



ICSTI
IRELAND

Irish Council for Science,
Technology and Innovation

State Expenditure Priorities for 1999

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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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SUMMARY

The Irish Council for Science, Technology and Innovation published its first statement on priorities for Government spending on STI in relation to 1998. The Council acknowledges the progress made on some of the actions it recommended to Government last year in relation to a number of key investment areas of national importance. It now draws attention to a number of public investment priorities which remain outstanding.

1. Industrial Research and Development

Recent research by economists in Trinity College Dublin has demonstrated conclusively that R&D-performing enterprises in Ireland have a much better track record in relation to employment than non-performers for the period 1986-1995.

Public policy must aim to raise the level of R&D performance in enterprises to well above the EU average.

A tax credit on incremental R&D expenditures should be introduced which would allow companies to deduct a certain percentage of their R&D expenditures from their tax liability and would go some way towards compensating for the disincentive effect on R&D investment of a low corporate tax environment.

The Council welcomes the recent announcement of an additional £5.6 million for the Research, Technology and Innovation (RTI) initiative which provides matching grants for industrial R&D and innovation projects. Should further reallocations of EU Structural Funds take place in 1999, additional funds should be provided for this initiative as a priority, in order to meet the level of demand from the business sector.

2. Industrial Design

Industrial design is recognised as an effective and economical way of gaining competitive advantage and an important route to product innovation. However, in common with many European countries, industrial design in Ireland does not enjoy the priority it should.

Increased funding up to £6m in 1999 should be made available for industrial design programmes.

3. Telecommunications Infrastructure

An investment of £30m should be made in 1999, to be co-funded by Government and the private sector on the basis of competitive tendering, to continue the development of broadband facilities in regional locations throughout the country.

The necessary resources - about £3.8m over three years - should be provided to enable the education and research network (the HEAnet) to be upgraded to broadband technology.

4. Technology Skills and Expertise

The Forþs Expert Group on Future Skills has identified a very significant requirement for additional third-level places in computer science and engineering degrees (800 extra places) and at sub-degree level (1,400 extra places). The Council recommends strongly that these requirements are fully provided for in the 1999 Estimates/Budget.

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The Council considers the lack of a co-ordinated approach to providing financial support for post-graduate research students and post-doctoral researchers to be a serious obstacle to the further development of a highly trained workforce for the knowledge economy. It urges the Department of Education and Science to assume responsibility for the support of post-graduate students and to establish a special programme for post-doctoral support to increase the professionalisation of the research base in the colleges, and to make provision for this in next year's Budget.

A single body should be established by the Department of Education and Science and the Department of Enterprise, Trade and Employment to co-ordinate the funding of third-level research. This body, in consultation with the two Departments, should rationalise the approach to funding of post-graduate students and fundamental research projects. The Government should allocate additional resources, if required, to allow the basic research grants scheme to reach the level of activity recommended in the recent Forþs evaluation study.

The Department of Education and Science should disburse during 1999 the £15m in the £250m Scientific and Technological Education (Investment) Fund for research equipment and should consider additional funding in future years.

5. Science in Schools

The Council welcomes the additional funds provided by the Government over the last year to increase the use of computers in schools. The Council also acknowledges the recent Ministerial concern over the teaching of science in schools, particularly physics and chemistry, and over the steady decline in the numbers taking science subjects in the Leaving Certificate.

The necessary resources should be made available immediately to enable the new science course to be introduced in the very early days of the new primary school curriculum.

Consideration should be given to the use of special resource teachers in the training of science teachers. This would involve the introduction of a cadre of trainers who have been given a special grounding in the teaching of science and who, in turn, would pass their expertise to both trainee and qualified teachers. Such an approach was successfully used when the 'new maths' curriculum was introduced.

The Government should allocate enough additional resources to make a significant start to improving the laboratory facilities in schools and to provide sufficient numbers of well-trained teachers for physics and chemistry.

An allocation of £0.5m should be made in 1999 to support the development of a plan for a network of science centres throughout the country, as such centres are recognised in other countries as an important component of science teaching.

6. Public Sector Research and Development

Government should consider reallocating additional resources to public sector research and development to support its own strategic objectives. Levels of public sector R&D in Ireland are among the lowest in the OECD.

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7. EU Structural Funds

Government should ensure that, when the current round of Structural Funds runs out in 1999, adequate funding is redirected to S&T activities, either from new Structural Funds programmes or through a replacement of EU funds by exchequer finance or private funds.

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1. Introduction

Shortly after its establishment last year the Irish Council for Science Technology and Innovation published its interim views on science and technology (S&T) priorities in the context of the 1998 Estimates. Since then the Council has been addressing a number of broad policy areas through three task forces which it has established. The Council wishes to draw attention to a number of issues important to the further development of S&T in supporting national social and economic objectives and to suggest how they might be addressed in the context of the 1999 Estimates.

The Council acknowledges the progress made on a number of the priorities for 1998, particularly as a result of the Government's initiative for a Scientific and Technological Education (Investment) Fund. The Council draws attention to the fact that our continued economic prosperity and high levels of growth are strongly dependent on the performance of the traded sector of the economy, including knowledge-based sectors in manufacturing and services. This performance can be sustained and enhanced by government action in a number of areas.

