Communication engineer
Computer-aided designer
Control engineer
Doctor in business administration
Electronic engineer (mentioned four times)
Expert systems specialist
Manufacturing engineer
Microbiology PhD
Plastic mould designer
Polyethylene chemist
Polymer chemist (mentioned three times)
Psychologist (for Newfoundland) vacant two years
Rehabilitation medicine researcher
Robotics engineer
Statistician
Structural fatigue and fracture specialist
Systems analyst with text-oriented experience

Each occupation or specialty was mentioned once unless otherwise noted.

APPENDIX 3

POSITIONS WHICH UNIVERSITIES HAVE HAD DIFFICULTY IN FILLING

Arts and Science Faculties

- Accountant
- Applied mathematician
- Atomic molecular physicist
- Biotechnologist
- Computer science Ph.D's (mentioned twice)
- Doctors in business administration (mentioned twice)
- Economist (mentioned twice)
- Economist specialized in econometrics
- Ecologist
- English (critical theory specialist)
- Geologist
- Geophysicist
- Laser physicist
- Seismologist
- Sociologist
- Statistician
- Surface and analytical chemist

One dean reported difficulty finding females.

Engineering Faculties

- Biotechnologist
- Computer engineer (mentioned three times)
- Expert systems specialist
- Explosives technologist
- Industrial engineer
- Materials engineer specializing in composites and ceramics (mentioned twice)
- Robotics engineer (mentioned three times)
- Specialist in microelectronics, VLSI (mentioned twice)
- Telecommunications engineer

Faculties of Medicine

- Head of rehabilitation medicine
- M.D. with research experience who can also treat patients and teach
- Microbiologist
- Ophthalmologist
- Pathologist
- Specialist in medical imaging
- Surgeon (recruiting difficulty said to be due to low salary)

APPENDIX 4

POSITIONS WHICH GOVERNMENT LABORATORIES HAD DIFFICULTY FILLING

Agricultural scientist

Agricultural scientist with specialty in physical sciences

Artificial intelligence specialist

Bacteriologist

Biological computer modeller

Biometrician

Biotechnologist

Cognitive scientist

Combustion and fuel technology scientist

Computer scientist (2 mentions)

Electrical engineer

Food scientist

Forage agronomist

Forest researcher

Fruit breeder

Marine biophysicist

Medical officer

Microbiologist

Mineral processing researcher

Molecular geneticist (2 mentions)

Nutritionist

Plant breeder

Population biologist with experience in the Arctic

Remote sensing scientist

Research scientist willing to go to the North

Space engineer

Statistician with computer programming experience

Toxicologist

Veterinarian with post-graduate training in epidemiology, microbiology, pathology

Veterinarian with post-graduate training in bacteriology, immunology, virology

Wheat-rust pathologist

Zoologist

APPENDIX 5

POSITIONS WHICH INDUSTRIAL FIRMS HAD DIFFICULTY FILLING

Accountant with university degree

Actuary

All professional categories in four to seven years' working experience group

Analytical chemist

Ceramic engineer with Ph.D.

Chemical engineer and chemist with Ph.D. and experience in paper, oil-field chemicals, lubrication, water treatment

Chemical engineer with Ph.D. and four years' experience

Chemical engineer (3 mentions)

Chemical oceanographer

Chemist with Ph.D.

Chemist with experience in paint and O & M finishes

Chemist (2 mentions)

Chemist with colour experience

Chemist with experience in formulation of agricultural chemicals

"Competent practical engineer"

Corrosion scientist with Ph.D.

Data-processing trainer

Data-processing methodology specialist

Economist

Electrical engineer (3 mentions)

Electronic design-development engineer

Electronic engineer with experience in microelectronics

Electrochemist (2 mentions)

Environmental engineer

Engineer with navigation, guidance and control and image-processing experience

Extruder engineer

Food product development scientist

Formulation chemist for microbial pesticides

Hardware video designer

High-speed precision equipment designer

Human factors engineer

Hydrometallurgist (2 mentions)

ILS manager

Instrumental and control engineer
Integrated-circuit designer
Lacquer chemist
Lubricants and plastics chemist
Manufacturing manager
Material scientist (3 mentions)
Material scientist with advanced composites knowledge
Membrane scientist
Metallurgical engineer with M.Sc. and Ph.D.
Naval architect with theoretical background
P.A. manager
Physical scientist
Physicist with Ph.D.
Polymer chemist (3 mentions)
Power plant engineer
Project engineer (2 mentions)
Project manager (2 mentions)
Pulp and paper mill engineer
R & D chemist with coatings experience
R.F. engineer
Radar engineer
Real-time software specialist
Sales engineer
Senior chemical process engineer
Senior engineer (type unspecified) (2 mentions)
Senior mechanical or electrical engineer
Senior power generation engineer
Senior research chemist capable of scientific and project leadership
Software engineer
Structural engineer with advanced degree
Switching software designer
Systems analyst
Systems architect
System software developer
"Techno-marketeer"
Wood chemist, Ph.D.

