EXECUTIVE SUMMARY

Introduction

The 'Science and Technology Budget' - the annual Forfás publication on State investment in science and technology - provides details of the allocations made by Government to scientific and technological (S&T) activities. In all, 43 government departments/agencies are included in the 1998 S&T Budget.

The total value of the S&T Budget in 1998 amounts to £845m, an increase of £113.4m or 15.5% over the 1997 level. All of the increase is accounted for by public funds, which rose from £586m outturn in 1997 to an allocation of £700m this year; the balance of £145m arises from income earned from the activities of the departments and agencies.

While the total figure is large, the coverage of the S&T Budget is very wide and includes S&T-based activities such as those of Met Éireann, Geological Survey and some elements of the Office of Public Works. The 'real science' element of the S&T Budget is considerably smaller than the total, and this year a clearer overall picture is presented by focusing sections of the report on different activities within the overall total.

Research and Development

The levels of R&D performed in the various departments and agencies of the State is contrasted with the total amounts they fund. An individual department or agency might perform little or no R&D itself while providing funding to other performers in either the public or private sectors.

The allocation for performance of R&D in 1998 is £55.8m, up from £51.7m last year. Nearly £12m of this is earned income so that the public funds invested amount to £44m in 1998.

In terms of *funding*, the departments and agencies are allocating £139m to R&D in 1998, up from £115m in 1997. A significant proportion of this increase (£11m) represents additional support for R&D in enterprises from the Department of Enterprise, Trade and Employment.

S&T for the Productive Sectors

This section details the support from government departments and agencies for scientific and technological activities other than research and development. These include information and advisory services, scientific and technical services, education and training, and technology transfer. These activities are to support the productive sectors of the economy Ð industry, agriculture and food, environment, marine and forestry, energy and transportation.

Education and Health

Educational activities, which include all third level education in the field of science and technology, account for 54% of the total S&T Budget in 1998. S&T courses in the Universities and Institutes of Technology are the major performers.

General Public Service

Other S&T Budget activities are included in this section of General Public Service. They account for 5.5% of the total budget.

Total S&T Budget

The funding matrix for the total S&T Budget overleaf illustrates the funding sources for all S&T activities included in the budget.

Matrix of science and technology budget funds. 1998. £m

Indicative Distribution of Govermant Funds for Science and Technology. 1998. £m

	RESEARCH AND DEVELOPMENT					S&T INFO.	TECH. SERVICES	TECH. TRANSFER	S&T ED. & TRAIN.	OVERHEADS & EXTRAMURAL	TOTAL
	Business	Third Level (1)	PATS (2)	Government	Total						
SOURCE OF FUNDS:											
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
Direct	4.0	17.2	2.1	34.2	57.5	26.1	51.0	1.3	290.2	109.5	535.7
Exchequer											
Indirect (3)		17.7			17.7						17.7
CSF Funds	35.6	12.7	6.2	9.9	64.3	8.4	5.5	3.0	64.8	1.1	147.0
EU contracts		10.5	3.7	3.1	17.3	0.3	1.6	0.0	0.0	0.3	19.5
Business		9.9	4.2	4.8	18.9	9.8	11.2	0.0	0.1	0.4	40.3
Other earned income		5.2	2.5	3.9	11.6	10.1	15.2	0.0	40.4	7.7	84.9
Total	39.6	73.2	18.6	55.8	187.2	54.7	84.5	4.4	395.5	119.0	845.2

(1) Science and Technology departments only

(2) AMT ireland is classified under S&T information and technical services

(3) Indirect funds for R&D are calculated on basis of HEA allocation to academic departments only

COMMENTARY

Prioritising State Expenditure on Science and Technology (S&T)

The Government has recently put in place new structures and procedures which are intended to assist in identifying national S&T priorities, in devising a long-term strategy for S&T and in facilitating planning of S&T spending. An Inter-Departmental Committee on Science and Technology has been established, comprised of senior officials in the major S&T spending departments. This Committee will review each year the actual S&T spend across departments and agencies and will examine proposed S&T spending for the following year. It is intended to make proposals on S&T spending to the Cabinet Committee on Science and Technology.

The Government has also established the Irish Council for Science, Technology and Innovation (ICSTI) to advise it on the strategic direction of science and technology policy, embracing all aspects including scientific research, third-level education, technology and R&D in industry, financing for innovation, public awareness of S&T, and prioritisation of state spending on S&T. The views of the new Council are an important input into the work of the Inter-Departmental Committee.

These are most positive and welcome moves, which confirm the increasing importance attached by the Government to the role of science and technology in economic and social development. This is most clearly visible in relation to the contribution of education at all levels in developing the skills and expertise required in a modern, technology-driven economy. The £250m Scientific and Technological Education (Investment) Fund announced by the Department of Education and Science in Autumn 1997 is the most significant development in recent years in the whole science and technology field. It is the major contributor to the substantial increase of 15.5% in the total state Science and Technology Budget this year.

The annual report on State Investment in Science and Technology (the ÔScience and Technology BudgetÕ) is a major source of information both for ICSTI and for the Inter-Departmental Committee. In this 1998 edition of the ÔS&T BudgetÕ there are significant changes in the format in which the information is presented. These changes are intended to assist the users of the report to identify more easily the salient features of the Irish S&T landscape.

Importance of Research and Development

Greater prominence is being given in this yearÕs ÔS&T BudgetÕ to research and development (R&D). Section 2 is devoted entirely to this topic. This reflects the predominant role of R&D in science and technology policy and its importance to the achievement of national objectives. There exists a wealth of international data on R&D published by the OECD, which permits a benchmarking of Irish performance against other countries. Particular reference is made to Table 3 in section 2.3. This shows Ireland last in a representative list of countries in relation to both performance of R&D in the public sector and funding of R&D by Government (whether performed in the business sector, higher education sector or government sector itself).

Ireland has been very successful in attracting high technology industries and they now account for a high proportion of industrial exports. However, a substantial proportion of the high technology companies located here depend for their future technology on research activities of the parent company. National priorities in this area need to concentrate on developing and deepening the participation of existing multinationals in the Irish economy. In view of the high-tech profile of these industries it is important to build up a credible and visible research infrastructure to help to anchor the activities of these industries in Ireland. Secondly, it is vital to put in place an underlying stratum of fertile soil from which new, indigenous industries can germinate. Over the past five to ten years a number of such successful firms have arisen, including Iona Technologies, Trintech and Baltimore Technologies, which for the

most part have their origins in the university research environment. Strengthening this environment will ensure that the flow of new, technology-based enterprises will increase.

As well as contributing to the development of a research infrastructure to support industrial development, public investment in research is an important element in helping government departments to achieve their strategic objectives. For example, recent rapid increases in prosperity have already given rise to a number of difficult social, economic and environmental problems. Without an adequate research base to analyse these issues in depth it will prove very difficult to identify the most appropriate public policy response. This report identifies clearly the research spending and performance in the public sector and should enable government departments to assess and benchmark their involvement in research.

Reliance on EU Funds

Throughout this report emphasis is put on the contribution of EU funds to Irish science and technology. Section 7 details the relevant facts. The EU contribution has been concentrated in a number of key areas: research and development, where £64m or 46% of public funds are from the EUÕs Community Support Framework (CSF); S&T activities for industry, where £14m or 35% of public funds are from the CSF; S&T activities for agriculture and food, where £7m or 20% of public funds are from the CSF.

As the current CSF comes to an end in 1999, the future of S&T funding after that is uncertain. The implications for funding of public sector S&T activities which are vital for economic and social development are very serious and this needs to be taken into account in the preparation of the National Plan for the period 2000 Ð 2006

1. INTRODUCTION

Irish Science and Technology has recently experienced on upsurge in interest and activity. A number of significant structural changes have taken place, including the establishment of the Irish Council for Science, Technology and Innovation (ICSTI) and of a Cabinet Committee and an Interdepartmental Committee for Science and Technology. The Department of Education has changed its name to the Department of Education and Science and has launched a number of new initiatives to support third level research.

It is only fitting, therefore, that the 'Science & Technology Budget' - the annual Forfás publication on State Investment in Science and Technology - should also change to reflect the new situation. The changes in this edition are not radical ones but they have been made in response to some of the work of ICSTI on public expenditure priorities. For the most part the changes are to the way in which the data are presented, giving greater prominence and emphasis than in the past to research and development. Arising from the greater visibility of, and interest in, the S&T Budget a number of government departments have requested changes in the coverage of the data relating to their activities. As far as possible, without too great an impact on the long-established time series of S&T Budget data, those requests have been complied with.

This document provides details of the allocations made by Government to scientific and technological (S&T) activities. In all, 43 government departments/agencies are included in the 1998 S&T Budget. The information on which the analysis is based was supplied by government departments, offices, agencies and other recipient institutions following finalisation of the overall government estimates for the public services for 1998, and after the operating institutions had decided on the distribution of their allocations over their programmes.

