Mechanisms for Prioritisation of State Expenditures on Science and Technology

Functions of the Irish Council for Science, Technology and Innovation (ICSTI)

- To advise on science and technology policy-related issues in response to specific requests from the Government (through the Minister responsible for Science and Technology) or from the Board of Forfás.
- To advise the Minister responsible for Science and Technology, the Office of Science and Technology and the Board of Forfás, on the Council's own initiative, on policy for science and technology and on related matters.
- To advise the Minister on the strategy for the preparation and implementation of national programmes in science and technology.
- To advise the Minister on the strategic direction for State investment in science, technology and innovation.
- To undertake from time to time such other functions as the Minister may decide. In this case the information sought is to be submitted to the Minister.

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Foreword

The strong performance of Ireland's economy at the present time provides a major opportunity to re-examine in a fundamental way some of the priority investment areas for the State. There is a strong argument that Government should use the fruits of the current performance to reinvest in areas which will ensure that the development potential of the economy remains strong when the current period of exceptional growth comes to an end - as inevitably it must. Science, Technology and Innovation (STI) is one such area.

The Government constantly faces multiple demands for investment in a wide range of areas. In these circumstances, there is a need to demonstrate clearly the sectors, technologies and structural areas where the STI investment will pay high social and economic dividends relative to alternative areas of investment. Where this is done in a clear and systematic way it facilitates a positive Government response to STI investment proposals, as exemplified by the recent Government decisions on the £250m Scientific and Technological Education (Investment) Fund to be administered by the Minister for Education and Science and the new National Innovation Investment Fund to be administered by the Minister for Science, Technology and Commerce. In that context there is a need to achieve greater clarity in relation to the priorities which underlie existing State expenditure on science and technology which amounted to over £800m in 1997.

In order to address these issues the Irish Council for Science, Technology and Innovation (ICSTI) has undertaken a study to identify how priorities for State expenditure on science and technology are currently established in Ireland, to compare the procedures in Ireland with best international practice, and to recommend changes as appropriate. This report presents the findings of this study.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

Executive Summary

The main findings from an examination of the existing system for funding and activities in science, technology and innovation in Ireland are as follows:

- Spending on S&T within government departments is 'derived' from wider policy objectives of the departments and no clear system is discernible in relating STI expenditure to these policy objectives
- In general, there is a weak focus on STI within departments and particularly across departments
- As a percentage of GDP the level of State expenditure on R&D undertaken directly within the public sector is less than half of that which is found across EU Member States on average

The Council makes the following recommendations for action to Government:

- Government should make an explicit strategic commitment to STI to be reflected in a national mission statement and this commitment should be recognised in the overall strategy statements prepared by each Government Department as part of the Strategic Management Initiative
- Each Government Department should draw up an STI Statement, covering its STI activities and objectives based on a three-year framework within the overall context of the Department's functions and objectives. The Statement should address any proposals for change in the STI component of its activities coming from analyses undertaken by ICSTI or other sources and should take account of those key technologies emerging from the Council's Technology Foresight Initiative
- Each Government Department with responsibility for significant STI activity should appoint a Scientific Adviser to improve the linkage between the Department's policy objectives and the contribution of STI activities to their achievement
- In order to facilitate the rapid implementation of the new approach the initial focus of the STI Statements of Government Departments should be on R&D activities, which tend to be more discretionary and adaptable
- The STI Statements of Government Departments should be synthesised by the Interdepartmental Committee on Science and Technology into a National STI Plan. Consultation with ICSTI on the Plan, which should be published and laid before the Oireachtas, is desirable
- The R&D components of the Forfás Science Budget should be separately extracted and published with an associated evaluative commentary
- Given the significant contribution which EU Structural Funds makes to the STI system in Ireland, it would greatly facilitate co-ordination and prioritisation of spending if, in a future round of Structural Funds, all of the activities were encompassed under a single programme

The new National Innovation Investment Fund should be increased substantially and utilised to encourage Departments to reallocate resources and activities to areas of emerging national priority. The Interdepartmental Committee, which has ultimate responsibility for the Fund, should establish these priorities in consultation with ICSTI and should allocate funding accordingly, on a competitive basis.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

1. Background

'Ireland accounts for less than 0.05% of European R&D. It is obvious, therefore, that we cannot be involved in everything. Choices have to be made. This emphasises the need for prioritisation in State expenditure so that Government has a coherent and integrated strategy for committing funds to different S&T activities.'
Report of the Science, Technology and Innovation Advisory Council (STIAC) 1995

1.1 The Need for Prioritisation of STI Funding

In many respects public spending on Science, Technology and Innovation (STI) is no different from public spending generally in that (a) Government will always seek the best value for money and (b) there is never enough public funding to meet all the demands for it. In Ireland, the public expenditure process has generally been improved in recent years by developments such as the introduction of a three-year planning framework and through the Public Service Strategic Management Initiative (SMI).

In one aspect STI investment is different. It not only seeks to spend public monies to address current needs, but also represents an investment in the future, whether in economic or social terms, e.g. in functional areas ranging from better healthcare to activities which, in environmental terms, result in sustainable development. This is the case whether the STI investment is in an important area of science policy, such as healthcare, or in an area important to economic development, such as industrial research.

The speed of technological change, the fusion of technologies and the globalisation of markets, which is partly a result of new technologies, requires a trading nation like Ireland to keep pace with developments. This implies, indeed requires, a vision of future needs and opportunities and conscious reflection on how Ireland wishes to develop over the medium to long-term. This reflection must include fundamental consideration in relation to which areas of science and technology are important to national development.

If a case for increasing levels of investment in STI is to be sustained it must further be made clear what current levels of investment are designed to achieve and how well it meets its objectives. In particular, it is essential to demonstrate as clearly as possible the contribution which State expenditure on S&T makes to the achievement of those social and economic objectives for which the government is responsible. This implies a process of prioritisation that is well understood and accepted. The availability of such a priority process is particularly important when additional spending is being contemplated.

The issue of prioritisation of STI spending has been addressed in a number of ways in a number of different countries. This Report seeks to put forward an approach to prioritisation which is suited to, and practical in, the context of the institutional structure of Government (and its agencies) in Ireland and of the key social and economic objectives of the country.

1.2 The White Paper on STI

The White Paper on Science, Technology and Innovation published in October 1996 drew strongly, if not fully, on the STIAC Report and on the Report of the Group established by Government to advise on its implementation. It outlined a series of government actions which would put in place the necessary institutional structures to provide a coherent national S&T strategy and determine national priorities. It noted that there was no budgetary process for determining, in advance for any particular year, the overall amount the Government was spending on S&T and how it was being allocated between different expenditure programmes. It also noted, that while much government spending on S&T is on non-discretionary activities, such as undergraduate teaching, the discretionary amount is still large enough to require that it be deployed in a systematic way to where it can do most good. The White Paper also saw the need for a government planning process with a long-term vision of the country's S&T requirements. It emphasised the need clearly to link S&T policy and programmes with industrial policy and wider economic and national development. The requirement for a co-ordinating mechanism at central government level to ensure efficiency of spending, value for money and, above all, a coherent approach across all S&T spending departments and agencies was recognised.

In relation to the issue of prioritisation the following Government decisions were announced in the White Paper:

- The Government would develop an integrated procedure for the prioritisation of S&T spending, based on the Forfás annual Science Budget (see section 1.3) and draft spending plans of Departments. The process would form an integral part of the annual Estimates and Budget cycle
- The process would be conducted by an Interdepartmental Committee under the direction of a Cabinet Committee
- Forfás would make proposals on the function, scope and appropriate approach for a technology foresight or alternative process for generating techno-economic scenarios as an input to the prioritisation process
- Each Department would designate an Assistant Secretary (or equivalent rank) with responsibility for promoting and co-ordinating its science and technology policy and budgets
- The Office of Science and Technology would have responsibility for national co-ordination of STI policy, which function would remain as part of the Department of Enterprise and Employment
- A permanent STI Advisory Council, representative of wide-ranging interests, would be established
- Funding for science and technology, on a programme basis, would increase in line with priorities, when a proven requirement is demonstrated and as resources permit.

1.3 The Science Budget

The Forfás Science Budget is the main source of statistical information on government investment in science and technology. By international standards it is a comprehensive and timely report made available during the year to which the latest data in the report refers. The Science Budget records public spending on a wide variety of STI-related activities as supplied by all those government departments and agencies which have any STI involvement.

The 1997 Science Budget indicates that the State allocated some IR£820m to S&T-related activities in that year. This sum (including private income generated as a result of Exchequer spend), with actual spending for 1995 and 1996 included for comparative purposes, is broken down as follows:

State Expenditure on Science and Technology

	1997	1996	1995
	IR£m	IR£m	IR£m
Public	692.4	645.9	498.0
(of which EU)	(133.3)	(106.4)	(60.1)
Private	127.2	130.2	143.1
Total	819.6	776.1	701.1

Source: Forfás Science Budget

Care is required in interpreting these figures as the definition of science and technology used in compiling the Science Budget data is a wide one first introduced in the early 1980s and based on an approach adopted by UNESCO in 1978 - 'Recommendation concerning the International Standardisation of Statistics in Science and Technology'. It includes the social sciences as well as the natural sciences and engineering, and covers the entire range of science and technology activities including R&D, technical services, information, technology transfer and education and training. It, therefore, includes disparate activities such as the performance of medical tests in hospital laboratories, the collection of statistics by the Central Statistics Office, the production of ordnance survey maps and technical support to various government departments.

The all-embracing definition used in the Science Budget means that for policy-analysis purposes it needs to be broken down into its component parts. In particular, it is important to isolate expenditure on strategic areas such as research and technological development, and education and manpower training for the purpose of economic and social development, which go beyond the day-to-day technical activities of government departments and agencies.