APPENDIX 6

Roughly a quarter of the Canadians studying in the United States have student loans from the Canada Student Loan Program, which would be another convenient way of notifying Canadians of the register.

CANADIANS STUDYING IN OTHER COUNTRIES WHO RECEIVED STUDENT LOANS FROM THE CANADA STUDENT LOAN PROGRAM

	1984	1985	Year Ending July 31, 1986
United States	3,393	3,590	3,845
United Kingdom	196	235	309
Europe	217	252	307
Rest of World	46	55	61
	3,852	4,132	4,522

CANADA STUDENT LOANS BY ACADEMIC LEVEL YEAR ENDING JULY 31, 1986

Academic Level	U.S.	U.K.	Rest of Europe	Rest of World	Total
Non-degree	588	55	127	11	781
Bachelors	2,261	100	97	29	2,487
Masters	792	122	56	14	984
Ph.D's	203	32	27	7	269
	3,844	309	307	61	4,521

Source: Secretary of State

APPENDIX 7

TOP TWENTY-FIVE U.S. SCHOOLS FOR CANADIANS AS MEASURED BY THE NUMBER OF CANADIAN DOCTORAL GRADUATES, 1978-1983

	Number of Ph.D's Granted
University of Oregon	74
Harvard University	65
M.I.T.	62
Cornell University	53
Stanford University	51
Yale University	47
University of California (Berkeley)	46
Princeton University	43
University of Indiana (Bloomington)	41
University of Wisconsin (Madison)	40
Michigan State University	39
Boston University	38
University of Michigan	37
University of Minnesota	37
State University of New York (Buffalo)	37
University of Washington	34
University of Illinois (Urbana)	33
U.C.L.A.	30
Pennsylvania State University	30
University of Pennsylvania	28
Ohio State University	27
California Institute of Technology	24
University of Illinois (Chicago)	24
Columbia University	21
Brigham Young University	20

Source: Doctoral Recipients Survey, National Research Council, (Washington)

APPENDIX 8

CLUSTERS OF CANADIAN DOCTORAL RECIPIENTS FROM U.S. SCHOOLS IN NATURAL SCIENCES AND ENGINEERING FIELDS, 1978-1983

	Field	Institution	Number of PhD's Granted	Total Number Granted in Field
1.	Physics and Astronomy	C.I.T.	8	
		Cornell	8	
		Harvard	7	
		Stanford	6	
	Subtotal		29	60
2.	Chemistry	M.I.T.	7	
		U.C.L.A.	4	
		C.I.T.	3	
	Subtotal		14	44
3.	Earth, Atmospheric and Marine Science	M.I.T.	4	
		Harvard	3	
		Princeton	3	
		Stanford	3	
		Washington	3	
	Subtotal		16	46
4.	Mathematics	Cornell	7	
		California (Berkeley)	5	
		Princeton	5	
		C.I.T.	4	
		M.I.T.	4	
		Stanford	4	
	Subtotal		29	67
5.	Computer Sciences	Carnegie Melon	3	
		U.C.L.A.	2	
		Illinois (Urbana)	2	
		Stanford	2	
	Subtotal		9	15
6.	Engineering	M.I.T.	23	
		Stanford	11	
		California (Berkeley)	6	
		Cornell	5	
		Princeton	5	
		C.I.T.	4	
		Illinois (Urbana)	4	
		Texas A & M	4	
	Subtotal		62	102
7.	Biochemistry	Cornell	3	19

	Field	Institution	Number of PhD's Granted	Total Number Granted in Field
8.	Other Biosciences	Michigan State	7	
		Michigan	5	
		California (Berkeley)	4	
		California (Davis)	4	
		Florida	4	
		Pensylvania State	4	
		Washington	4	
		Wisconsin (Madison)	4	
	Subtotal		36	128
9.	Agricultural Sciences	Cornell	9	
		Oregon State	8	
		Wisconsin (Madison)	7	
	Subtotal		24	61
10.	Life Sciences	Cornell	16	
		Michigan	13	
		Wisconsin (Madison)	13	
		Oregon State	10	
		Minnesota	10	
		California (Davis)	8	
		California (Berkeley)	7	
		Harvard	6	
		Michigan	6	
		Purdue	6	
		Washington	6	
		Wayne State	6	
	Subtotal		107	254

Source: Doctoral Recipients Survey, National Research Council, (Washington)

APPENDIX 9

SURVEY METHODOLOGY

Telephone interviews were conducted with selected employers, academics, alumni representatives, professional and trade associations as a means of identifying issues and formulating a questionnaire.