Figure 1. Government Departments/Agencies Funding S&T, 1998

DEPARTMENTS	AGENCY	DEPARTMENTS	AGENCY
Agriculture, Food & Forestry	Teagasc	**Education & Science**	HEA DIAS
Enterprise & Employment	Forfás Forbairt IDA Ireland	**Environment & Local Government**	EPA NRA
	NMRC Patents Office NMAC FÁS Innovation Centre NSAI	**Social, Community and Family Affairs**	
		Arts, Culture & the Gaeltacht	Údarás na Gaeltachta Natural History Museum
Public Enterprise	GSI RPII Met Éireann	**Health & Children**	HRB Postgraduate Medical & Dental Board
Marine & Natural Resources	Marine Institute BIM Central Fisheries Board	**Taoiseach**	NESC

OFFICES CSO OPW Central Bank State Laboratory Ordnance Survey

INCORPORATED COMPANIES ESRI Shannon Development SRAI

See Appendix 4 for explanation of acronyms.

Section 2 of this report examines research and development for the public sector in 1998. Section 3 considers other public sector activities related to the productive sectors of the economy. Section 4 covers S&T education, training and health, while Section 5 include a range of other public sector S&T activities. Section 6 brings together the total S&T picture for the public sector, including non-exchequer monies Ð mainly fees and other earned income Ð of institutions which operate science and technology programmes. The last section examines the influence of the European Union in supporting public sector sciences and technology in Ireland via its Community Support Framework initiatives.

2. RESEARCH AND DEVELOPMENT

Research and development (R&D) in all countries is performed in three distinct sectors of the economy Ð the business sector, the universities and technological institutes of the third level sector, and the government sector. The State both funds R&D activities performed in all three sectors and also arranges for R&D to be performed within the state sector in order to promote its own strategic objectives. This section examines both performance and funding of R&D by the State.

2.1 Performance of R&D in the Government Sector

Table 1 gives the profile of R&D performance in the government sector. The total 1998 allocation is £55.8m, representing about 0.4% of total government budget allocations of over £13 billion. Indeed, nearly £12m of the total comes from earned income, so that the public investment in R&D, which is performed in the state sector, is only £44m. There was an increase in total R&D spend in 1998 of £4.1m (7.9%) over the 1997 outturn.

Table 1. Performance of Research and Development in the Government Sector

Performing Department/Agency	1997 Source of funds				1998 Source of funds			
	Exchequer	CSF	Private	Total	Exchequer	CSF	Private	Total
	£'000	£'000	£'000	£'000	£'000	£'000	£'000	£'000
Department of Agriculture & Food	2,091	116	604	2,811	2,138	114	376	2,628
• Teagasc	12,350	5,257	5,976	23,583	11,695	5,435	6,217	23,346
Department of Marine & Natural Resources	469	0	3	472	400	0	6	406
• Marine Institute	3,446	1,135	268	4,849	3,722	2,140	984	6,846
• Salmon Research Agency of Ireland	324	106	107	537	407	132	49	588
• COFORD	29	87	0	116	48	146	0	194
Department of Health and Children	376	0	0	376	645	0	0	645
• Health Research Board	3,714	0	390	4,104	4,345	0	475	4,820
Department of Enterprise, Trade & Employment								
• Forbairt	445	314	404	1,163	468	339	435	1,241
• Innovation Centre	50	43	0	93	46	50	0	96
• National Microelectronics Applications Centre	0	50	355	405	0	49	411	460
• Fás	724	503	0	1,227	728	506	0	1,234
Department of the Environment & Local Government	290	0	0	290	286	0	0	286
• Environmental Protection Agency	1,043	261	380	1,684	1,102	709	735	2,546
• National Roads Authority	473	0	135	608	500	0	95	595

State Investment in Science & Technology, 1998

Performing Department / Agency	1997 Source of funds				1998 Source of funds			
	Exchequer	CSF	Private	Total	Exchequer	CSF	Private	Total
	£'000	£'000	£'000	£'000	£'000	£'000	£'000	£'000
Department of Finance								
• Economic and Social Research Institute	1,460	0	1,646	3,106	1,456	0	1,561	3,017
Department of Social, Community and Family Affairs	2,226	0	43	2,269	2,160	0	18	2,178
Department of Education and Science								
• Dublin Institute for Advanced Studies	992	43	364	1,399	1,222	36	174	1,432
Department of Arts, Heritage, Gaeltacht & the Islands	391	33	0	424	777	188	0	965
• Natural History Museum	315	0	0	315	350	0	0	350
Department of Public Enterprise								
• Radiological Protection Institute of Ireland	127	0	136	263	124	0	135	260
• Met Éireann	432	18	67	517	576	10	66	652
Department of the Taoiseach								
• National Economic and Social Council	460	0	12	472	374	0	10	384
Valuation and Ordnance Survey Office	270	0	0	270	270	0	0	270
Central Bank	279	0	0	279	277	0	0	277
State Laboratory	34	0	0	34	44	0	0	44
Total	**32,810**	**7,965**	**10,892**	**51,666**	**34,160**	**9,853**	**11,748**	**55,761**

Where there are transfers from one S&T agency/department to another the funds are accounted for in the performing agency

The major component of public sector R&D performance is Teagasc, which accounts for 41% of the total. When R&D performed directly by the Department of Agriculture and Food is included this percentage increases to 46%. Other significant performers are the Marine Institute (12%), the Health Research Board (8.5%), the Economic and Social Research Institute (5%) and the Environmental Protection Agency (4.5%).

2.2 Funding of R&D by the State

Table 2 shows the Government funding of R&D, which can be performed either in the Government sector itself, in the business sector or in third level education colleges. The total allocation is £139.5m, up from £114.7m in 1997 (an increase of 22%). This increase is mainly accounted for by two major elements Ð an additional £10m for R&D grants for enterprises via the Department of Enterprise, Trade and Employment and an increase of £10m for third level research via the Department of Education and ScienceÕs new research support scheme.

Table 2 Public Funding of Research and Development

		1997			1998		
Funding Department / Agency	**Performing Organisation**	**Exchequer £'000**	**CSF £'000**	**Public Funding £'000**	**Exchequer £'000**	**CSF £'000**	**Public Funding £'000**
Enterprise, Trade & Employment	Forbairt	2,199	16,634	18,834	2,055	26,597	28,652
	PATs	2,011	6,412	8,423	2,057	6,174	8,231
	IDA Ireland	850	4,682	5,532	550	6,000	6,550
	Higher Education Authority	1,395	4,186	5,581	1,464	4,393	5,857
	Shannon Development	1,951	3,188	5,139	1,351	4,000	5,351
	NMRC	674	2,020	2,694	615	1,845	2,460
	FÁS	724	503	1,227	728	506	1,234
	Údarás na Gaeltachta	0	972	972	0	900	900
	Innovation Centre	50	43	93	46	50	96
	ESRI	61	0	61	67	0	67
	NMAC	0	50	50	0	49	49
	DIAS	0	0	0	5	13	18
Sub-total		***9,915***	***38,691***	***48,606***	***8,937***	***50,527***	***59,465***
Education & Science	Higher Education Authority	18,928	0	18,928	19,118	0	19,118
	Education & Science	1,419	0	1,419	11,658	0	11,658
	DIAS	984	20	1,004	1,209	0	1,209
	ESRI	78	0	78	95	0	95
Sub-total		***21,409***	***20***	***21,429***	***32,080***	***0***	***32,080***

Agriculture & Food	Teagasc	12,344	5,204	17,548	11,689	5,377	17,065
	Higher Education Authority	1,351	4,010	5,361	1,303	3,844	5,147
	Department of Agri & Food	2,091	116	2,207	2,138	114	2,252
	Forbairt	37	110	147	39	119	158
	ESRI	0	0	0	13	0	13
Sub-total		***15,823***	***9,439***	***25,263***	***15,182***	***9,453***	***24,635***
Marine & Natural Resources	Marine Institute	3,383	1,135	4,518	3,680	2,140	5,820
	Salmon Research Agency	324	106	430	407	132	539
	Higher Education Authority	89	267	356	120	362	482
	Marine & Natural Resources	469	0	469	400	0	400
	COFORD	29	87	116	48	146	194
	Forbairt	43	130	173	43	130	173
	DIAS	8	23	31	8	23	31
	ESRI	14	0	14	29	0	29
	Teagasc	6	18	24	6	18	24
Sub-total		***4,365***	***1,765***	***6,131***	***4,741***	***2,951***	***7,692***
Health & Children	Health Research Board	3,714	0	3,714	4,345	0	4,345
	Health & Children	376	0	376	645	0	645
	ESRI	217	0	217	183	0	183
Sub-total		***4,307***	***0***	***4,307***	***5,173***	***0***	***5,173***
Environment & Local Government	Environ'al Protection Agency	1,043	261	1,304	1,102	709	1,811
	National Roads Authority	473	0	473	500	0	500
	Higher Education Authority	0	155	155	0	382	382
	Environment & Local Gov.	290	0	290	286	0	286
	Marine Institute	63	0	63	42	0	42
	Teagasc	0	35	35	0	40	40
	Met Éireann	13	0	13	14	0	14
	ESRI	9	0	9	8	0	8
Sub-total		***1,890***	***451***	***2,341***	***1,951***	***1,131***	***3,082***