The Science Budget details S&T spending within 12 government departments and 33 agencies and divides this total into five broad categories, according to the main objectives of departments. The table below shows the public funding (exchequer plus Structural Funds) for 1997 by the major broad objectives.

S&T Allocations of Departments & Agencies by Main Objective: 1997		
	IR£m	% of Total
Education & Training (in scientific and technological fields)	322.7	47.0
Health and Social Services	179.4	26.0
Enterprise Development	90.0	13.0
Natural Resources	71.9	10.0
Environment	25.7	4.0
Total	692.4	100.0

It is also useful to break down the total State science and technology expenditure data (including earned income) to show the activities being funded (see table below).

S&T Expenditure Allocation by Activity: 1997		
	IR£m	% of Total Activity
Research and development	173.5	21.2
Information & specialist advisory services	49.6	6.1
Scientific and technical services	232.0	28.3
Technology transfer	5.0	0.6
Education and training	284.3	34.6
Other activities	75.2	9.2
Total	819.6	100.0

Section 3.1 provides a more detailed review of the Science Budget data.

1.4 ICSTI Statement on Public Expenditure

At the request of the Minister for Science, Technology and Commerce, the Irish Council for Science, Technology and Innovation (ICSTI) has already provided in September 1997 (and subsequently published) its views on science and technology expenditure priorities in the context of the 1998 Estimates. In its published Statement the Council concentrated on a number of structural deficiencies in Irish science and technology. It emphasised the need for additional resources for education at all levels and for the encouragement of innovation in enterprises. It drew attention to the major role of the EU in financing Irish S&T via Structural Funds and stressed the importance of timely preparation and planning for the post-1999 period. The Council also called for a selective focusing of scarce public resources on those areas of strategic importance to Ireland's economic well-being and recommended the establishment of a National Innovation Investment Fund for priority S&T investments of importance for national development purposes.

This work is taken further in the present report which describes the STI prioritisation process in Ireland, considers its strengths and weaknesses and recommends how the present system can be substantively improved.

2. The Public Expenditure Process and Funding for STI

2.1 Public Expenditure Allocation - the Government Estimates Process

In general terms, the annual Government Estimates process begins with a broad direction from the Minister for Finance to each Minister, following overall Government consideration, setting out the parameters for public spending compared to the previous year.

Individual Departments put forward initial spending proposals including those for the State Agencies for which they are responsible, based on 'no policy changes' (i.e. operating to the same policies as the previous year) and prepared within the general parameters set by Government. Departments also indicate any new policy areas which need to be addressed. Following bilateral exchanges with the Department of Finance, estimates for individual Departments are agreed. Residual areas of difference between the Department of Finance and individual Departments are resolved at Government meetings.

According to the Science Budget definitions, there are 12 Government Departments with STI-related spending. In most cases the spending represents a subset of a wider departmental function and STI activity does not normally emerge for separate consideration in the Estimates process. To a large extent it is included only insofar as it is considered to contribute to the achievement of the overall objectives of the Department seeking public funding.

The overall Departmental estimates determine the allocations to the broad functional areas of government responsibility, and they, in turn, determine the allocations to STI activities which serve those broad functions. There is, to some extent, prioritisation between functions within a Department, and, perhaps, some prioritisation in terms of the STI contribution to that function (viz-a-viz other components). However, with the exception of certain programmes (for example in the R&D area) there does not tend to be any separate focus on prioritisation between all of the STI activities within a government department - or for that matter across departmental boundaries.

2.2 Setting Priorities within Departmental Functional Allocations - the Historical Perspective

The history of S&T priority setting in Ireland is not complex. The two-tier system in other countries - one for science and one for technology - was not replicated here. Many countries have a Research Council or even a series of such Councils as a significant, if not the main, institutional arrangement to allocate State expenditure for R&D between competing demands. The nearest approach to a Research Council in Ireland was the National Board for Science and Technology (1978-1987), which, however, had little or no discretionary funds to distribute to research in the universities. The main reason for the demise of the NBST appears to have been a view that it did not sufficiently demonstrate its relevance to the achievement of Government objectives for social and economic development, including those implemented through Government Departments and executive agencies.

Until more recently, agricultural research was afforded a higher priority than any other area in the allocation of finances by the Government, and relatively significant amounts were allocated via An Foras Talúntais (later Teagasc). The allocation of resources to agriculture reflected the historical importance of agriculture to social and economic development in Ireland. The corresponding organisation to AFT for industrial technology - the Institute for

Industrial Research and Standards - in general did not establish the significant research capabilities that similar technological institutes achieved in other countries.

The availability of significantly increased levels of Structural Funds at the end of the 1980s heralded a new era for the funding of science and technology in Ireland. The earlier background work by the NBST, the Institute for Industrial Research and Standards, Eolas and other agencies, and by the then Department of Industry and Commerce in particular, led to a certain level of thematic priority setting. This was set out initially in the National Plan (1989) prepared for Structural Fund purposes and, subsequently, in the S&T sub-programme of the first Community Support Framework (CSF) (1989-1993). For example, a range of key technologies which were identified both as having significant levels of expertise in the universities, and as being of current or potential interest to industry, were put forward for Structural Funds support. This led to the establishment of the Programmes in Advanced Technologies (biotechnology, advanced manufacturing, optoelectronics, materials technology, software, telecommunications, and power electronics). The methodology by which these priority areas were identified was not, perhaps, particularly sophisticated but the areas chosen did represent what is generally accepted by most countries as being areas of prime technological importance.

Within the constraints under which the EU provided these funds (for example, support for basic research was excluded as it was then considered to be the function of individual governments alone to fund this activity) a number of structural priorities were identified:-

- *strengthening the technological capability of firms* (for example, via technology audits and graduate placement schemes);
- *improving industry/third level links* (for example, by supporting the recruitment of industrial liaison officers in the colleges, by promoting collaborative research between colleges and industry);
- *strengthening the regional infrastructure* (for example, by establishing technology centres in the RTCs).

The total allocation of public finance for S&T activities under the S&T sub-programme amounted to £152m over the 1989-1994 period. This compared with about £30m over the previous five year period. As a result of an underspend for the original measures included in the programme it was subsequently decided to increase significantly the resources allocated to funding R&D projects performed in enterprises and a new 'Measure' was launched for this purpose in 1993.

In parallel with what the Department of Industry and Commerce (later Department of Enterprise and Employment) were doing under the Industry Operational Programme other departments had more modest, but still significant, S&T components to the Operational Programmes for which they held responsibility. The agriculture, food, forestry, marine and environment sectors all benefited from proposals supported by their relevant government departments. In general, the activities and programmes included were prepared by the government department concerned, usually in consultation with the relevant agency or agencies. At national level only the Department of Finance, in its role as co-ordinator for the Irish Community Support Framework, had any sort of trans-departmental role in prioritising between S&T funding proposals from different departments. In exercising their role the Department of Finance, in line generally with the existing institutional arrangements, adopted a sectoral/functional rather than a 'horizontal' approach.

An important advance in the approach to expenditure programmes for S&T (and other areas) under the Structural Funds lay in the move to multi-annual (5 year) allocations and the incorporation of a systematic approach to the use of performance indicators and the evaluation of programmes.

Generally speaking, the earlier approach was continued when the second CSF was launched in 1994. Each department put forward its own set of activities for funding, with S&T generally having a higher profile than for the first CSF. Within departments and agencies, distinct priority-setting activities were beginning to emerge, mainly with a focus on research. Some examples:

Department of Agriculture, Food & Fisheries: Priorities within research activities are set by various consultative mechanisms involving industry groups, representative committees, the Board of Teagasc, and expert evaluations. A new initiative, in the form of a stimulus fund, was launched to foster collaborative and multi-disciplinary projects across institutes. In addition, support for institutional food research was opened to all food research institutions on a competitive project basis.

Environmental Protection Agency: A report outlining a national programme of environmental research priorities was published by the Agency in 1995. The priority research areas identified in the report covered the areas of ecosystems, monitoring capability, waste reduction, clean technology and enviro-socio-economics. Research work in the priority areas identified in the report is being carried out under the Environmental Monitoring R&D Sub-Programme of the Environmental Services Operational Programme (1994-1999). The R&D Programme is also supporting a pilot demonstration programme for the promotion of cleaner production in industry and fourteen companies are participating in the pilot programme.

Department of Marine and Natural Resources: The Department is preparing a National Marine RTD Strategy, covering marine food, marine technology and marine tourism and leisure sectors which will be submitted shortly to the Minister. Expenditure under the Marine Research Measure of the Fisheries Operational Programme 1994-1999 is being targeted on identified R&D priorities (industry partnership projects and infrastructure needs). Department of Health and Children: STIAC drew attention to the strength of the medical S&T infrastructure in Ireland and its potential for economic and industrial development. It recommended increased resources for the Health Research Board to support health-related R&D.

The Health Research Board is the statutory body with responsibility for health research in Ireland. The Board's primary function is to promote, assist, commission or conduct medical, health and health services research. In addition, the Board assists and supports other health agencies including health boards and co-operates with other research bodies in promoting or conducting such research in Ireland. The Health Research Board is the primary vehicle for health research funding from the Department.

Under the terms of a 1997 agreement between the HRB and the Wellcome Trust significant additional funding has been made available for Biomedical Research in Ireland. Beginning in the academic year 1997/1998 for a period of three years additional matching funding totalling £2m per year (£1m from the Department of Health and Children and £1m sterling from the Wellcome Trust) is being made available. It is envisaged that this new venture will make a significant contribution to strengthening basic research in Ireland for the long term.

Department of Enterprise, Trade and Employment/Office of Science and Technology: In-company R&D and third level research targeted at specific technologies and industrial linkages have received priority attention in recent years. Each scheme operated by OST is assessed against targets on an annual basis and funding for the following year is allocated according to performance, outstanding commitments and demand.