A letter was sent to 67 professional and trade associations, and followed up by up to four telephone calls. Forty-seven responded (70%).

Telephone interviews were also conducted with vice-presidents-academic, deans of arts and science, engineering, medicine and other senior university officials; representative employers, the former organizers of "Operation Retrieval", American professional associations, the National Science Foundation (U.S.), and Canadian and American academics specializing in this area. The results of the telephone interviews were recorded on a form.

Questionnaires were sent to 327 research laboratories employing ten or more engineers and scientists listed in Statistics Canada's publications, Directory of Federal Government Scientific & Technological Establishments, 1986 (Catalogue No. 88-206E) and Directory of Industrial Research & Development Facilities in Canada, 1986 (Catalogue No. 88-205E). Additional questionnaires were sent to non-profit and other organizations not listed in those publications. Thirty-five percent of the combined group replied.

Through the courtesy of the University and College Placement Association, questionnaires were sent to 248 organizations who are major recruiters at universities. Thirteen percent replied.

In all, 236 replies were received from 755 research units and organizations.

Computer data bases were searched for information on the "brain drain", the job market and efforts by other nations to retrieve their graduates.

Much use was made of unpublished labour market studies by the Technical Service Council, as well as TSC data on consultants' workload, direct-mail campaigns, file up-dating, operating costs, promotion of Canadian graduates at the Harvard Business School and operating standards of employment agencies.

The manpower forecasts for all research-intensive occupations in Canada Employment's forthcoming issue of Job Futures were reviewed.

ACKNOWLEDGEMENT

The authors very much appreciate the assistance they received from so many personnel managers, deans, other academics, association executives and government officials. Without the help they gave so willingly this report would not have been possible.

60 YEARS

TECHNICAL SERVICE COUNCIL

ONE ST. CLAIR AVENUE EAST, 10TH FLOOR, TORONTO, CANADA M4T 2V7, TEL. 966-5030

June 29, 1987

LETTER SENT TO SELECTED ASSOCIATIONS

Dear

For years Canadians have been concerned about the loss of university-trained talent to other countries. The Federal Government has engaged us to study the feasibility of establishing a national system to keep track of Canadians in research-intensive occupations studying and/or working outside the country. The objective would be to provide them with information on jobs in Canada and to inform employers about their availability.

We would greatly appreciate the views of your organization on the utility of such a system.

Some of the issues are:

- Whether the register should cover Canadians both studying and working abroad.
- What disciplines and occupations should be included.
- Whether the register should be confined to Canadians in North America, Europe or world-wide locations.
- How often it would be used.
- What information should be included in the register.
- How much users would contribute towards the costs of such a system.

We shall take the liberty of telephoning you in the near future to obtain your views. Your cooperation will be appreciated.

Yours truly

Neil A. Macdougall
President

NAM:DG

SURVEY OF ORGANIZATIONS

SURVEY ON THE NEED FOR A REGISTER OF CANADIANS STUDYING AND WORKING OUTSIDE CANADA

Organization: _____

Contact: _____ ____ Member orgn's employing _____

_____ Individuals

Form and Use of Register

1. Would your organization use a national register of Canadians working and/or studying out of the country? _____(Yes) _____(No)

   If not, why not _____

2. How often would you expect to use the register? _____ times per year

3. What is your degree of interest in such a register?

   _____Strong _____Moderate _____Little _____See no need

4. What types of professionals would you like to see listed?

Discipline	New Bachelors Grads	New Masters Grads	New PhD's	Grads with one to 25 years' experience
Computer Scientists				
Engineering				
Physical Scientists				
Life Scientists				

5. From what geographical location are you prepared to interview candidates?

Discipline	Nearby	Somewhere in Canada	U.S.	U.S & Europe	Anywhere	Other (specify)
New Bachelors' graduates						
New Masters' graduates						
New PhD graduates						
Experienced graduates						

6. How would you like the register to operate? Please mark 1 - 5 in order of preference.

   a) Employer to list jobs and receive screened responses _____

   b) Employers to receive quarterly lists of available candidates _____

   c) Employers' jobs to be advertised in a newspaper circulated to graduates outside the country, who would reply directly to you _____

   d) On-line computer register where vacancies could be entered in a computer at your office and resumes viewed _____

   e) Other (please specify) _____

7. Do your recruiters have access to a personal computer with a modem? _____(Yes) _____(No)

.../2

The Government would prefer to recover part of the cost of any such register.