Arts, Heritage, Gaeltacht & the Islands	Udaras na Gaeltachta	818	0	818	1,000	0	1,000
	Department of Arts, Heritage, etc.	391	33	424	777	188	965
	Natural History Museum	315	0	315	350	0	350
Sub-total		***1,524***	***33***	***1,557***	***2,127***	***188***	***2,315***
Public Enterprise	Met Eireann	420	18	438	562	10	572
	Forbairt	112	28	139	102	31	134
	Public Enterprise	127	0	127	124	0	124
Sub-total		***658***	***46***	***704***	***788***	***42***	***830***
Social, Community and Family Affairs	Social Community etc.	2,226	0	2,226	2,160	0	2,160
	ERSI	41	0	41	53	0	53
Sub-total		***2,267***	***0***	***2,267***	***2,213***	***0***	***2,213***
Finance	ESRI	1,012	0	1,012	1,008	0	**1,008**
State Laboratory	Ordnance Survey Office	270	0	270	270	0	**270**
Taoiseach	NESC	460	0	460	374	0	**374**
Central Statistics Office	ESRI	28	0	28	0	0	**0**
Central Bank	ESRI	279	0	279	277	0	**277**
Total		**64,241**	**50,445**	**114,687**	**75,167**	**64,292**	**139,459**

** Public Funds are exchequer & CSF funds*

Of the total of £139.5m some £64m, or 46%, comes from the EU via the Community Support Framework initiative. In some areas this reliance on EU support is even more critical; for example, the R&D activities funded by the Department of Enterprise, Trade and Employment are 85% funded by the CSF. A major proportion of that DepartmentÕs activities are in the form of grants to industry - £36m out of £59.5m total - which are heavily EU-dependent.

2.3 International Comparisons on Public Sector R&D

It is generally useful to compare the performance of a country in any major area of activity with what is happening in that area in other countries of a similar size and stage of development. In the case of Ireland it is difficult to identify any exact comparator economies. As recently as ten years ago the whole of Ireland was classified with Greece, Portugal and parts of Spain and Italy, as an underdeveloped region of Europe. This has changed today, mainly due to the performance of a number of high growth, high technology industrial sectors. Again, there are relatively few countries with a similar industrial profile to Ireland.

Nevertheless, international comparisons should be made and it would be unwise to discount totally the findings from such comparisons on the grounds that conditions here are very different form elsewhere. Such international comparisons are now common in relation to national competitiveness indicators, and research and development is a widely accepted measure of competitiveness.

Table 3 shows both the performance of R&D in the public sector (excluding the higher education sector) and the funding of R&D by the Government (this would fund R&D performed not only in the public sector but also in the business sector and in the higher education sector).

Table 3. R&D Performance and Funding by the Government Sector for Selected Countries. (1997 or nearest)

	Public Sector R&D Performance (% GDP)	Government Funding of Civil R&D (% GDP)
New Zealand	0.41	0.49
Finland	0.40	1.00
Netherlands	0.38	0.81
Denmark	0.32	0.76
Norway	0.30	0.88
Portugal	0.16	0.51
Sweden	0.13	0.96
Greece	0.13	0.34
Ireland (1998)	**0.13**	**0.27**

There is a wide variation in approaches and results between the different countries. Most of the countries except Sweden have a similar profile, performing a significant level of R&D in the public sector and funding still more in other sectors. Sweden has a tradition, as has Ireland, of having very little R&D performed in the public sector; however, in comparison it has a substantial investment in third level research, almost twice as much as a percentage of GDP as any other OECD country. Irish economic policy has concentrated more on attracting inward investment and has been so successful at this that economic growth rates are the envy of the world.

3. SCIENCE AND TECHNOLOGY FOR THE PRODUCTIVE SECTORS

Section 2 presented data on R&D across the whole public sector. In this section we look at other science and technology (S&T) activities, apart from R&D, which are performed in support of the productive sectors of the economy. The sectors considered are industry, agriculture and food, the environment, energy, the marine and forestry areas.

3.1 Industry

Table 4 shows the S&T allocations (including earned income) to various government departments and agencies to support industrial activity. Forbairt accounts for about one third of the total, providing a range of services in industrial technologies for enterprises as well as aids to technology transfer through its Technology Transfer and Partnerships programme and the Technology Placements programmes (Techstart and Techman). Industrial training programmes of FçS account for a further 22% of the total and the National Standards Authority of Ireland (NSAI) for 13%.

Table 4 1998 Science and Technology Allocations (including earned income) by Industry objective

	Information and Specialist Advisory Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
Agency / Department	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity
Forbairt	3,814 20	9,920 53	250 1	3,914 21	964 5	0 0	**18,862** **100**	**17,250** **9%**
FÁS	0 0	0 0	12,856 100	0 0	0 0	0 0	**12,856** **100**	**9,547** **35%**
Department of Enterprise, Trade and Employment	475 5	1,800 18	0 0	0 0	350 4	7,265 73	**9,890** **100**	**5,676** **74%**
NSAI	0 0	7,219 100	0 0	0 0	0 0	0 0	**7,219** **100**	**6,946** **4%**
Shannon Development	0 0	0 0	3,223 62	0 0	1,988 38	0 0	**5,211** **100**	**4,447** **17%**
Teagasc	1,248 55	865 38	0 0	0 0	0 0	142 6	**2,254** **100**	**2,061** **9%**
National Microelectronics Research Centre	0 0	0 0	0 0	0 0	950 100	0 0	**950** **100**	**959** **-1%**
Innovation Centre	504 100	0 0	0 0	0 0	0 0	0 0	**504** **100**	**487** **3%**
Forfás (inc. NAB)	0 0	456 100	0 0	0 0	0 0	0 0	**456** **100**	**448** **2%**

National Microelectronics Applications Centre	80 32	40 16	40 16	30 12	30 12	30 12	**250** **100**	**200** **25%**
IDA Ireland	0 0	0 0	0 0	200 100	0 0	0 0	**200** **100**	**0**
Bord Iascaigh Mhara	0 0	50 100	0 0	0 0	0 0	0 0	**50** **100**	**83** **-40%**
Total	**8,548** **14%**	**20,350** **33%**	**16,369** **27%**	**4,144** **7%**	**4,586** **7%**	**7,437** **12%**	**61,433** **100%**	**50,979** **21%**

3.2 Agriculture and Food

Table 5 shows the S&T allocations (including earned income) to government departments and agencies to support activities in the agriculture and food area. The major players here are the Department of Agriculture and Food (47%) and Teagasc (53%). The Department operates a number of veterinary laboratories, three dairy science laboratories, as well as classification, testing and certification schemes in relation to meat and crop production. The major activity in Teagasc is an advice service to farmers at enterprise level.

Table 5 1998 Science and Technology Allocations (including earned income) by Agriculture & Food objective

	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
Agency / Department	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity
Teagasc	24,276 93	1,557 6	0 0	0 0	0 0	327 1	**26,160** **100**	**24,409** **9%**
Department of Agriculture & Food	3,738 16	17,375 76	0 0	0 0	0 0	1,649 7	**22,762** **100**	**19,856** **-15%**
Total	**28,014** **57%**	**18,932** **39%**	**0** **0%**	**0** **0%**	**0** **0%**	**1,976** **4%**	**48,922** **100%**	**44,265** **11%**

3.3 Environment

Table 6 shows the science and technology allocations (including earned income) for activities broadly categorised as environment-related. The major components are the specialist advice, monitoring and laboratory services and other activities of the Environmental Protection Agency, as well as the technical services in environment management of Forbairt and Teagasc.

Table 6 1998 Science and Technology Allocations (including earned income) by Environmental objective

Agency / Department	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity
Environmental Protection Agency	1,289 18	5,910 80	0 0	0 0	0 0	160 2	**7,359** **100**	**6,875** **7%**
Forbairt	63 3	2,021 97	0 0	0 0	0 0	0 0	**2,084** **100**	**2,207** **-6%**
Radiological Protection Institute of Ireland	521 55	260 28	0 0	0 0	161 17	0 0	**941** **100**	**948** **-1%**
Teagasc	493 55	342 38	0 0	0 0	0 0	68 8	**903** **100**	**914** **-1%**
Department of Arts, Heritage, Gaeltacht & the Islands	690 100	0 0	0 0	0 0	0 0	0 0	**690** **100**	**1,369** **-50%**
Department of the Environment & Local Government	83 35	136 57	0 0	0 0	0 0	21 9	**240** **100**	**227** **6%**
Total	**3,139** **26%**	**8,669** **71%**	**0** **0%**	**0** **0%**	**161** **1%**	**249** **2%**	**12,217** **100%**	**12,540** **-3%**

3.4 Marine and Forestry

Table 7 shows the science and technology allocations (including earned income) for activities in the marine, fisheries and forestry areas.

If you exclude the Marine InstituteÕs expenditure on developing a National Marine STI policy (£2.5m), 49% of the remaining expenditure is spent on S&T services mainly carried out by the Central Fisheries Board in the marine section and Forbairt in the forestry section. Education and training now accounts for 31% of the expenditure with the majority of the spending undertaken by An Bord Iascaigh Mhara.