One other development in relation to priority setting is worth recording. OST is the provider of discretionary funds for third level research through grant schemes operated by Forbairt. A notable innovation in this area has been the establishment of the National Research Support Fund Board to take overall responsibility for these schemes. In this way OST has devolved some responsibility for priority setting in science to this Board, which acts very like a

Research Council and determines the broad areas to be supported under the various research schemes.

2.3 STI Funding Prioritisation - International Comparisons

A comparison of the STI prioritisation process in a number of countries has been carried out by the Council secretariat, with studies of the Finnish, Danish, Dutch, Australian and New Zealand systems. While each of these countries has a different approach to the prioritisation of STI resource allocation, in each case there are lessons which are of benefit in considering how the position in Ireland can be further developed and improved. Some discussion of the situation in each country is included in Appendix II while the overall conclusions and implications for Ireland are set out in the following paragraphs.

In the cases of Finland, Denmark and the Netherlands it is generally true to say that the case for the importance of research and development to national objectives is widely accepted. Examples of this are the existence of the Science and Technology Council in Finland - a cross-departmental group chaired by the Prime Minister - and the recent creation of the Ministry of Research in Denmark as distinct from the Ministry of Education. The countries operate a centralised system of advanced planning for R&D, with national strategic objectives being set at interministerial level and individual ministries pursuing impact-oriented priorities, i.e. priorities which link R&D closely with the functional objectives of the Ministry. There is a great deal of interaction between the major players in R&D activity. For example, the prioritisation process in Denmark is led by the Ministry of Research which consults with other Departments with Research Budgets and also with the seven Research Funding Councils. In Finland, the major departments are represented on the Science and Technology Policy Council, and these in turn hold formal negotiations with the agencies under their remit which are responsible for funding or performing research.

Prioritisation is concentrated on R&D spending. This is partly because detailed R&D data are more readily available than information on other S&T activities but mainly because R&D is seen as the major determinant of innovation and change in the economy. While the importance of industrial R&D performed within enterprises is recognised in all the countries studied there is also recognition of the need to support innovation in industry through public sector research activities. Research is also seen as important for addressing the major social and cultural issues - such as drug abuse, health, leisure activities - which can impinge directly or indirectly on the performance of enterprises.

The availability of 'new money' for investing in priorities is recognised as being important to stimulate change and to influence existing budgets. In the Netherlands, resource allocation decisions within government departments are required to reflect the results of their Technology Foresight exercise and the subsequent government decisions about its findings.

New Zealand introduced radical reforms of the public sector in the late 1980s with less of an interventionist public sector role in the economy. While the value of the output in the manufacturing and services sectors has grown, there is still a significant dependence on the agricultural based sectors and concern that the economy is reliant on a very narrow base for growth.

One of the more radical reforms was the introduction of the *Public Good Science Fund*. This fund, which is overseen by the Ministry of Research, Science and Technology is by far the single biggest source of public funding for S&T in New Zealand. The fund was generated by amalgamating funding from across a range of aligned departments and is used to channel research funding into areas of national priority. In particular it seeks to support research in new or emerging technologies and sectors, which are not funded by other departments. The Public Good Science Fund amounted to $NZ282m (c. £140m) in 1996. The total expenditure by other aligned departments amounts to $NZ90m (c. £45m) in the same year.

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Australia is the only country which is contemplating a science and technology prioritisation system which is wider than just R&D. The findings of a review of Australian science and technology arrangements, undertaken by their Chief Scientist within the government sector, Professor John Stocker, at the request of the Prime Minister, are relevant to Ireland. The main points are:

- National-level priorities for S&T should concentrate on structural issues rather than thematic prioritisation
- A Cabinet Committee should address these national priorities as well as major cross-portfolio S&T issues
- Each Department with significant S&T responsibilities should establish a position of chief scientific adviser.

A question raised by this review of the approach to S&T prioritisation in other countries is whether in Ireland the focus at this stage should be on defining a good prioritisation process for R&D activities initially rather than attempting the more difficult task of establishing a prioritisation system for the total S&T spend. This issue will be returned to in the final section on recommendations.

3. Existing System of Prioritising STI Resource Allocation

3.1 The Existing Profile of STI Expenditure

As described in Section 2, when overall departmental budgets have been fixed, STI spending is usually a subset of an allocation for a broader set of activities put in place to achieve particular policy objectives. In many cases the STI expenditure involved is difficult to identify separately. An exception to this would be for completely new initiatives in the STI area where both the scope of the STI activities and the wider policy objectives are normally made clear.

The overall Science Budget is a compilation of the S&T spending of twelve government departments and 33 agencies. The S&T activities of these organisations can be viewed in terms of the type of activity involved (i.e. from R&D for basic research, to product development, technical services, technical information etc.) or in terms of broad objectives (i.e. industrial development, health, natural resources etc.). Tables 2 and 3 show the distribution of the total Science Budget spend according to these classifications.

Table 2 shows the distribution of expenditure allocations for S&T activity across the main public sector agencies in 1997. Looking at each activity in Table 2 in more detail the following points are relevant:

R&D Activities:

Arrangements for prioritisation are of particular importance within the R&D component, because of the non-routine nature of the investment and because spending in this area tends to be more discretionary in the short term. Almost all countries make some effort to monitor and prioritise their R&D activities. Many of them use technology foresight, or some variant of it, to help set public sector R&D targets and priorities.

The overall level of public sector R&D, as a percent of GDP, is significantly lower in Ireland than in other comparable countries as Table 1 beneath indicates. This applies both to government funding of R&D in all sectors of the economy and to the undertaking of R&D activities by the government sector itself. The level of R&D activity performed in the government sector as a proportion of GDP is less than half the EU average.

Table 2 shows that £173m or 21% of the Science Budget is allocated to R&D activities. This total includes approximately £47m of income earned by the research bodies supported by the State. The public sector financial contribution is about £126m, of which some £56m comes from EU Structural Funds. Only some £66m of the £126m is allocated to R&D activities performed within the public sector itself (about 0.14% GDP, as in Table 1 comparing Ireland with other countries). The balance of £60m is performed in the third level and business sectors. The conclusion is clear: compared to the position in most other countries at Ireland's stage of economic development the State sector is directly engaged in a relatively low level of R&D to support its objectives in relation to health, industry, marine, agriculture, and economic and social affairs generally.

While it is difficult to generalise about the reasons for, and consequences of, this relatively low level of direct investment in R&D by the State it would be wrong to simply conclude that this reflects, in some way, a 'privatisation' of R&D more closely aligned to the needs of the business sector. With a total expenditure of £11.8 billion in 1997 and a projected expenditure of £12.9 billion in 1998, it is difficult to justify the fact that the State itself allocates only some £66m of this significant spend on R&D activities which it undertakes itself. Such a low priority to direct R&D activities must inevitably give rise to concerns as to how effective and well-decided are the large levels of public expenditure undertaken - especially in areas such as

environmental, health and social programmes where good research can make a significant contribution to good decision-making.

Table 1: R&D Performance and Funding by the Government Sector as a percentage of GDP: Selected Countries (1995 or nearest)

Country	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	0.33	0.76
Norway	0.30	0.88
EU Average	0.30	N/A
OECD Average	0.26	N/A
Portugal	0.16	0.51
Ireland	**0.14**	**0.37**

Source: OECD - Main S&T Indicators

Table 2: Profile of State Sector Allocations to S&T Activities (£m) 1997						
	R&D	**Information & Advisory Services**	**Scientific & Tech. Services**	**Training Activities**	**Other**	**Total**
D/Education	2.0			155.0	0.5	157.5
HEA	41.1			123.8	43.6	208.5
D/Enterprise		0.4			5.2	5.6
Forbairt		0.4			5.2	5.6
IDA	7.1					7.1
FÁS	1.4			5.0		6.4
SFADCO	8.3			1.0		9.3
Forfás		0.8	7.1			7.9
NMRC	7.4				1.2	8.6
Udarus	2.0					2.0
D/Agriculture	7.3	2.6	16.3		1.2	27.4
Teagasc	23.5	24.0	2.8		0.5	50.8
COFORD	0.5				0.2	0.7
Marine	8.0		2.4	2.1		12.5
D/Environment	0.3		0.7		0.8	1.8
EPA	1.7	1.2	4.7		0.2	7.8
D/Health		0.5	134.4		5.2	140.1
HRB	4.7		0.2	0.1		5.0
D/Social Welfare	2.2	0.3			1.9	4.4
D/Energy		0.5	0.7		0.2	1.4
Geological Survey			2.3			2.3
Radiological Institute	0.2	0.8	0.6		5.3	1.9
ESRI	2.9	0.2		1.0		4.1
State Laboratory	0.6	0.5	1.8			2.9
Ordnance Survey	0.4		8.3		0.8	9.5
CSO			15.1		1.6	10.0
D/Justice	0.61		13.9			14.5
Total	**173.5**	**49.6**	**232.0**	**284.3**	**80.1**	**820.0**

Source: Forfás 1997

Table 3: State S&T by Major Objectives (Major Organisations) £m, 1997

	Education & Training	Industry	Agriculture & Forestry	Marine	Energy	Env	Health	Economic & Social	General Public Svce
D/Education	157.5								
HEA	208.8								
D/Enterprise		5.3							
Forbairt	1.7	62.7	0.9		4.8	2.0			
IDA		7.1							
FÁS	6.4								
SFADCO		8.3							0.8
Forfás		7.1							
NMRC		8.7							
Udarus		2.0							
D/Agriculture			27.5			3.6			
Teagasc		9.4	37.9						
COFORD			0.7						
Marine				12.5					
D/Environment						1.3			0.6
EPA						1.3			0.6
D/Health							140.0		
HRB							5.0		
D/Social Welfare								4.4	
D/Energy					0.8				0.5
Geological Survey									2.4
Radiological Institute						1.1	0.6		0.2
ESRI								4.2	
State Laboratory									2.9
Ordnance Survey									9.4
CSO									19.4
Met Eireann	0.2								9.8
D/Justice									14.4
Total	**380.6**	**114.4**	**66.9**	**12.5**	**5.6**	**11.2**	**145.6**	**9.4**	**71.0**

Source: Forfás 1997

Mechanisms for Prioritisation of State Expenditures on Science and Technology

The major components of overall public sector expenditure on R&D are:

- a proportion of the HEA's block grant to the universities for salaries of academic staff
- grants to firms to finance their R&D projects
- grants to third level colleges/hospitals for R&D projects
- R&D programmes operated by agencies such as Forbairt, Teagasc, Marine Institute, NMRC etc.
- Economic and social research performed by ESRI, Combat Poverty Agency etc.