1. How much would you be prepared to pay

For listing each vacancy?		For filling a job?	
Nothing	____	Nothing	____
$10. - $25.	____	1% - 3% of starting salary	____
$26. - $50.	____	4% - 6% of starting salary	____
$51. - $100.	____	7% - 10% of starting salary	____
Other (please specify)	_____	Other (please specify)	_____

2. Which would you prefer? a fee for listing a job _____ a placement fee _____

Recruiting Practices

1. What types of people, if any, have you had difficulty recruiting?

_____

_____

_____

Comments _____

_____

_____

_____

60 YEARS

TECHNICAL SERVICE COUNCIL

ONE ST. CLAIR AVENUE EAST, 10TH FLOOR, TORONTO, CANADA M4T 2V7, TEL. 966-5030

June 30, 1987

I M P O R T A N T:

NEED FOR A NATIONAL REGISTER OF CANADIAN RESEARCHERS OVERSEAS

Dear Scientific/Engineering Manager:

For years Canadians have been concerned about the loss of university-trained talent to other countries. The Ministry of State for Science and Technology have engaged us to study the feasibility of establishing a national system to keep track of Canadians in research-intensive occupations studying and/or working outside the country. The objective would be to provide them with information on jobs in Canada and to inform employers about their availability.

Although there has been much publicity about the "brain-drain", there is little reliable data on whether employers would use such a register, the number of vacancies which might be generated and the form any register should take.

Your views would enable the Government to achieve several things:

1. Determine whether a register would be useful and cost-effective.

2. Permit policy-makers to design a register which meets employers' needs.

3. Identify the disciplines, specialities and the geographical locations which employers would prefer.

The information in this questionnaire will be published in summary form only and specific information on individual organizations will not be released. We would greatly appreciate your cooperation. If you have any questions do not hesitate to contact me.

Yours truly

N.A. Macdougall
President

NAM:DG
Encl.

1927 1987

SURVEY ON THE NEED FOR A REGISTER OF CANADIANS STUDYING AND WORKING OUTSIDE CANADA

Recruiting Practices:

	1985	1986	6 Mos. 1987
1. No. of engineers and scientists hired per year			
Computer scientists	____	____	____
Engineers	____	____	____
Physical scientists (chemists, physicists, etc.)	____	____	____
Life scientists	____	____	____
2. No. of those above hired from outside Canada			
Computer scientists	____	____	____
Engineers	____	____	____
Physical scientists (chemists, physicists, etc.)	____	____	____
Life scientists	____	____	____

3. Total engineers and scientists employed in your unit _____

Type of organization: Industry ☐ Government ☐ Crown Corporation ☐ Non-profit ☐

4. Anticipated needs	1988	1989	1990
Computer scientists	____	____	____
Engineers	____	____	____
Physical scientists (chemists, physicists, etc.)	____	____	____
Life scientists	____	____	____

5. What types of people, if any, have you had difficulty recruiting?

_____

_____

Form and Use of Register

1. Would your organization use a national register of Canadians working and/or studying out of the country? _____(Yes) _____(No)

   If not, why not _____

2. How often would you expect to use the register? _____ times per year

3. What is your degree of interest in such a register?

   _____Strong _____Moderate _____Little _____See no need

PLEASE TURN OVER

4. What types of professionals would you like to see listed?

Discipline	New Bachelors Grads	New Masters Grads	New PhD's	Grads with one to 25 years' experience
Computer Scientists				
Engineering				
Physical Scientists				
Life Scientists				

5. From what geographical location are you prepared to interview candidates?

Discipline	Nearby	Somewhere in Canada	U.S.	U.S & Europe	Anywhere	Other (specify)
New Bachelors' graduates						
New Masters' graduates						
New PhD graduates						
Experienced graduates						

6. How would you like the register to operate? Please mark 1 - 5 in order of preference.

a) Employer to list jobs and receive screened responses _____

b) Employers to receive quarterly lists of available candidates _____

c) Employers' jobs to be advertised in a newspaper circulated to graduates outside the country, who would reply directly to you _____

d) On-line computer register where vacancies could be entered in a computer at your office and resumes viewed _____

e) Other (please specify) _____

7. Do your recruiters have access to a personal computer with a modem? ____(Yes) ____(No)

The Government is seeking to recover part of the cost of such a register.

1. How much would you be prepared to pay

For listing each vacancy?

Nothing ____
$10. - $25. ____
$26. - $50. ____
$51. - $100. ____
Other (please specify) _____

For filling a job?

Nothing ____
1% - 3% of starting salary ____
4% - 6% of starting salary ____
7% - 10% of starting salary ____
Other (please specify) _____

2. Which would you prefer? a fee for listing a job _____ a placement fee _____

Comments _____

_____

(optional) Name _____ Organization _____ City _____