Table 7 1998 Science and Technology Allocations (including earned income) by Marine & Forestry objective

	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
Agency / Department	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity
Marine Institute	0 0	600 20	0 0	0 0	2,474 80	0 0	**3,074** **100**	**2,996** **3%**
Bord Iascaigh Mhara	0 0	0 0	1,685 72	0 0	641 28	0 0	**2,326** **100**	**2,029** **15%**
Central & Regional Fisheries Board	0 0	1,460 100	0 0	0 0	0 0	0 0	**1,460** **100**	**1,760** **-17%**
Forbairt	96 14	595 86	0 0	0 0	0 0	0 0	**691** **100**	**695** **-1%**
COFORD	0 0	0 0	0 0	80 27	216 73	0 0	**296** **100**	**245** **21%**
Salmon Research Agency of Ireland	34 30	10 9	2 2	0 0	66 58	1 1	**114** **100**	**158** **-28%**
Total	**130** **2%**	**2,665** **33%**	**1,687** **21%**	**80** **1%**	**3,3971** **43%**	**1** **0%**	**7,961** **100%**	**7,883** **1%**

- The Marine area includes freshwater as well as seawater activities

3.5 Energy

Table 8 shows science and technology allocations (including earned income) for activities related to energy. The major element here is the energy technology promotion activities of the Irish Energy Centre in Forbairt. The Department of Marine and Natural Resources operate an Exploration and Mining Division and a Petroleum Affairs Division, which provides the technical expertise necessary for promotion, monitoring and controlling of petroleum exploration and development activities by private enterprise under licence to the Department.

Table 8 1998 Science and Technology Allocations (including earned income) by Energy objective

Agency / Department	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity
Forbairt	4,521 97	145 3	0 0	0 0	0 0	0 0	**4,666** **100**	**4,065** **15%**
Department of Marine & Natural Resources	550 61	198 22	0 0	0 0	0 0	147 16	**895** **100**	**608** **47%**
Total	**5,071** **91%**	**343** **6%**	**0** **0%**	**0** **0%**	**0** **0%**	**147** **3%**	**5,561** **100%**	**4,673** **19%**

3.6 Transportation

Table 9 shows S&T allocations (including earned income) in support of national transportation objectives. The activity relates to the work of the National Roads Authority in planning and supervising the construction, improvement and maintenance of network of national roads. It amounts to £1.15m overall.

Table 8 1998 Science and Technology Allocations (including earned income) by Energy objective

Agency / Department	Information and Specialist Advisory services	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity
National Roads Authority	214 19	825 72	49 4	59 5	0 0	0 0	**1,147** **100**	**1,181** **-3%**
Total	**214** **19%**	**852** **72%**	**49** **4%**	**59** **5%**	**0** **0%**	**0** **0%**	**1,147** **100%**	**1,181** **-3%**

4. Education And Health Activities

The S&T Budget incorporates data relating to scientific and technological activities undertaken in a broader social context. The major components of this relate to educational and health activities.

Table 10 shows the science and technology allocations (including earned income) for education and training activities. S&T courses in the universities and institutes of technology are the major performers.

Table 10 1998 Science and Technology Allocations (including earned income) by Education & Training objective

Agency / Department	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity
Department of Education & Science	0 0	0 0	262,101 100	0 0	0 0	0 0	**262,101** **100**	**212,150** **24%**
Higher Education Authority	0 0	0 0	195,131 100	0 0	0 0	0 0	**195,131** **100**	**177,678** **10%**
Postgraduate Medical & Dental Board	0 0	0 0	193 8	0 0	0 0	2,101 92	**2,294** **100**	**1,715** **34%**
Dublin Institute of Advanced Studies	46 10	29 6	0 0	0 0	400 84	0 0	**475** **100**	**477** **0%**
Total	**46** **0%**	**29** **0%**	**457,425** **99%**	**0** **0%**	**400** **0%**	**2,101** **0%**	**460,001** **100%**	**392,020** **17%**

Activities in the area of health are shown in Table 11. Science and technology activities in the Health sector are dominated by the activities of the Department of Health and Children. In the Department of Health and Children, the extramural activities of £4.5m relates to the activities of the Irish Medicines Board, which is self-funding from earned income and receives no public funds. The other departmental activities relate to the various health advisory functions it operates and to the National Cancer Registry Board.

Table 11 1998 Science and Technology Allocations (including earned income) by Health objective

Agency / Department	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity	£'000 % activity
Department of Health & Children	2,805 38	75 1	0 0	0 0	10 0	4,500 61	**7,390** **100**	**7,397** **0%**
Radiological Protection of Ireland	361 43	361 43	0 0	0 0	111 13	0 0	**833** **100**	**620** **34%**
Health Reseach Board	0 0	183 69	81 31	0 0	0 0	0 0	**264** **100**	**275** **-4%**
Total	**3,166** **37%**	**619** **7%**	**81** **1%**	**0** **0%**	**121** **1%**	**4,500** **53%**	**8,487** **100%**	**8,292** **2%**

5. GENERAL PUBLIC SERVICE ACTIVITIES

This area is concerned with science and technology activities undertaken by the Government in support of regulatory and statutory activities. These are listed in table 12.

The Office of Public Work's capital allocations to buildings for S&T activities are also included.

In line with the objective of the institutes classified in this area, almost 67% of the area's activities are devoted to the provision of S&T services and technical information.

Table 12 1998 Science and Technology Allocations (including earned income) by General Public Services objective

	Information and Specialist Advisory	Scientific and Technical Services	Education and Training	Technology Transfer	Other Activities	Extramural Activities	Total	1997 Outturn
Agency / Department	**£'000 % activity**	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity	**£'000** % activity
Central Statistics Office	0 0	12,294 74	0 0	0 0	4,316 26	0 0	**16,610** **100**	**18,469** **-10%**
Met Éireann	4,800 49	3,266 33	127 1	68 1	578 6	1,040 11	**9,879** **100**	**9,037** **9%**
Ordnance Survey	0 0	8,991 91	0 0	0 0	852 9	0 0	**9,843** **100**	**9,155** **8%**
State Laboratory	0 0	3,386 99	39 1	0 0	0 0	0 0	**3,425** **100**	**2,635** **30%**
Office of Public Works	0 0	0 0	0 0	0 0	2,657 100	0 0	**2,657** **100**	**2,531** **6%**
Geological Survey of Ireland	0 0	2,390 100	0 0	0 0	0 0	0 0	**2,390** **100**	**2,283** **5%**
Forfás	928 100	0 0	0 0	0 0	0 0	0 0	**928** **100**	**875** **6%**
Department of Environment & Local Government	0 0	621 99	4 1	0 0	0 0	0 0	**625** **100**	**590** **6%**
Radiological Protection Institute	63 43	63 43	0 0	0 0	21 14	0 0	**147** **100**	**136** **8%**
Total	**5,791** **12%**	**31,011** **67%**	**170** **0%**	**68** **0%**	**8,442** **18%**	**1,040** **2%**	**46,522** **100%**	**45,711** **2%**

6. TOTAL GOVERNMENT FUNDING OF SCIENCE AND TECHNOLOGY

6.1 Total Funding and Trends

The previous four sections of this report have detailed public expenditure on science and technology under four broad classifications:

- Research and development activities
- Other S&T activities in support of industry, agriculture and food, the environment, marine and forestry, energy and transportation
- Education and health
- Other public service activities

The total of these four components constitutes the State Investment in Science and Technology for 1998 (the ÔScience and Technology BudgetÕ). Funding for these activities come from three sources Ð the exchequer, the Community Support Framework (CSF) of the EU, and income earned by the agencies/departments implementing science and technology programmes.

The total value of the science and technology budget in 1998 amounts to £845m and Table 13 identifies the sources of funding for 1991, 1996, 1997 and 1998.

Table 13 Government Science and Technology by source of funds

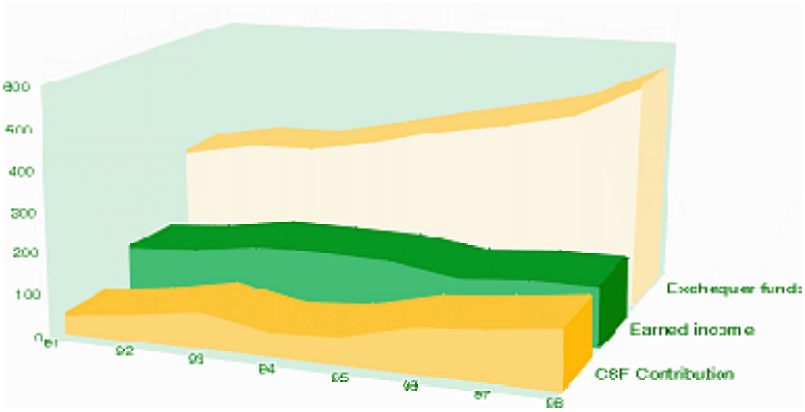
	91 Outturn		96 Outturn		97 Outturn		98 Allocation	
	£m	%	£m	%	£m	%	£m	%
Exchequer Funds	258.61	64	421.42	65	463.00	63	533.36	65
EU Contribution	37.80	9	106.35	16	123.21	17	147.04	17
Total Public Funds	296.41	74	527.77	81	586.21	80	700.40	83
Earned Income	106.53	26	125.06	19	145.54	20	144.77	17
Total	**402.94**	**100%**	**652.83**	**100%**	**731.75**	**100%**	**845.17**	**100%**

There was an increase of £113.4m, or 15.5% over the 1997 level. All of the increase is accounted for by public funds, as earned income is budgeted to remain at the 1997 outturn level, although that outturn exceeded the budget figure for 1997 by 11%. The main element of the increase for 1998 is the additional resources provided by the Department of Education and Science for education and research in the third level colleges.