Table 2 shows an amount of £41m for R&D activities against the Higher Education Authority (HEA). This figure may be somewhat misleading. It includes an amount of £15m earned by the universities from contract research, of which £5m comes from EU projects. A further £10m is an attribution to research of a proportion of what the HEA allocates the universities for academic salaries; the actual proportion used is based on occasional surveys of R&D in the third level sector. Up to now the HEA itself has not provided any funds specifically for research projects in the universities, with the result that non-commercial research priorities in the colleges are driven entirely by the requirements of external contracts, such as EU Framework Programme. While it is good that the colleges are increasingly seeking to meet the commercial R&D needs of industry, the lack of adequate support for fundamental research is of concern. In its Statement on the new £250m Scientific and Technological Education (Investment) Fund, the Council has recommended that the additional £5m available in the Department of Education and Science in 1998 for third level research should be invested entirely in basic research. The Council welcomes recent moves by the Department of Education and Science in this direction.

Information and Advisory Services: The major element (about 50%) of the £49.6m allocated to information and advisory services in 1997 is the professional advice provided by Teagasc to farmer clients. Forbairt operates a smaller-scale advisory service on industrial technologies. Most other countries appear to operate similar support programmes but comparable data are not readily available.

Scientific and Technical Services: Of the total amount of £232m allocated under this heading in 1997 a sizeable amount (£134m) is in respect of the Health Laboratories operated by the Department of Health. Under this heading also the Department of Agriculture operates a whole series of laboratories and classification schemes mainly relating to food standards and quality. Forbairt operates a range of technical services for industry and the National Standards Authority of Ireland still operated from Forfás in 1997.

Training and Education: The £284m allocated under this heading in 1997 mainly covers the activities of the Department of Education and Science and the HEA in funding the teaching of scientific and technological courses in third level colleges.

3.2 Commentary on Existing Priority-Setting Mechanisms

Despite the significant levels of public money invested in STI, and the detailed description of it available in the published Estimates and the Science Budget, it is difficult to discern any systematic and comprehensive approach in relating this expenditure to national priorities for either STI itself or, importantly, for the sectoral/functional areas of Government activity.

As described in Section 1.3, for over a decade the Forfás Science Budget has been the most extensive source of statistical information on current government expenditure on science, technology and innovation. The publication covers the entire range of STI activities including R&D, technical services, technical information, technology transfer and education and training. It also provides details of the spend by broad objective e.g. industrial development, education and training, health, natural resource development and so on. The definitions used to classify STI expenditure for the Science Budget are broad (based on a classification system recommended by UNESCO) and include the social sciences as well as the natural sciences and engineering. The comprehensive nature of the Science Budget, together with the descriptions of STI activity and associated commentary which it contains, provides rich source material for policy research and analysis on the pattern of STI expenditure including its various components. Little appears to have been attempted in this area to date, however.

The Science Budget is an ex-post description of expenditure on STI compiled and published after the allocations have been decided. It needs to be complemented by a budgetary process for planning in advance how public STI funding is determined and apportioned.

As a result of the recommendations of the Implementation Group on STIAC included in the 1996 White Paper on Science, Technology and Innovation, Departments now identify STI expenditure proposals at the annual draft Estimates stage. The STI spending allocations are now published in the form of an Annex to each Department's Vote which allows for the consolidation of S&T spending and earlier commentary and debate.

The new procedure is a marked improvement on the previous situation. The information provided in the published book of Estimates, however, understandably does not indicate how priorities were established or analyse the thematic or structural objectives they are intended to achieve. The aggregation in the Book of Estimates of STI expenditure plans within Departments and agencies, and across Departments, makes for difficulty in determining the sectoral and national priorities which underpin the spending proposals.

In these circumstances, there is an assumption - but no more - that STI expenditure within a given functional or sectoral area is intended to underpin the achievement of wider policy objectives for that area. However, in circumstances where STI expenditure is not spelled out in detail, nor its objectives explicitly stated, this assumption cannot be validated and there is cause for concern that the STI component within a particular area of expenditure receives a lower priority than is justified by its potential.

Better planning and prioritisation become more pressing given the importance, albeit small scale, attaching to current public sector expenditure on STI in Ireland (see Section 3.1). Indeed, the failure to relate departmental plans to national priorities, as described in the foregoing paragraphs, helps to explain in part why Ireland's expenditure on STI is below our international competitors for both total spending and for specific elements within it, especially R&D. Furthermore, in an STI context, there is no process to provide effective guidance on which sectors, technologies or skills might achieve comparative advantage in the future, for example in helping to attract the next generation of technology-based industries. There is, in short, an absence of a strategic management approach to the overall STI budget or indeed recognition of the strategic importance of STI to future national development.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

The comparatively low levels of public finance allocated to STI activities in the current arrangements within Government Departments for allocating STI expenditures - i.e. by deriving it from allocations to wider public policy objectives - implies a failure on the part of those responsible to develop convincing arguments on the contribution which STI can make in the pursuit of those objectives and so enable STI investment to be given a higher weighting in the allocation of finance. This failure, in turn, leads to an inability on the part of Government to establish a firm link between STI and national development issues and also to a more general lack of public appreciation of STI. In a more specific way it also gives rise to the following problems:

- A tendency to roll over STI spending based on incremental funding for the current activities of Agencies and Programmes. While there may be some validity in this for the provision of routine technical services or information it becomes an issue of serious concern when it leads to a situation where R&D spend is 'locked-in' through long-term commitments or the failure to undertake fundamental comparative evaluations of STI activities and programmes with clear-cut reallocative recommendations
- Insufficient dynamism and an inadequate capacity to react in a timely way to new issues or emerging situations which require a reorientation of existing S&T activities
- Emphasis on activities and objectives which derive from policy priorities established in the past but which may have lost full relevance to current circumstances
- Absence of synergy from the cross-departmental consideration of STI issues
- Possibility of contradictory or duplicatory approaches between departments
- The possibility of good projects not proceeding because of the "somebody else's responsibility" syndrome

Insufficient emphasis on collaborative activities with a consequent smaller scale of effort in individual projects

3.3 Conclusions

Based on analysis of the existing information on the pattern and evolution of state-funded STI activities and of lessons drawn from the experience of other countries, the Council draws the following conclusions:

- Financial allocations to STI at present take place largely within the allocations to Government Departments to fund the functional/sectoral responsibilities of Government, reflecting the organisation of government business and departments. The first stage of improved prioritisation for STI, therefore, is best approached within the context of this organisational model by focusing on the contribution which STI can make to the Government's objectives in areas such as industrial development, natural resources, education, health and environment
- The current process is largely based on an 'incrementalism' approach under which existing programmes either 'advance' or 'stagnate' thus limiting the scope for shifting resources to new areas of national priority
- The process of cross-departmental prioritisation for STI activities is not explicit. This, in turn, weakens the focus on STI activities in the system of public expenditure allocation
- Under the present approach the extent to which STI activities are linked to stated national policy priorities is not clear e.g. those priorities set out in documents such as Partnership 2000, Programme for Government, Shaping Our Future etc. The contribution of STI to national development is, thereby, understated
- The current process would benefit by being supplemented with an approach based on horizontal STI objectives and priorities, which identify the priority sectors, technologies and STI related issues to be tackled
- The Government should adopt five interdependent guidelines in establishing an improved system of prioritisation for STI activities as follows:
    - Make clear that Government expenditure on STI activities is not simply an end in itself but a means towards the more effective achievement of the nation's social and economic objectives.
    - Establish a process to identify clearly and explicitly the contribution which STI investment can make to the achievement of the functional and sectoral objectives for which the Government is responsible.
    - Within this process establish clear objectives and criteria as a basis for allocating public funds to STI activities.
    - Determine the structural deficiencies e.g. STI skills, fundamental research, school curricula, which may need to be addressed for long term results.
    - Determine the key technologies and capabilities which Ireland will require for its ongoing development and invest resources in those areas.
- A good case exists for attaching a somewhat higher ranking in terms of the timing of an improved prioritisation process for STI to R&D activities
- There is a need for a better approach to the measurement (at the national level) of the development of Ireland's STI capability and its benchmarking against international best practice.

4. Mechanisms for Greater Prioritisation of Public Spending on STI

Based on the foregoing analysis, the Council makes recommendations on the following six areas in order to bring about improvements in the prioritisation process for public spending on STI.

4.1 Strategic Commitment by Government

ICSTI acknowledges the Government's wider objective of bringing about improvements in public expenditure allocations e.g. through the Strategic Management Initiative, multi-annual programming and systematic programme evaluations. These improvements are designed to achieve reallocation of public expenditure to areas of national priority within the overall limits for public expenditure. Examples of this type of reallocation approach are the Scientific and Technological Education (Investment) Fund and the National Innovation Investment Fund. Consistent with that approach, the Council considers that there should be an explicit strategic commitment to STI, as a powerful instrument for social and economic advancement, and that this commitment should be recognised in the strategy statements that each government department prepares under the Strategic Management Initiative.