In 1998 the EU contribution to Irish S&T will increase further to £147m or 17.4% of the total, up from a level of 16.8% in 1997. This contribution comes via the Community Support Framework and consists of three separate funds Ð the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the European Agriculture, Guidance and Guarantee Fund (EAGGF). Further details are provided in Appendix 2.

Figure 2 illustrates the trends in funding in the recent past.

Figure 2 Distribution of Goverment supported S&T by source of funds, 1998 prices, £m



In real terms exchequer funds grew by 14.4% per annum between 1991 and 1997. A further real increase of 17.7% is expected in 1998. Earned income grew by 3.0% per year between 1991 and 1997, although the allocations for 1998 show a decrease of 2.1% over the 1997 outturn.

6.2 Funding by Type of Cost

Table 14 Government funding of Science and Technology by type of costs

	1991		1997		1998	
	£m	%	£m	%	£m	%
Public * current monies	259.38	64	513.72	70	539.20	64
Public capital monies	37.04	9	72.48	10	161.20	19
Total Public Funds	**296.41**	**74**	**586.21**	**80**	**700.40**	**83**
Earned Income	106.53	26	145.54	20	144.77	17
Total	**402.94**	**100**	**731.75**	**100**	**845.17**	**100**

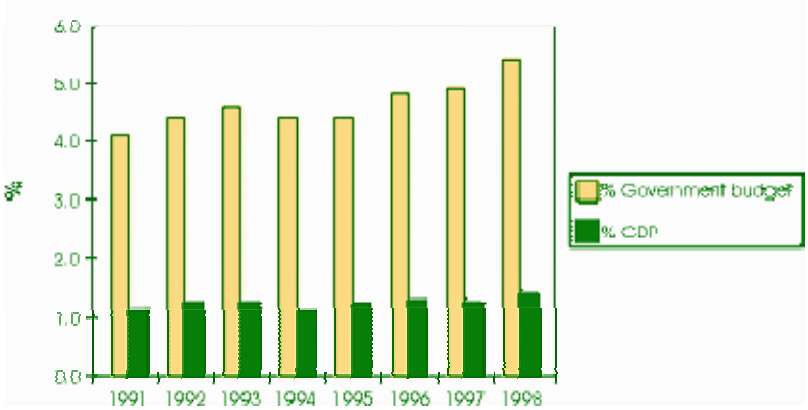
* Public monies are exchequer + CSF funds

Table 14 shows that when exchequer and CSF funds are combined, public current monies have a real growth of 10.8% per annum in the 7-year period to 1998. Public capital monies have increased significantly in 1998 due to the HEAÕs investment in skills initiative programme (£10m), and the Department of EducationÕs Science and Technology Education Investment fund (£87m).

6.3 Comparison with GDP and Total Government Budgets

Public funding for S&T as a percentage of total government budgets increased steadily since 1991 to drop slightly in 1994 and 1995 and increase again in 1996 to reach 5.4% in 1998 (Figure 3). Public funds for S&T as a percentage of GDP have also grown since 1990, and have returned to the levels achieved in the mid-1980s.

Figure 3 Public * funding of S&T: % Government budget, % GDP 1991-1998



* Exchequer + CSF

6.4 Government Departments/Agencies funding science and technology

Table 15 presents each Department/Agency's allocation to S&T analysed by source of funds. Some agencies are extremely reliant on non-exchequer sources for their income in the form of CSF funds and earned income while others are funded entirely from exchequer sources. In all, 9 agencies receive less than half of their S&T funds from direct exchequer sources, the balance being made up to a greater or lesser extent by CSF funds and earned income. The most significant agencies in this regard are Forbairt, IDA Ireland, Teagasc, COFORD and the NMRC.

Table 15 1998 Science and Technology Allocation to Departments/Agencies by source of funds

	Exchequer Funds	CSF Funds	Total Public Funds	Earned income	Total
	£'000	£'000	£'000	£'000	£'000
Department of Education and Science	224,878	48,881	273,759		273,759
• Higher Education Authority	165,252	18,260	183,512	63,614	247,126
• Dublin Institute for Advanced Studies	1,658	36	1,694	213	1,907
Department of Enterprise, Trade & Employment	9,534	356	9,890		9,890
• Forbairt	14,812	42,482	57,294	17,160	74,454
• IDA Ireland	600	6,150	6,750		6,750
• Forfás (inc. NAB)	1,154		1,154	230	1,384
• Shannon Development	6,562	4,000	10,562		10,562
• Innovation Centre	286	314	600		600
• National Microelectronics Research Centre	1,565	1,845	3,410	4,592	8,002
• National Microelectronics Applications Centre	25	75	100	610	710
• Fás	8,039	6,051	14,090		14,090
• Patents Office	-2,611		-2,611	5,342	2,731
• NSAI	753		753	6,466	7,291

Department of Agriculture and Food	17,293	1,284	18,577	6,813	25,390
• Teagasc	25,789	11,379	37,168	15,496	52,664
Central Statistics Office	15,240		15,240	1,370	16,610
Department of Marine and Natural Resources	1,295		1,295	6	1,301
• Marine Institute	6,461	2,140	8,601	1,319	9,920
• Bord Iascaigh Mhara	1,296	1,027	2,323	53	2,376
• Central & Regional Fisheries Board	1,067	383	1,450	10	1,460
• Salmon Research Agency of Ireland	442	164	586	116	702
• COFORD	122	368	490		490
Department of Health and Children	3,535		3,535	4,500	8,035
• Health Research Board	4,574		4,574	510	5,084
• Postgraduate Medical & Dental Board	2,294		2,294		2,294
Department of Public Enterprise					
• Geological Survey of Ireland	2,225	6	2,231	159	2,390
• Radiological Protection Institute of Ireland	1,574		1,574	607	2,181
• Met Éireann	5,425	42	5,467	5,064	10,531
Department of Environment and Local Government	1,151		1,151		1,151
• Environmental Protection Agency	5,634	709	6,343	3,562	9,905
• National Roads Authority	1,554		1,554	188	1,742
Ordnance Survey Office	5,313		5,313	4,800	10,113
Department of Social, Community and Family Affairs	6,634		6,634	38	6,672
Department of Justice					
Department of Finance					
• Economic and Social Research Institute	2,340		2,340	1,920	4,260
Department of Arts, Heritage, Gaeltacht and the Islands	1,467	188	1,655		1,655
• Udaras na Gaeltachta	1,000	900	1,900		1,900

• Natural History Museum	350		350		350
State Laboratory	3,469		3,469		3,469
Office of Public Works	2,675		2,675		2,675
Department of the Taoiseach					
• National Economic and Social Council	374		374	10	384
Central Bank	277		277		277
Total	**553,357**	**147,040**	**700,397**	**144,768**	**845,165**

* Where there are transfers from one S&T agency/department to another the funds are accounted for in the performing agency.

Note: *Earned income assigned to the Higher Education Authority refers to funds which the colleges under its aegis receive by way of fees for education courses and income generated from contract research activity. These funds are not allocated by the HEA to colleges.*

Table 16 looks at the changes which have occurred at agency/departmental level with regard to public funding of S&T since 1997. This year saw the continuation of funds committed under the present series of Operational Programmes and the trend of expenditure set in 1997 is continued into 1998. The main increase in public expenditure in 1998 occurred in Forbairt (£12.4m), due to increased funding to its CSF supported programmes. The other significant increases occurred in FçS (£3.3m), the Department of Agriculture & Food (£2.7m), the Department of Social, Community and Family Affairs (£2.6m) and the Department Enterprise Trade & Employment (£2.5m).

Table 16: 1998 Science and Technology Allocation to Agencies/Departments (*) by type of costs

	Capital	Public Funds ** Current	Total Public	Increase in Current public funds over 1997 outturn %
	£'000	£'000	£'000	%
Department of Education and Science	109,578	164,181	273,759	-10.1
• Higher Education Authority	16,200	167,312	183,512	9.9
• Dublin Institute for Advanced Studies		1,694	1,694	12.1
Department of Enterprise, Trade & Employment	1,800	8,090	9,890	45.1
• Forbairt	1,832	55,462	57,294	28.7
• Fás		14,090	14,090	30.8
• Shannon Development	10,562		10,562	30.8
• IDA Ireland	6,750		6,750	
• National Microelectronics Research Centre	2,261	1,149	3,410	28.1
• Forfás (inc. NAB)		1,154	1,154	5.6

• NSAI		753	753	10.4
• Innovation Centre		600	600	3.4
• National Microelectronics Applications Centre		100	100	0.0
• Patents Office		-2,611	-2,611	-6.2
Department of Agriculture and Food		18,577	18,577	17.3
• Teagasc	1,425	35,743	37,168	0.8
Central Statistics Office	436	14,804	15,240	-10.2
Department of Marine and Natural Resources		1,295	1,295	20.2
• Marine Institute		8,601	8,601	16.7
• Bord Iascaigh Mhara	886	1,437	2,323	3.3
• Central & Regional Fisheries Board	50	1,400	1,450	-10.3
• Salmon Research Agency of Ireland	93	493	586	24.5
• COFORD		490	490	35.7
Department of Health and Children		3,535	3,535	27.5
• Health Research Board		4,574	4,574	14.8
• Postgraduate Medical & Dental Board		2,294	2,294	33.8
Department of Public Enterprise				
• Geological Survey of Ireland	79	2,152	2,231	4.2
• Radiological Protection Institute of Ireland	200	1,374	1,574	15.4
• Meterological Office	1,065	4,402	5,467	1.2
Department of Environment and Local Government		1,151	1,151	4.0
• Environmental Protection Agency	1,045	5,298	6,343	8.0
• National Roads Authority		1,554>	1,554	-0.3
Department of Social, Community and Family Affairs		6,634	6,634	65.0
Ordnance Survey Office		5,313	5,313	22.3
Department of Arts, Heritage, Gaeltacht and the Islands		1,655	1,655	-7.7
• Udaras na Gaeltachta	1,900		1,900	

• Natural History Museum	250	100	350	11.1
State Laboratory		3,469	3,469	30.0
Office of Public Works	2,675		2,675	
Department of Finance				
• Economic and Social Research Institute		2,340	2,340	0.6
Department of the Taoiseach				
• National Economic and Social Council	0	374	374	-18.7
Central Bank		277	277	-0.7
Department of Justice				
Total	**159,087**	**541,310**	**700,397**	

* Where there are transfers from one S&T agency/department to another the funds are accounted for in the performing agency
** Public funds are exchequer & CSF funds

6.5 Funding by activity

Expenditure on the different S&T activities have been detailed in the previous sections. Figure 4 illustrates how funding of S&T is distributed across the range of activities in 1998. Education and training accounts for 57% of the total and figure 5 illustrates the trend in activity funding over time.

Figure 4 Distribution of S&T funding by S&T activity 1998 (including earned income)

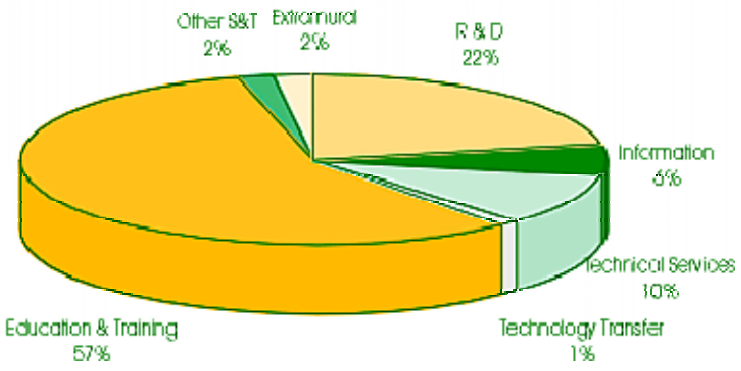
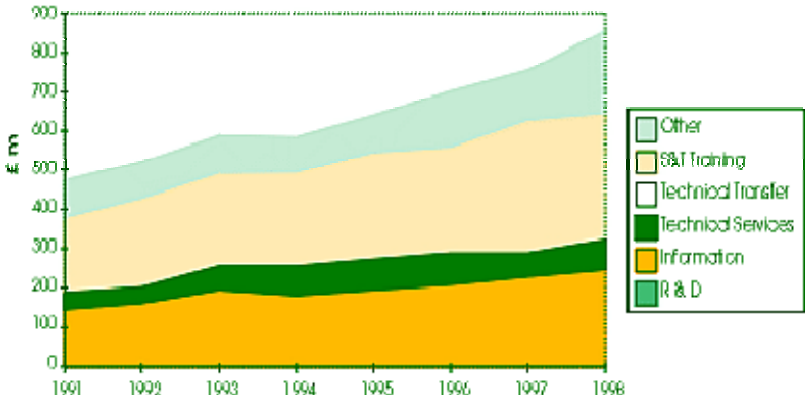


Figure 5 Funding of S&T activities (including earned income) 1998 prices, £m



* Other = Other S&T + Extramural + capital

6.6 Public Funding Trends by objective

Table 17 examines how the different objectives are funded since 1991. The industry area earns almost two-thirds of its S&T public funds from the CSF. This depicts a decrease of 18% in exchequer fundingÕs percentage of total public expenditure. While there has been an increase in exchequer support (£10.8m) since 1991, CSF support has increased by £40.2m.

The agriculture and forestry area now receives 22% of its funds from the CSF, while in the marine area it accounts for 26%. This is in contrast to 1991 where these areas were almost completely funded by the exchequer.

Education and manpower objective has remained relatively constant from 1991 to 1998 in its percentage breakdown, but actual exchequer funding has increased by £245m as opposed to increased CSF funding of £53m.

Table 17 Public * expenditure on science and technology by objective

		1991 outturn	1997 outturn	1998 allocation
		£'000	£'000	£'000
Education and Manpower**	**Total**	**171,638**	**385,477**	**469,307**
	% Exchequer	90	84	85
	% CSF Funds	10	16	15
Health	**Total**	**4,249**	**7,043**	**8,596**
	% Exchequer	100	100	100
	% CSF Funds	0	0	0
Industry	**Total**	**46,389**	**76,734**	**97,395**
	% Exchequer	56	39	38
	% CSF Funds	44	62	62
Agriculture & Forestry	**Total**	**25,339**	**45,244**	**47,681**
	% Exchequer	100	80	78
	% CSF Funds	0	20	22
General Public Services	**Total**	**35,488**	**39,662**	**40,958**
	% Exchequer	100	100	100
	% CSF Funds	0	0	0

Marine~	**Total**	**3,041**	**10,193**	**11.278**
	% Exchequer	100	74	75
	% CSF Funds	0	26	26
Economic and Social	**Total**	**3,752**	**7,381**	**9,937**
	% Exchequer	100	100	100
	% CSF Funds	0	0	0
Environment	**Total**	**4,239**	**8,252**	**8,101**
	% Exchequer	98	86	77
	% CSF Funds	3	14	23
Energy	**Total**	**1,531**	**4,662**	**5,590**
	% Exchequer	83	68	72
	% CSF Funds	17	32	28
Transportation	**Total**	**746**	**1,559**	**1,554**
	% Exchequer	100	100	100
	% CSF Funds	0	0	0
Total	**Total**	**296,412**	**586,207**	**700,397**
	% Exchequer	87	79	79
	% CSF Funds	13	21	21

* Public funds are Exchequer + CSF funds
** Funds allocated to research in the higher education sector are accounted in Education and Manpower
~ The Marine area includes freshwater as well as seawater activities

6.7 Matrix of Science & Technology funding sources

Figure 6 illustrates the funding sources for all S&T activities comprising the science and technology budget.

This Figure identifies the sectors in receipt of Government funds for research and development. Indirect government funds for research in the third level sector are derived from the HEAÕs grant-in-aid to academic departments in the universities. In 1998 it is an estimated £17.7m compared to the direct public (exchequer and CSF funds) funding of research in all third level colleges which amounts to £27.4m. The business sector also provides funds for research in the third level sector and the figures quoted here refer to business funds which match public funds for joint third level-industry research.

CSF funds are allocated to support R&D in the business sector to the value of £35.6m compared to direct exchequer support of £4.0m. Income from other sources for research is indicated. Receipts from EU contracts and business account for 35% of the direct funds for research in third level colleges.

6.8 Transfer payments between Departments/Agencies

The science and technology infrastructure is very complex with a range of agencies/departments donating and receiving funds from each other to fund various S&T activities. Table 18 outlines the flows of funds for 1998. Some of these flows come about when agencies are requested to carry out specific activities on behalf of another government institution, while others result from contracts won on a competitive basis.

Figure 6 Indicative distribution of science budget funds, 1998, £m

Indicative Distribution of Government Funds for Science and Technology, 1998, £m											
	RESEARCH AND DEVELOPMENT					S&T INFO.	TECH. SERVICES	TECH. TRANSFER	S&T ED. & TRAIN.	OVERHEADS &	TOTAL
	Business	Third Level (1)	PATS (2)	Government	Total						
SOURCE OF FUNDS:											
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
Direct	4.0	17.2	2.1	34.2	57.5	26.1	51.0	1.3	290.2	109.5	535.7
Exchequer											
Indirect (3)		17.7			17.7						17.7
CSF Funds	35.6	12.7	6.2	9.9	64.3	8.4	5.5	3.0	64.8	1.1	147.0
EU contracts		10.5	3.7	3.1	17.3	0.3	1.6	0.0	0.0	0.3	19.5
Business		9.9	4.2	4.8	18.9	9.8	11.2	0.0	0.1	0.4	40.3
Other earned income		5.2	2.5	3.9	11.6	10.1	15.2	0.0	40.4	7.7	84.9
Total	39.6	73.2	18.6	55.8	187.2	54.7	84.5	4.4	395.5	119.0	845.2

(1) Science and Technology departments only

(2) AMT ireland is classified under S&T information and technical services

(3) Indirect funds for R&D are calculated on basis of HEA allocation to academic departments only

Table 18: Planned Transfer payments between S&T organisation for S&T activities, 1998, £'000