4.2 Criteria for the Establishment of STI Priorities

In order to determine priorities at both national and departmental levels, as well as to reduce the possibility of inconsistent approaches to funding of STI across Departments, Departments should be required to allocate funding against a coherent national STI mission and set of criteria.

The Mission for all publicly supported STI should include the following objectives:

- To ensure that the appropriate scientific and technological infrastructure, in terms of research, skills, technical services and information is in place to underpin Ireland's economic and social development
- To promote an environment conducive to S&T-based innovation, leading to increased international competitiveness of the traded sector of the economy and the domestic infrastructure on which it depends ,p>
- To promote greater public appreciation of the role and contribution of STI to national development

Funding should be allocated on the basis of the following basic criteria:

- The activity is necessary to underpin the development of the sector involved or the efficiency/effectiveness of the function
- The activity is not being provided, or capable of being provided, by the private sector. However, private sector participation in publicly funded projects should be encouraged
- Funding should, as far as is practicable, be provided on an open, competitive basis. This is particularly true in relation to R&D programmes. The Council acknowledges that this may not be immediately feasible for certain types of programmes e.g. those which provide technical services or information on a day-to-day basis but any constraints to moving to such an approach should be quickly addressed
- Activities and Programmes should be subjected to rigorous evaluation and monitoring in terms of their impact and achievement of objectives.

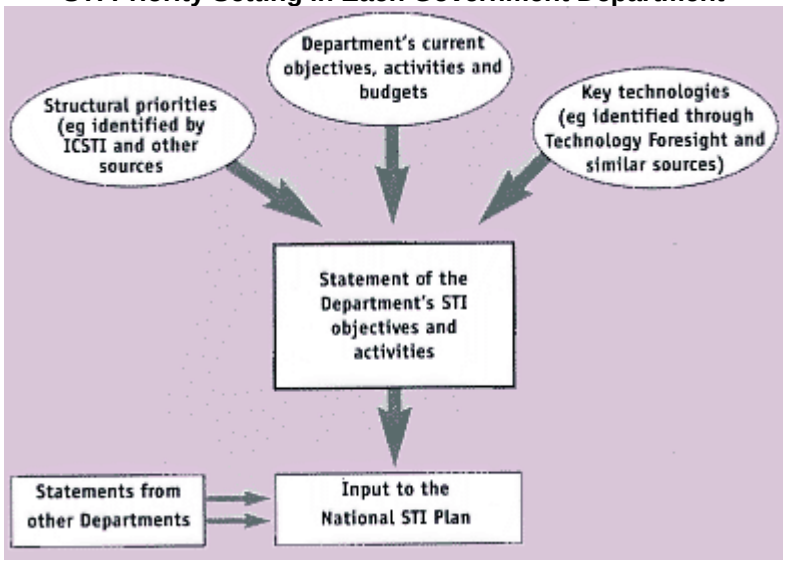
4.3 Departmental Statements on STI

In order to improve the effectiveness of departmental STI activities, to promote greater synergy in activities across Departments, and to facilitate prioritisation of public spending, the Council believes that each Department should be required to draw up a Statement covering its STI activities and objectives (including for agencies under its aegis) based on a three-year framework.

The Statements should be prepared in tandem with the Estimates exercise for the year in question, in keeping with the (three-year) multi-annual programme approach to the Estimates. The Interdepartmental Committee should compile and synthesise the Statements into a three-year National STI Plan and the Council should also have an input into the finalisation of the Plan. The Plan should be published and debated by the Oireachtas, as envisaged in the 1996 White Paper.

The following diagram illustrates how this process might work:

STI Priority Setting in Each Government Department



A typical departmental Statement would contain the following:

- The overall mission/objective of the STI activities and spending of the Department
- A description of the functional areas (and objectives) or sectors under which STI activity takes place. References to any link between these objectives and national development objectives should be set out. Any relevant structural problems (e.g. skills shortages, need for fundamental research) identified by ICSTI or other bodies should be incorporated
- A description of the existing STI activities undertaken (R&D, technical services, information etc.) which seek to underpin the development of each functional area or sector
- A description of the future development of the sector or functional area for which the Department is responsible and of the technologies which will impact in a significant way on the sector or functional area. This should incorporate the findings of any relevant panel in the Technology Foresight exercise of ICSTI or similar forward looking analysis
- A three-year budget framework covering STI activities for each functional or sectoral area
- Indicators and targets by which the achievements of overall objectives and of STI objectives can be measured

In order to put this action into practice as quickly as possible and to bring immediate clarity into national priorities, it could be confined initially to R&D activities within Departments, which tend to be more discretionary and thus more adaptable.

Scientific Advisers: Each Department should appoint a Scientific Adviser, either from amongst existing departmental or agency staff, or by recruitment. The aim would be to ensure that the scientific and technical basis of the plan, in meeting the Department's wider objectives, is brought to the fore and that the contribution of STI activities to achieving the overall objectives of the Department is better articulated and understood.

4.4 STI Spending and Structural Funds

At present a wide array of STI programmes and activities across Government are funded with the support of the EU Structural Funds. It is estimated that of the total Science Budget of £820m, some £133m is EU-sourced. These programmes and activities are carried out as part of the EU co-financed Operational Programmes for a number of different sectoral/functional areas prepared by Government Departments. They are co-ordinated by an STI Co-ordinating Committee which reports to the Community Support Framework (CSF) Committee, chaired by the Department of Finance and including representatives of Government Departments, the EU and the social partners, which monitors the totality of Structural Funds spending within the framework of a national development plan. This Committee structure provides a basis for the rationalisation and prioritisation of EU funded STI activities.

It would greatly facilitate the co-ordination and prioritisation of spending if, in a further round of Structural Funds, all activities were encompassed under a single programme for STI. And to further strengthen prioritisation, the flagship Measure of such a programme would be a substantially expanded National Innovation Investment Fund (described in section 4.5).

4.5 National Innovation Investment Fund

In order to give immediate focus to the prioritisation of public spending, ICSTI in its Statement on State Expenditure Priorities in September 1997 recommended the establishment of a National Innovation Investment Fund. The Government has since announced the establishment of such a Fund. The Council's view is that the Fund should be used to support projects of strategic importance for national development purposes and should operate as follows:

- ***Source of Funding***
  Based on the Exchequer contribution (initially £2.5m in 1998), Departments which have responsibility for the functional areas and projects to be funded should provide matching funding. The total funding from Exchequer sources should then be matched by the EU under the existing Structural Funds Programme and as the flagship measure in a new Operational Programme for STI under a new round of Structural Fund allocations

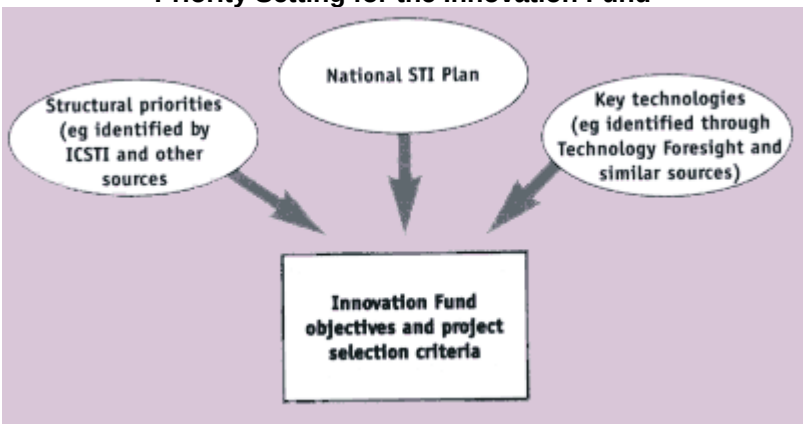
- ***Growth of Fund***
  On the above basis the Fund would amount initially to £10m per annum. However, if this Fund is to have a significant impact on determining and implementing national STI priorities, it would need to grow rapidly to at least £30m, which represents about one quarter of the current public spending on R&D

- ***Operating Responsibility***
  The Fund should operate as a subhead of the Vote of the Department of Enterprise, Trade and Employment, given the responsibility of the Office of Science and Technology in that Department for the co-ordination of national STI policy. The Fund should be overseen by the Interdepartmental and Cabinet Committees, which would take decisions regarding the priority areas to be funded and would take final decisions regarding projects to be funded

- ***Operation of the Fund***
  The fund should primarily be used to re-orient departmental spending towards areas of national priority. The Interdepartmental Committee should, in consultation with ICSTI, establish an agreed set of priorities for any given year and should allocate the Fund, on a competitive basis, to those Departments which most effectively provide matching funds to initiate or increase activities in selected priority areas. In particular, the Fund should promote projects of sufficient scale, duration and critical mass with potential for significant impact and should encourage collaboration across disciplines, across functional areas, between the public and private sectors and internationally where appropriate

The following diagram shows how the process would operate:

Priority Setting for the Innovation Fund



- ***Evaluation***
  Each project should contain performance 'milestones' and targets which allow it to be monitored and evaluated. Each project proposal should provide for public dissemination of the nature of the project, its objectives and results.

4.6 External Inputs and Benchmarking

The operational arrangements in place as described, and the implementation of the recommendations set out in the previous paragraphs, would benefit greatly from a process of external inputs, benchmarking and audit. Such a process forms part of the functions for which the Council was established by the Government and to that end:

- The Council will produce occasional statements on priorities for STI investment
- The Science Budget will continue to be published annually, including the Council's analysis of the patterns of spending and the balance between activities and objectives
- The R&D components of the Science Budget will be separately extracted and published together with an evaluative commentary

- The Council Task Forces on Technology Foresight and Innovation Infrastructure will provide valuable advice on areas of opportunity and deficiency which merit priority support
- The Council will carry out further work this year on national STI indicators, which will facilitate the monitoring and benchmarking of STI activities and investment in Ireland against comparative international data.