From:	DAgri	DAC&G	C&RFB	COFORD	Dept E&E	Dept. Educ	Dept. Energy	Dept. Envir	Forbairt	Dept. Health	HEA	Dept. Marine.	Marine Inst	NRA	OPW	SFADCo	DSocW	Total
To:																		
A.C.&G.			250															250
B.I.M.													30					30
C F Board		220											6		50			276
D.I.A.S.					18								31					49
E.P.A.								709										709
ERSI	1 7				100	148		10		286		39					82	682
Forbairt	1 3 0			133	41,419		4,820					173	73					46,748
G.S.I.													8					8
HEA	4,632			515	5,857			382					482					11,868
HRB										72								72
IDA					6000													6000
Innov Centre																286		286
NMRC					2,460				700		950							4,110
MAC					100													100
Marine Inst	4 0		268					42										350
Met Office								30						43				73
SFADCO					7,250													7,250

SRAI			100										9					109
Teagasc	2,830			151				40					24					3.045
UDARUS					900													900
Total	**7,649**	**220**	**618**	**799**	**64,104**	**148**	**4,820**	**1,213**	**700**	**358**	**950**	**212**	**663**	**43**	**50**	**286**	**82**	**82,915**

7. EU SUPPORT FOR SCIENCE AND TECHNOLOGY

The major financial impact of EU programmes on the Irish science and technology landscape has been well documented. The total EU support for the RTD (research and technological development) component of the current Community Support Framework (CSF) amounts to £354m between 1994 and 1999, or roughly 8% of the total EU funds allocated. For the Industry Operational Programme alone the EU contribution to R&D is £264m or 32% of the total EU funds for the Programme.

STIAC pointed out that government support for S&T prior to the first Community Support Framework (CSF) in 1989 was inadequate and a major cause of low industrial innovation and a poorly functioning national system of innovation. The Government decision to give a high profile to science and technology in the CSF for 1989-1993 enabled a wide range of new initiatives to be introduced; these included the Programmes in Advanced Technology (to link university expertise with industry), the industry research and development initiative (to support R&D projects in enterprises), and a range of mechanisms to improve the technological performance of indigenous industry - Technology Audits, Placements, the Technology Transfer and Partnerships programme. The new CSF for 1994-1999 also contains a major science and technology element, enabling these initiatives to continue and also providing some new money for basic research in the colleges and to support a new technology management initiative in industry.

As can be seen in Table 13 (p.16), Exchequer funding of science and technology has remained constant at around 65% of the annual spend between 1991 and 1998. The CSF contribution has increased in real terms by £104m (238%) since 1991, to a £147m allocation in 1998, 17% of the total.

7.1 EU Support by Objective

Public support for science and technology, according to the objective of the spending, was outlined in section 6.6 (p.23). Two thirds of this funding is for education and training, while industry (14%) and agriculture/forestry (7%) are the other main objectives. Marine, health and economic and social objectives all account for about 1.5 % of total public funding. EU support is concentrated in four objectives ÐEducation/Training, Industry, Agriculture/Forestry and Marine.

Education and Training: (£469.3m)
This sector has accounted for 61%, on average, of public expenditure on science and technology from 1991 to 1998. The 1998 CSF contribution (£70.1m) accounts for 15% of the public spend for this objective.

Industry: (£97.4m)
In 1991, the Exchequer accounted for 57% of the public expenditure for this objective, with the CSF (43%) funding the remainder. The time series data shows that while expenditure has increased in real terms by £44.1m, there has been a decrease in the exchequer support to 38% and a corresponding increase in CSF support to 62%.

Agriculture: (£47.7m)
This sector has remained relatively constant accounting for 8%, on average, of public expenditure on science and technology from 1991. The CSF contribution now accounts for 22% (£10.5m) of the public spend, as compared to 1993 there was negligible CSF contribution.

Marine: (£11.3m)
The increasing importance of CSF funding in this sector is very evident. In 1991 there was no CSF contribution in comparison to its present contribution of 25% to the marine sector.

APPENDIX 1
COMMUNITY SUPPORT FRAMEWORK INIATIVES IN SUPPORT OF S&T

INTRODUCTION

The EU Community Support Framework (CSF) consists of a series of Operational Programmes many of which have Measures in support of S&T initiatives. These Operational Programmes are listed below with their appropriate source of funds.

The Community Support Framework comprises a number of individual funds, all of which support S&T activity to a greater or lesser extent. These funds are the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the European Agriculture, Guidance and Guarantee Fund (EAGGF). This appendix describes in detail the S&T programmes receiving CSF support.

Table 1. Operational Programmes and their Funding sources

Operational Programme	Funding source
Industrial Development	ERDF, EAGGF, ESF
Agriculture, Rural Development and Forestry	EAGGF, ERDF, ESF
Fisheries	ERDF
Environmental services	ERDF
Economic infrastructure	ERDF
Human Resources Development	ESF, ERDF

Table 2 presents a list of Operational Programmes, Sub-Programmes and Measures which have an S&T component and which are included in the science budget.

Table 2 List of RTD-Related Activities in the Community Support Framework 1994-1999 Covered In The Science Budget

Operational Programme for Industrial Development		
Sub-Programme 3: Research and Development		
Measure 1		Industry R&D Initiative
Measure 2		Industry/Third Level Co-operation Services
	Sub-measure 1:	Capability Support
	Sub-measure 2:	Technology Services
	Sub-measure 3:	Technology Service Centres
	Sub-measure 4:	PATs
Measure 2		Human Resource Development
	Sub-measure 1:	Graduate Training
	Sub-measure 2:	Enterprise Development
	Sub-measure 3:	RTD Management Development
Measure 4		Research Support

Sub-Programme 6: Development of the Food Industry

Measure 3		Research and Development
	Sub-measure 1:	In-Company Research and Development
	Sub-measure 2:	Institutional Research and Development

Operational Programme for Agriculture, Rural Development and Forestry

Sub-Programme 1: Structural Improvement and Rural Development

Measure 5		Research
	Sub-measure (a):	Research in Sustainable Agriculture and Rural Development
	Sub-measure (b):	Research Stimulus Fund

Sub-Programme 2: Forestry

Measure 2		
	Sub-measure (b):	Forestry Development Research and Development

Operational Programme for Fisheries

Sub-Programme 3: Research and Development

Measure 8		Marine Research
	Sub-Measure 1:	Research Vessel Capability
	Sub-Measure 2:	National Marine Research Laboratories
	Sub-Measure 3:	Fisheries/Aquaculture R&D
	Sub-Measure 4:	Marine Food Processing
	Sub-Measure 5:	National Marine Survey
	Sub-Measure 6:	Marine Technology Development
	Sub-Measure 7:	Evaluation of STRIDE OP

Operational Programme for Environmental Services

Sub-Programme 4: Environmental Monitoring, Research and Development

Measure 1:	Environmentally Sustainable Resource Management
Measure 2:	Cleaner Production

Operational Programme for Economic Infrastructure

Sub-Programme 1: Energy

Measure 2	Energy Efficiency/Conservation

Operational Programme for Human Resources Development

Sub-Programme 1: Initial Education and Training

Advanced Technical Skills Programme

Sub-Programme 5: Measure to Improve the Quality of Training Provision

Measure 5	Vocational Training Infrastructure
Sub-measure 1:	Third Level Capital
	Dublin Institute of Technology, Regional Technical Colleges and Vocational Education Committee Colleges Sector
	University Sector

At the start of the CSF 1994-1999 yearly targets of funding were set. These are presented in Table 3, as an indication of the level of support given by the individual Operational Programmes. Timing differences which have occurred in some areas limit the direct comparability of these data with those presented in the science budget analysis.

Table 3: Research and Technology Development Expenditure, CSF 1994-1999 Breakdown by Measure and Year

IR£m	1994	1995	1996	1997	1998	1999	Total
Research and Development Sub-Programme							
(Sub-Programme 3, OP for Industrial Development)							
Measure 1: Industry R&D Initiative							
Total	26.914	30.295	30.060	29.735	29.735	29.665	176.404
Measure 2: Industry/Third Level Co-operation Services							
Total	30.867	31.962	31.962	31.262	32.552	32.942	191.657
Measure 3: Human Resource Development							
Total	1.295	2.826	2.826	2.826	2.826	2.826	15.425
Measure 4: Research Support							
Total	2.750	3.090	3.140	3.640	4.474	5.020	22.114
Total Measures 1-4							
Total	61.826	68.173	67.988	67.463	69.697	70.453	**405.601**
Food Research and Development							
(Measure 3, Sub-Programme 6, OP for Industrial Development)							
Total	12.883	12.363	12.226	13.078	14.027	14.194	**78.771**
Agriculture and Rural Development Research							
(Measure 5, Sub-Programme 1, OP for Agriculture, Rural Development and Forestry)							
Total	6.801	6.239	6.239	6.239	6.239	6.239	**37.992**
Forestry Research and Development							
(Sub-measure (b), Measure 2, Sub-Programme 2, OP for Agriculture, Rural Devel. and Forestry)							
Total	1.000	1.000	1.000	1.000	1.000	1.000	**6.000**
Marine Research							
(Measure 8, OP for Fisheries)							
Total	1.358	1.722	1.198	1.198	1.268	1.578	**8.322**
Environmental Monitoring, Research and Development							
(Sub-Programme 4, OP for Environmental Services)							
Measure 1: Environmentally Sustainable Resource Management							
Total	0.938	0.510	0.420	0.420	0.420	0.385	**3.092**
Measure 2: Cleaner Production							
Total	0	0.321	0.411	0.411	0.411	0.447	**2.001**
Total Measures 1-2							
Total	0.938	0.831	0.831	0.831	0.831	0.832	**5.093**
Energy Efficiency / Conservation							
(Sub-Programme 1, Measure 2, OP for Economic Infrastructure)							
Total	2.345	4.286	6.873	6.873	6.955	6.793	**34.124**
Advanced Technical Skills Expenditure							
(in Sub-Programme 1, OP for Human Resourced Development)							
Total	10.087	7.871	7.871	7.871	7.871	7.871	**49.439**
TOTAL PLANNED EXPENDITURE							
	97.239	**102.486**	**104.225**	**104.552**	**107887**	**108.958**	**625.342**

Figures may not sum due to rounding.

APPENDIX 2
METHODOLOGY & DEFINITIONS

Methodological Note

The information given in this document relates to 43 institutions in receipt of monies from the exchequer for the performance or support of scientific, technological and related activities in every field and is based on the information supplied by these institutions.

Following discussions with the Office of the Director of Telecommunications Regulation in the preparation of this document it was agreed that it's programme formerly included in the science budget would be removed from the analysis due to their lack of conformity to the definitions of science and technology.

The Department of Health and Children re-examined its programmes included in the science and technology budget. It was agreed, through consultation, that the General Hospital Programme, which encompasses the routine activities of radiologists, pathologists, biochemists, physicists, computer, and related paramedical (e.g. laboratory) staff, and appropriate clerical support staff employed in State supported hospitals, was to be omitted.

The Department of Environment and Local Government, resulting from its submission for the estimates campaign, have reclassified contributions to international organisations as non-science and technology expenditure.

In preparation for the 1998 science budget the forestry functions of the former Department of Agriculture, Food and Forestry and mining and hydrocarbon functions of the former Department of Transport, Energy and Communications were transferred to the Department of Marine and Natural Resources.

In order to ensure consistency of analysis the database has been adjusted back to 1991 to take account of the above addition and deletions.

The recently formed Irish Council for Science, Technology and Innovation has identified as one of its priorities an examination of public funding of science and technology. It is anticipated that further methodological changes may result from this work. The areas of change may include a greater emphasis on funders of S&T in the analysis and a move towards using GDP as a deflator rather than CPI as is currently used.

In general, institutions and information relating to them are listed separately. In a few cases an institution is listed with its parent department or organisation but identified separately. Where practicable the programmes of the various institutions have been separated and categorised in accordance with international practice into relevant scientific and technological activities i.e.:

- research and development (R&D)
- information and specialist advisory services
- scientific and technical services
- training (including courses) and
- technology transfer.

However, in many instances, especially in institutions with few staff, institutions operate several programmes jointly, sharing resources in an administratively appropriate unit. In these circumstances the programmes, as described here, do not represent truly independent programmes. Consequently, the data should be interpreted with caution if expansions or contractions are being considered.

Expenditure data for specific programmes refer to the 1997 outturn costs of programmes and to the expected costs in 1998. The outturn costs are mainly funded by matching grant-in-aid or voted monies. Where programmes are funded in other ways these monies are noted separately. In these instances the expenditure (cost) data shown includes both exchequer and other income contributions.

Expenditures are based on unaudited figures, except in a few cases where they are identical with a Vote by the Oireachtas. For convenience, general overheads, where shown, are distributed in proportion to programmesÕ expenditures. Programmes are attributed to the institution most directly involved, that is to those actually operating them, but not necessarily funding them. An example of the latter is the Department of Enterprise, Trade and Employment, which funds, but does not operate or manage many programmes. Only their own administrative costs are attributed to the funding institutions in such cases.

Numbers of staff involved on individual S&T programmes are shown only where a reasonable subdivision is possible. Where institutions are involved in funding a large number of external R&D (or similar) personnel, data on these external personnel are not given.

In some cases it is possible to give an indication of output, e.g. numbers of grants awarded, samples analysed etc. per annum. The information given relates to 1997 unless otherwise stated.

Apportionment problems arise in the third level sector (mainly the monies distributed by the Higher Education Authority and the Department of Education to institutes of technology). In the case of the HEA, total funds are first apportioned between S&T faculties and non-S&T faculties in the colleges. (Expenditure on non-S&T faculties is not included in this document).

The extent and cost of the R&D work undertaken in colleges, and funded out of the HEAÕs general block grant, is determined indirectly from surveys of academic staff in colleges. These surveys are carried out by Forf‡s on a multi-annual basis and the corresponding cost data are, of necessity, based on historical estimates. The HEA funding of academic departments was isolated from administration and support services within colleges. Co-efficients of research time derived from Forf‡s surveys are now applied to funding of academic departments only, not including the administration and support services as had been included in the past. In the case of RTCs, costs are apportioned between S&T departments and second level activities; the latter are not included.

DEFINITIONS OF S&T ACTIVITIES

i. **Research:** Original, experimental or theoretical investigations under-taken to acquire new knowledge, with or without a particular application or use in view.

ii. **Development:** Systematic work drawing on existing knowledge gained from research and/or practical experience, that is directed to producing new products, processes, systems, services, varieties and breeds and to improving substantially already existing ones. Data collection conducted solely or primarily as part of the research and development (R&D) process included under "research" or "development" as appropriate.

iii. **Information and Specialist Advisory Services:** Provision of information via formalised scientific and technical information and documentation (STID) services includes all expenditure (manpower and materials) involved in acquiring, controlling or transmitting information to users with the involvement of staff whose primary function is in formalised STID services, e.g. provision of S&T information, advice, liaison.

Specialist advice, information analysis, libraries, publications and documentation services, translations, technical seminars and conferences. Provision of information via non-formalised STID services includes expenditures on providing know how and expertise by members of staff who, while not specifically engaged in formalised STID

services, provide specialist advice, liaison, consultancy or other general information services.

iv. **Technical Services:** Specialised support services of a scientific or technical nature generally provided by centralised laboratories or facilities, and can be of a routine or non-routine nature. Essentially they comprise the technical back-up analytical, diagnostic and data collection/processing services.
v. **Training:** Education and training of third level or equivalent students in science and technology disciplines.
vi. **Technology Transfer:** Activities which are directed solely or primarily towards the transfer and adoption of new technology, generally in enterprises. The horizontal transfer of technology, primarily from abroad, but also from colleges to enterprises is included here.
vii. **Other S&T Activities:** Activities which cannot be conveniently grouped under the above headings can be included here e.g. grants to international organisations, policy planning units etc.
viii. **Extramural Expenditure:** Monies spent on S&T activities carried out on behalf of the reporting institution by a third party.

Other Definitions

ix. **Third Level Education:** All universities and Institutes of Technology.
x. **Public Funds:** Exchequer monies and funds from the European Regional Development Fund.

APPENDIX 3
INDEX OF ACRONYMS

BIM	Bord Iascaigh Mhara - The Irish Sea Fisheries Board
C&RFB	Central and Regional Fisheries Boards
CenBank	Central Bank
COFORD	National Council for Forest Research and Development
CSF	Community Support Framework
CSO	Central Statistics Office
DACG	Department of Arts, Culture and the Gaeltacht
DAgri	Department of Agriculture, Food and Forestry
DEduc	Department of Education
DEE	Department of Enterprise and Employment
DEnrg	Department of Transport, Energy and Communications
DEnv	Department of the Environment
DHlth	Department of Health
DIAS	Dublin Institute for Advanced Studies
DMar	Department of the Marine
DSocW	Department of Social Welfare
EAGGF	European Agriculture Guidance and Guarantee Fund
EOLAS	Eolas - The Irish Science and Technology Agency
ERDF	European Regional Development Fund
ESF	European Social Fund
ESRI	Economic and Social Research Institute
EU	European Union
FÁS	FÁS - the National Training and Employment Authority
Forb	Forbairt
Forfás	Forfás - the Policy and Advisory board for Industrial Development
GSI	Geological Survey of Ireland
HEA	Higher Education Authority
HRB	Health Research Board
IDA	Industrial Development Agency Ireland
InnovC	Innovation Centre
MAC	National Microelectronics Applications Centre
MI	Marine Institute
MS	Meteorological Service
NAB	National Accreditation Board
NESC	National Economic and Social Council
NHMus	Natural History Museum
NMRC	National Microelectronics Research Centre
NRA	National Roads Authority
NSAI	National Standards Authority of Ireland
OPW	Office of Public Works
OS	Ordnance Survey
OST	Office of Science and Technology - Department of Enterprise, Trade and Employment
PatO	Patents Office
PGMDB	Postgraduate Medical and Dental Board
RPII	Radiological Protection Institute of Ireland
SFADCo	Shannon Development
SRAI	Salmon Research Agency of Ireland
StLab	State Laboratory
TEAG	Teagasc - The Agriculture and Food Development Authority
UN	United Nations
UnaG	Údarás na Gaeltachta