APPENDIX I - Priority Setting in Other Countries

This Appendix was drafted on the basis of discussions held and material collected by Michael Fitzgibbon and Eugene Forde during visits to Denmark, the Netherlands and Finland in 1997. The material on Australia and New Zealand was compiled from a search of the literature and desk research. Additional material on New Zealand was provided by the Chief Executive of the Ministry of Research, Science and Technology during a visit to Ireland in May 1998.

Finland

The organisation responsible for the development of all aspects of the science, technology and innovation system in Finland is the Science and Technology Policy Council of Finland (STPCF). The Council is chaired by the Prime Minister and consists of the Ministers for Industry, Education, Finance, Culture, representatives of industry and academia.

The STPCF plays an important role in determining the allocation of STI funding and in fulfilling this role engages in discussion and negotiations with the Ministry for Trade and Industry, the Ministry of Education and Science and other relevant bodies. In recent years the Council has decided that the largest share of STI funding should be directed to R&D.

With the proceeds of the privatisation of a number of State companies in recent years, the Finnish government has accumulated a fund of 1.5 billion Finnmarks (IR£200m) which the STPCF intends to use during the period 1997-1999 to bring national R&D spending up to 2.9 per cent of GDP. (EU Average = 1.8%; Ireland = 1.5%)

The new fund has the following goals:

- Balanced development of the entire innovation system
- Quality development of the infrastructure
- Increased human resource output
- The creation of the centres of excellence which bridge scientific development, technological development and industrial development.

The new funding is to be allocated (a) on a competitive basis, (b) to promote collaboration and (c) to encourage additional private financing.

Almost two-thirds of new funding will be allocated to the Ministry of Trade and Industry which in turn disburses the monies through its principal industrial technology funding agency, TEKES.

One-third is to be allocated to the Ministry for Education for disbursement to the third level sector through its principal agency, the Academy of Finland. The monies will be made available to the universities on a competitive tendering basis. The universities receive funding directly from the Ministry for Education to cover their teaching and research costs. It is anticipated that on average, 60% of each university's STI budget will be sourced directly from the Ministry for teaching (including related research and overheads) and the balance will be sourced from the Academy for project or results-oriented research.

The Academy of Finland designs large strategic research programmes e.g. in the areas of forestry, food, environment, and health. These are also developed in agreement with the Ministry of Education and are influenced by the national development agenda such as the Governments political programme.

A residual amount from the 1.5 billion Finnmarks national investment fund is to be allocated to the development of industrial R&D clusters and for goal-oriented research in the universities.

As noted above, TEKES is the principal STI funding distribution agency for industrially-related technology development. While the pattern of funding to TEKES is broadly known a number of years in advance, the Ministry of Trade and Industry has formal discussions with the agency twice a year to discuss policy priorities and to also to plan the detailed budget for each year some 18 months in advance. Against the broad objectives established by the ministry, TEKES sets down an annual plan to achieve them and targets are set at the 'impact' level (as opposed to the outputs) The annual plan consists of three elements, i.e. the mission and goals of TEKES, the environmental factors influencing industrial technology development and the strategic priorities arising from discussions with the MTI (e.g. the need for basic research related to the information and communication sectors; opportunities for new technology-based business, including technology-based services).

Environmental factors include broader national development objectives, national industry scenarios and major international trends in technological development. The new money available has led the development of new strategic objectives including 'industry research clusters' (funded by both the MTI and other sectoral Ministries e.g. foodstuff clusters, telecommunication clusters and environmental clusters)

Mechanisms for Prioritisation of State Expenditures on Science and Technology

Denmark

A key element of the STI prioritisation process in Denmark is the Ministry of Research which was established five years ago as a spin-off from the Ministry of Education and Science. The mission of the Ministry of Research is to co-ordinate research across all government ministries. It also provides direct funding for research through seven research councils and to a number of research institutes.

In 1997, an extra DK300m (IR£30m) was made available for distribution on new research priorities. This was the culmination of a process led by the Ministry of Research where each ministry put forward its priorities which was then negotiated to a final list of twelve. The priorities cover individual research and technology areas, as well as policy issues of a structural nature (e.g. women in science).

In the negotiation process some ministerial priorities were amalgamated in order to keep the list to a minimum and to keep as many Ministries as possible on board.

The process begins in the late autumn when the Research Councils provide their advice on strategic priorities. The first meeting of the inter-ministerial group is held in February when the ministries bring forward their proposals which are then debated in the light of the advice from the Research Councils. After a number of iterations the research plan is concluded by May/June and submitted to Parliament. The plan provides details of all proposed research spending by all Ministries, including proposals for new funding to tackle the identified priorities. If the plan/budget is approved by parliament and government, the funding is made available from the following year.

In practice, the new funding for priorities is being supplemented by existing money by a factor of three, and thus has an enormous influence on the reallocation of the existing resources. Having agreed the strategic priorities at inter-ministerial level, the funding is distributed by the Research Councils who are responsible for the criteria, project selection and administration. The Research Councils were originally created to fund research in the areas of agriculture, medical, natural science, humanities, social science and technical research. In addition to the existing councils, the Ministry of Research has added a seventh council, with responsibility for new strategies and interdisciplinarity across the other six areas.

Each research council has its own strategic plan which forms the basis of its advice to the research ministry in its negotiation on priorities with other ministries. The total level of funding to the councils is based on:

1. the priorities determined by the inter-ministerial group; and,
2. the strategic programme of each council.

In relation to the council's own strategic programme, excellence is the principal criterion whereas relevance to national policy issues is the main criterion for funding of projects under the priority research areas.

The Ministry for Research also provides funding to a number of research institutes of which the National Laboratory accounts for half of this funding. While funding for the National Laboratories comes principally from the Ministry of Research it also obtains funds from other ministries and from contract research with companies and international contracts.

The Ministry negotiates a contract with the Laboratory every four years where policy and strategic goals are agreed (e.g. the most recent contract provides for a greater level of collaboration between the Laboratory and the universities. The Laboratory is overseen by a

Board which sets scientific goals. The performance of the Laboratory, relative to the contract with the Ministry, is reviewed annually by the Ministry and the Board.

STI funding for the university sector principally comes from two sources:

- 'objective oriented' research funding from the Ministry of Education whose principal objective is to improve teaching and scholarship; and,
- results-oriented funding from the Research Councils.

Ministry of Education funding was previously allocated to the universities via the Higher Education Council, but the Ministry now reserves some 5% of the research budget for particular objectives such as increasing research income (including private sector funding), teacher quality and student numbers. In other words there is a 'semi-competitive' arrangement which seeks to reward universities for achieving a strong balance between teaching/internal research and externally-funded research.

Using the Research Councils as assessment panels, the quality of research in the universities is examined on a four-year cycle by reference to best international standards and reserved funding is allocated to the universities achieving the highest standards. A small amount of money is reserved for a 'priorities' fund i.e. priorities for the institution itself, which promote the strategic development and international standing of the university. Each university has a research plan (covering internal and externally-funded research) which is the basis for funding under this category.

The Ministry of Education indicates that the introduction of this system of incentives and competition is to promote and reward the universities in their total development as institutions.

The Netherlands

Prioritisation of STI budgets in the Netherlands takes place at cabinet and ministry level. This sub-section examines the prioritisation process at cabinet level and in the two main Dutch government ministries involved in funding research: Education, Culture and Science and Economic Affairs (industry).

Every two years the Government publishes its 'Science Budget', which is its budget for scientific research and in which the Dutch Cabinet sets out its long-term science policy. The government is advised on its research policies by the Advisory Council for Science and Technology Policy (AWT) with 12 members from various branches of society, and the process is co-ordinated by the Ministry for Education, Culture and Science. The AWT has taken over responsibility from the Ministry for the carrying out of technology foresight studies. It is anticipated that this will lead to a greater input from industry and society than has been the case with the foresight committees established by the Ministry of Education, Culture and Science.

The Dutch Government's main STI objectives are:

- to increase the private investment in RTD
- to promote greater co-operation between industry and public research
- to increase knowledge-intensive activities in the Dutch economy

As the government's financial scope is limited, choices have to be made. The role of the Foresight Steering Committee is the key to this and the 1997 Science Budget contains the Cabinet's response to the Foresight Report. For each field of knowledge and area of science, the Cabinet indicates which concrete choices it intends to make and which programmes will receive extra funding. The Cabinet considers that quality is paramount in science and it wishes to retain top talent and to create the necessary pre-conditions for high-quality research. One proposal aimed at improving research quality, which is controversial and still being considered by government, is to double the research funds budget of NWO (the Dutch Organisation for Scientific Research) at the expense of what is termed the 'first cut' funds for academic research - i.e. the global grant to the universities for research which is not limited to specific projects.

In response to the identification of new STI priorities, the government's approach has been to gradually shift funding to new priority areas and to achieve this through inducements rather than by coercion.

The Science Directorate within the Ministry of Education, Culture and Science has overall responsibility for scientific research across all Ministries but lacks any specific mechanism to enforce its views. In general, science and research were said to have been rather low on the political agenda until the last couple of years. This is changing now with the increasing importance of education and of investment in knowledge. The current Minister is committed to the concept of a knowledge society and the Dutch Cabinet is currently debating the importance of investment in knowledge as opposed to physical infrastructure.

One interesting prioritisation mechanism in which the Ministry is involved relates to TNO, the Netherlands Organisation for Applied Research. TNO undertakes research on behalf of a number of different ministries. The various budgets for science in TNO have recently been centralised under the Ministry of Education, Culture and Science and an inter-departmental committee of the ministries involved meets, under the chair of the Minister for Education, Culture and Science, to agree what TNO should do for each ministry for the following four years. Each ministry makes a proposal and the Ministry of Education, Culture and Science comments on it. The priorities are based on the results of a technology foresight exercise,

which was managed by the Ministry of Education, Culture and Science, took four years to complete and was finished in 1996.

Priority setting in the Economic Affairs ministry is very much linked to the needs of industry. The ministry is conducting its own 'key technologies' analysis - which it calls 'Technology Radar' - by visiting companies to get their views on key technologies and identifying any mismatches against existing strengths in the system. The key emphasis is on R&D.

Some years ago, the CEOs of a number of firms contacted the ministry complaining about the lack of relevance of university research and the shortage of qualified labour. These firms were at the forefront of applied research and needed good basic research to back them up. They wanted this basic research in specific areas. This has led to the creation of four Technological Top Institutes (TTIs) which were not completely new but located in centres of expertise in the universities - somewhat similar in concept to the PATs in Ireland. The four areas chosen were food science; metal technology, specifically surface science; polymers; telematics. The ministry provides 50% funding for basic research projects in the TTIs, with 25% from industry and the balance "in kind" from the universities. The total budget for the ministry for the TTIs is about £18m per year, or about £4.5m for each TTI.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

New Zealand

New Zealand introduced radical reforms of the public sector in the late 1980s with a general thrust of the public sector becoming less interventionist in the economy. While the value of the output in the manufacturing and services sectors has grown, there is still a significant dependence on the agricultural based sectors and concern that the economy is reliant on a very narrow base for growth.

One of the more radical reforms was the introduction of the 'Public Good Science Fund'. This fund, which is overseen by the Ministry of Research, Science and Technology is by far the single biggest source of public funding for S&T in New Zealand. The fund was generated by amalgamating funding from across a range of sectoral departments and is used to target research funding on areas of national priority. In particular it seeks to support research in new or emerging technologies and sectors, which are not funded by other departments.

The Public Good Science Fund amounts to $NZ282m (c. £140m). The total expenditure by other aligned departments amounts to $NZ90m (c. £45m). Both these funds are regarded as 'targeted' funds. In addition the Department of Education dispenses 'untargeted' funds totalling $NZ96m (c. £48m) for university research.

The Ministry of Research Science and Technology is responsible for policy advice to government. Its funding is allocated through the Foundation for Research, Science and Technology to a variety of research organisations including universities, research associations, government departments and private sector bodies which compete on the basis of the quality of their projects. Also eligible to compete for public funding are the nine Crown Research Institutes, which are state-owned institutes dedicated to research in specific sectors. In addition to competing for public monies, the Crown Research Institutes provide research services to the private sector on a competitive basis.

Following the last review of priorities for S&T in 1995, the Ministry of Research, Science and Technology identified the need for an improved priority setting process. As a result they are engaged in a technology foresight exercise which links government investment in research, science and technology with New Zealand's development as a knowledge society. According to the Ministry 'the focus on the future must not be constrained by what we have have been doing in the past'.

In keeping with its minimalist intervention approach, New Zealand does not have targets for GERD or BERD. However, its vision for research, science and technology in 2010 is to have a society which:

- Understands and values science and technology and their critical role in ensuring New Zealand's future prosperity and well-being
- Maximises the contribution of science and technology to wider economic, social and environmental goals through scientific research and technological learning of the highest quality.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

Australia

In early 1997 the Prime Minister of Australia requested the Chief scientist (Professor John Stocker) to undertake a review of Australian science and technology arrangements, including ways of identifying national science and technology priorities.

The overwhelming sentiment reflected in the submissions to the review from a wide range of organisations and individuals is that Australia needs a Government-endorsed statement of 'priorities for science and technology', or a 'national vision' or 'guidelines' in this area. It was argued strongly that any development of national science and technology priorities must be at the broad level - a detailed prescription of which scientific discipline or specific social or economic objectives should be favoured is inappropriate. Rather, priorities should focus on the goals of science and technology, both strengthening science and technology capacities and applying S&T to national needs, and should be strongly linked to broader policy areas, in particular the statement of an explicit industry policy.

The major recommendations of the Stocker Report relating to priority setting are:

- The Government should articulate a preferred vision for Australia's development towards national goals for economic and industrial development, quality of the environment and social well-being
- National-level priority identification for S&T should be undertaken by the Prime Minister's Science and Engineering Council, with the Chief Scientist taking the leading executive role
- Those national-level priorities should concentrate on structural issues. Thematic priorities (related to disciplines or socio-economic objectives) should only be included when there is a very strong case that the objective or field of science concerned needs special attention
- An early step should be the gathering, analysis and publication of data on allocation of resources against agreed structural and thematic priorities for S&T
- A Cabinet Committee should be given responsibility for S&T matters, and should address issues such as national priorities for S&T and major ad hoc cross-portfolio S&T issues raised by the Minister for Science and Technology
- Each department with significant S&T responsibilities should establish a position of chief science adviser, or assign the duties of such an adviser to an existing position in the department
- Each department should ensure that it has a high-level co-ordination and consultation mechanism, which regularly brings together the key portfolio S&T players to develop and refine their S&T planning systems and activities to ensure that S&T make their full contribution to achieving departmental goals and are properly resourced.

APPENDIX II

Statement of the Irish Council for Science, Technology and Innovation (ICSTI)

State Expenditure Priorities for 1998

September 1997

Summary

In considering priority areas of public expenditure in science, technology and innovation in Ireland, the recently established Irish Council for Science, Technology and Innovation draws attention to a number of key areas of investment of national importance, and recommends the following actions:

1. Science in Schools

- Increase significantly the initial commitment, announced earlier this year, of £30m over five years to a range of measures to promote the use of information technology in the schools
- Provide additional resources to improve the science curriculum in primary schools, if necessary by reallocating existing expenditure
- Place increased emphasis on science, mathematics and technology subjects in secondary schools and provide the consequential additional resources

2. Third Level Education

- Allocate the resources required in 1997/1998 to provide for 1,000 additional third level places per year for computer science/software engineering and 750 additional places per year for technicians for the electronics industry, in line with the recommendations of the Forfás Skills Identification Group
- Provide £10m per year additional funding from 1998 onwards to redress the equipment crisis in the third level colleges

3. Third Level Research

- Increase support for basic research, via a fund open to all on a competitive basis, from £2m per year at present to £6m per year

4. Industrial Innovation

- In the context of further Structural Funds reallocations in 1998, an additional £12m should be made available for the Industry R&D Grants Scheme of the Industry Operational Programme ('Measure 1'), including food research
- Focus the new funding to be allocated this year on encouraging new R&D performers and on building long-term research capabilities within enterprises
- Place greater emphasis under 'Measure 1' on promoting and supporting industrial design
- Allocate additional resources to improving the links between industry and third level colleges

5. Structural Funds

- Ensure that adequate funding continues to be available for science and technology activities after the current Structural Funds round ends in 1999, by initiating immediately intensive planning for the post-1999 situation

6. Funding Areas of Strategic Importance

- Establish a Strategic Innovation Investment Fund

Economic development and job creation in Ireland are increasingly dependent on a high-quality knowledge and science-based enterprise sector. Scarce public resources for science and technology should be selectively focused on those areas of strategic importance to Irelands economic well-being. Aware of the resource constraints on Government, the Council recommends the establishment of a Strategic Innovation Investment Fund for priority investments of importance for national development purposes. To provide such a fund a levy could be applied, if necessary, to the totality of public expenditure on science, technology and innovation. This fund would be directed to finance the accelerated development of those areas of science, technology and innovation of strategic importance to Ireland's international competitive position.

Mechanisms for Prioritisation of State Expenditures on Science and Technology

1. Introduction

1.1 Following its recent establishment the Council is in the process of developing a work-programme which will form the basis of its advice to the Government through the Minister for Science and Technology. A central part of that programme includes a fundamental examination of the funding of science and technology in Ireland. This work will take some time to complete to the stage of well-conceived and authoritative findings.

1.2 In the interim the Council has been requested by the Minister to provide views on science and technology expenditure priorities in the context of the 1998 Estimates. In doing so the Council stresses the need for a long-term view in setting priorities and draws attention to two underlying principles behind state investment in science and technology:

1. The national importance of promoting science and technology as a powerful instrument of the social and economic policies of the Government.
2. The national importance of promoting science and technology in the pursuit of knowledge for educational, intellectual and cultural reasons.

1.3 These two principles are not mutually exclusive - they support and complement one another. For example, the applied research so necessary for social and economic development and competitive business is not possible in the absence of a basic foundation of highly-qualified people trained and well-versed in the methodologies of scientific research, with good access to modern scientific equipment. At the same time, the availability of the resources needed to allow the pursuit of knowledge for educational, intellectual and cultural reasons is largely dependent on the success of technology-based industry in creating the necessary wealth.

1.4 In this context the Council has identified a number of expenditure priorities for consideration in the contest of the 1998 Estimates under two headings:

- Knowledge and Skills
- Industrial Innovation

The Council also comments on the unique role of EU Structural Funds in supporting Irish investment in science and technology and draws attention to the need for a special funding mechanism for financing priority investment areas.

2. Knowledge and Skills

2.1 Science in Schools

- Increase significantly the initial commitment, announced earlier this year, of £30m over five years to a range of measures to promote the use of information technology in the education sector
- Provide additional resources to strengthen significantly the science curriculum in primary schools, if necessary by reallocating existing spending
- Place increased emphasis on science and technology subjects in secondary schools, and provide the consequential resources.

Rationale: A modern economy needs a scientifically literate and innovative population. We should aim to raise the performance of Irish school children into the top ten in the world in science and mathematics. This will also enable more people to study science and engineering at third level. There is a requirement for additional investment in teacher training and in facilities; the Department of Education is currently evaluating the implications of this for the budget. This is a long-term task but a start should be made in the 1998 estimates.

The Council strongly endorses the views on this issue in the report of the Information Society Steering Committee. In a first response to the recommendations of the Information Society Steering Committee, which Forfás convened, the Government announced earlier this year a commitment to invest £30m over five years in a range of measures to promote the use of information technology in schools. The Council welcomes this initial commitment and recommends that, in the light of developments that have taken place since this commitment was made in April last and which emphasise even more strongly the importance of ensuring that students at all levels are familiar with, and competent in the use of, information technology, the Government should significantly increase the level of financial commitment to this area of education.

2.2 Third Level Education

- Allocate the resources required to provide for 1,000 additional places per year for computer and software graduates and 750 additional places per year for technicians for the electronics industry. An initial additional capital tranche of £5m has been allocated for 1997. Total capital requirements over 5 years are estimated at some £50m, with associated current expenditure rising to £16m per year when all additional places are established
- £10m additional funding should be made available in 1998 and subsequent years to redress the equipment crisis which exists at present in the third level colleges. This fund should be allocated on a competitive basis between users, to ensure that the most urgent cases get priority and to minimise any duplication of major items of equipment.

Rationale: Serious skill shortages are now appearing in industry. Ireland has made enormous progress in attracting many of the most sophisticated enterprises in high technology industries such as electronics, telecommunications, pharmaceuticals, software and computers. There has also been significant development and increasing technological sophistication in Irish-owned industry in these sectors. These developments, if they are to be sustained, require a parallel investment in developing the human resources for those industries. Demand for software courses, for examples, outstrips supply by a factor of five - there were about 3,600 applicants last year for the 700 computer science places in third level colleges. Emerging skill shortages are also giving rise to wage inflation in particular sectors which will spill-over into more general inflationary

pressures and constrain economic development and job creation generally unless the supply of people with the skills required is increased. The situation is particularly difficult for small Irish-owned firms attempting to compete for scarce skilled people against large multinational companies. It is essential that the additional places required are provided.

The equipment crisis has resulted from long-term underfunding of equipment in colleges. Funds for equipment for the third level colleges are provided on an annual ad-hoc basis. Three years ago the Higher Education Authority estimated an overall need of at least £50m to address the equipment shortfall in the universities. Since then the position has worsened. Many laboratories are now in a critical condition, affecting the efficiency and effectiveness of education and research at undergraduate and postgraduate levels. An additional allocation of £10m per year for 1998 and subsequent years is essential, as is the need to put equipment depreciation and replacement on a sound financial footing as a routine part of the budget process.

2.3 Third Level Research

Support for basic research, via a fund which is open to all on a competitive basis, should be increased from the current level of £2m per year to the £6m per year recommended by STIAC. Structural Funds could be allocated to meet the additional amounts required, as suggested in the mid-term review of the Industry Operational Programme. Consideration should be given to ear-marking a specific amount under the block-grant system to third level colleges for basic research purposes.

Rationale: Accepting the two principles outlined in the **Introduction**, reasons for supporting third level basic research include:

Establishing a national reputation for excellence in research so as to expand access to international networks of scientific knowledge. Ireland can perform only a tiny fraction of world research and must develop the expertise and knowledge to be able to tap into results generated elsewhere. An excellent research environment is necessary to attract and keep in Ireland the best quality students and staff. It is also essential for attracting inward investment in advanced technology industries. At present, the research environment in Ireland is quite limited by the standards of comparable countries;

To train postgraduate students in research under a more 'professional' cadre of research programme managers. Trained researchers, particularly PhDs, are being sought more and more as the technological levels of Irish industry rise. Industrial R&D is increasing rapidly but is still concentrated at the development, rather than research, end of this spectrum. The availability of additional recruits, highly trained in good research techniques, will help to move enterprises towards more innovative research areas;

Third level institutions with a strong basic research programme will successfully attract higher quality of staff and students, resulting in an overall upgrading of standards and the 'outputs' available for the business sector and for society generally. The success of a number of campus-based companies in computer software and other areas in recent years indicates what can be achieved.

3. Industrial Innovation

3.1 Industrial Research and Development

There is to be a reallocation of Structural Funds within the existing Community Support Framework to provide an additional £27m for the Industrial R&D Grants Scheme under the Operational Programme for Industry ('Measure 1') between now and 1999. This is because the original allocation to the scheme has been exhausted some two years ahead of schedule. 'Measure 1' includes a significant allocation for food research. The Council welcomes this reallocation, recognising that public support for R&D in enterprises is necessary to help share the risks for companies involved in a wealth-creating activity where individual firms are not always able to appropriate fully the final benefits.

- In the context of further Structural Funds reallocations in 1998 an additional £12m should be made available for 'Measure 1'
- The new funding should be focused on encouraging new R&D performers and on building long-term, relevant research capabilities within companies
- In view of the importance of industrial design to product innovation, the 'Measure 1' scheme should make greater use of its power to promote and support industrial design
- Greater efforts are needed to improve industry-college links, with the aim of increasing the transfer of knowledge and expertise between industry and the third level colleges. This is particularly important for indigenous industry

Rationale: In the context of limited public funds to support industrial research and development it makes sense to focus expenditures in such a way as to promote key national policy objectives in this area. One such objective is to involve more enterprises in performing R&D for the first time; statistics show that over half of industrial firms in Ireland do no research and development at all, while another 30% have only a minor involvement in R&D. State funds should be utilised to encourage enterprises to become involved in R&D and, for those already with some involvement, to facilitate and encourage a long-term commitment and capability in research and development. The Council agrees that food research should remain a national priority.

3.2 Government Research Institutes

The government research institutes, which are generally sector-focused, have a significant role to play in servicing the R&D needs of the sectors that they serve and in advising associated government departments on R&D issues. The capability of some of these institutes has been seriously eroded over the years and there is now a serious need to revitalise these services to enable them to play a full role in support of innovation and technological advancement.

Applied Research and Technology Transfer: Applied research and applications development are essential to the industrial relevance of a research programme. These components are required to transform a public research programme from being scientifically interesting to being useful and innovative. In particular, the inclusion of applied research and applications development in a public programme is essential in supporting industry in adopting new products and processes and in the capacity to support the technological development of firms.

The public sector institutes in Ireland play a vital role in these areas. The STIAC Report and the White Paper on Science, Technology and Innovation stress the central importance of technology transfer and of the various S&T services provided by the State institutions. In the Irish context of an overwhelming concentration of SMEs in the economy, the Council stress the continuing importance of the State institutions in the areas of applied research, application of appropriate available technologies and the provision of a range of technical services to ensure that the performance of firms is not impaired.

4. EU Structural Funds

The Council recognises the important contribution of Structural Funds to the development of the Irish science and technology system in recent years and welcomes the fact that the mid-term review of Structural Funds programmes has highlighted science and technology as an important national investment priority.

Government should ensure that, when the current round of Structural Funds runs out in 1999, adequate funding remains available for S&T activities, either from new Structural Funds programmes or though a replacement of EU funds by exchequer finance.

Preliminary planning for the post-1999 situation has already started but needs to be intensified. The Council will make specific proposals in this area.

Rationale: Since the introduction of major new initiatives for Irish science and technology with the Structural Funds programmes that began in 1989 the levels of research and development in Ireland have risen from amongst the lowest in Europe to around the EU average. This has contributed to the significant growth in output, exports, productivity and employment over this period. The mid-term review of the Community Support Programme recognises the crucial importance of R&D to competitiveness and growth, and comments on the enormously important role of the CSF in promoting increased R&D in Ireland. It is vital to maintain this level of public commitment into the future. The challenge for Ireland lies in the extent of dependence in the past on EU funds and the danger that recent achievements will be dissipated when the current ERDF round finishes in 1999.

5. Funding Areas of Strategic Importance to Ireland

- Establish a **Strategic Innovation Investment Fund.**

The Council recognises the resource constraints on Government in the context of the public finance objectives set out in the Programme for Government. Within those constraints it is considered that investment in science, technology and education along the lines proposed here needs to be given priority status because of its impact on the knowledge, skills and employment prospects of the Irish labour force in the immediate and more distant future. Economic development and job creation in Ireland are increasingly dependent on a high-quality knowledge and science based enterprise sector. The Council wishes to ensure that available public resources for science and technology are selectively focused on those areas of strategic importance to Ireland's economic well-being. The Government has already acknowledged the need for action by establishing new organisational structures for this area - a Cabinet Committee and an Inter-Departmental Committee for science and technology.

These initiatives should be complemented and given effective teeth by the establishment of a **Strategic Innovation Investment Fund.** This fund would be directed to finance the accelerated development of those areas of science, technology and innovation of strategic importance to Ireland's international competitive position.

To provide such a fund a levy could be applied, if necessary, to the totality of public expenditure on science, technology and innovation. The impact of such a levy on individual programmes need not be significant but the contribution it would yield to the Government's commitment to science and technology as a critical arm of social and development policy would be very high. The creation of such a fund would represent a significant step towards a

priority-driven system of S&T investment.

A Strategic Innovation Investment Fund should have two clear operational guidelines. It should be based strongly on the concept of excellence and national competitiveness, with competition for scarce resources being the key driver. Secondly, it should be carefully monitored, with a post-allocation justification and analysis of effectiveness of all investments and a maximum level of transparency and accountability.

6. Conclusions

The Council welcomes the structural changes for improved decision making in relation to public expenditure on science and technology which are set out in the Government Programme and are now being put into place by the Government. The new Interdepartmental Committee of senior civil servants, chaired by the Minister for Science and Technology, will bring a more co-ordinated and strategic approach to the setting of science and technology budgets within government departments and agencies. The purpose of this Statement is to help the Minister and the Committee in their deliberations leading to the 1998 budget allocations.

ICSTI, September 16, 1997