1. Industrial Research and Development

Providing definitive evidence of investment in R&D and employment creation is difficult, but recent research by Professor Frances Ruane and Allan Kearns of Trinity College appears conclusive. Examining R&D-active firms vis-a-vis non-R&D firms over the ten years between 1986 and 1995 the change in employment patterns is quite stark. In the case of foreign-owned firms, non-R&D firms suffered an employment loss of 25% compared to an increase of 16% in firms which were R&D-active. For Irish-owned firms in the period there was an overall decline in employment of 18%, but this decline was only 5% for R&D-active firms compared to 31% for firms not involved in R&D.

Employment Growth 1986-95 in 1986 Cohorts of Irish-owned and Foreign Firms			
	Not R&D Active	R&D Active	Total
Irish-owned Firms	-30.6%	-5.1%	-18.4%
Foreign Firms	-25.2%	16.3%	-1.0%

Industrial Research and Development

Research and technology are among the main drivers of innovation in firms. Evidence that innovative companies outperform non-innovators is contained in a recent study by the Northern Ireland Economic Research Centre (NIERC) which studied the innovation experience and business performance of over 750 manufacturing firms in Northern Ireland and the Republic of Ireland in 1997. Among the findings of the study were that average sales growth among firms in the Republic of Ireland introducing new or improved products was 44.2% from 1993 to 1996 compared to 26.3% among non-innovators.

The Council believes that it is imperative to ensure that R&D in enterprises continues to increase at a rapid rate. At the moment, investment in R&D by the enterprise sector lies below the EU average level of performance, which in turn is low relative to the U.S. In the case of Irish-owned firms the position is even less satisfactory. This is not sufficient to maintain and develop the type of technology-based industry to which we aspire.

In the past the duality of Irish industry has often been noted, emphasising the dichotomy between foreign and indigenous enterprises. Nowadays it would be more accurate to refer to a tri-partite division between the larger multinationals, the broad bulk of indigenous enterprises together with smaller multinationals, and micro-enterprises (often technology-

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based). Many of the larger multinationals are becoming involved in R&D here in a serious way. They must be encouraged to expand their R&D activities by ensuring that fiscal and other governmental incentives for R&D are in line with normal international practice. At the same time, enterprises not yet undertaking R&D to any significant extent - whether in the indigenous or foreign-owned sector - must be stimulated to take this first key step towards higher levels of innovation. For the first time there is now a significant number of indigenous high-technology enterprises and every effort must be made to help them to survive and prosper. This newly emerging industrial structure is heavily oriented to sectors such as pharmaceuticals, healthcare, electronics, telecommunications and computer software, and is, therefore, more technology-dependent than the average position among our fellow EU Member States. For this reason public policy must aim to raise the level of R&D performance in enterprises to well above the EU average, rather than just below it where the most recent data position Ireland.

- **Tax Credits:** A tax credit would allow companies to deduct a certain percentage of their R&D expenditures from their tax liability. ICSTI proposes that (using 1998 as the base year and the US Internal Revenue Service definition of Research and Experimental Development) incremental expenditure on R&D should be eligible for a 25% tax credit. Taking 10% manufacturing tax into account, this would bring the level of tax relief for R&D in Ireland up to that of comparable and competitor countries.

This tax credit would modify the "enhanced deduction" for R&D expenditure introduced for a three-year period in the 1995 Finance Act.

- **RTI Initiative:** The pattern developing over the initial three months of the new Research, Technology and Innovation (RTI) initiative, which has new selection criteria, indicates an excess of private demand over public funding supply. Many more projects have come forward from companies willing to spend 65% of project costs on R&D than there is public money available to meet the other 35%. On this basis, the Council welcomes the recent announcement of an additional £5.6 million for the initiative, arising from a reallocation of EU Structural Funds. Should any further reallocations take place in 1999, the Council recommends that the RTI initiative should be treated as a priority in order to meet the level of demand from the business sector.

2. Industrial Design

Industrial design is recognised as an effective and economical way of gaining competitive advantage, and an important route to product innovation. However, in common with many European countries, industrial design in Ireland does not enjoy the priority it should.

The State contribution to promoting design in the context of new product development is handled through Enterprise Ireland (formerly An Bord Tráchtála) in the form of bought-in specialist services such as design audits, design study visits, colour and trend forecasting services. Expenditure in 1997 was £500,000 on services provided by ABT to companies, plus another £2 million as contributions paid directly to companies as part of their own Design and Product Development programmes. Results being achieved are excellent, but increased funding would permit a considerable expansion of the programme, which turns down many proposals for lack of sufficient funds.

- Increased funding up to £6m in 1999 should be made available for industrial design programmes.

3. Telecommunications Infrastructure

A countrywide broadband telecommunications highway is an essential requirement to halt migration to already congested cities, to attract enterprises to locate in the regions in a balanced way and to neutralise our physical peripherality. The development of this highway will be a partnership arrangement between the public and private sectors, with commercial investment being most likely in areas of high enterprise density such as Dublin, Cork, Limerick and Galway. The deployment of fibre networks and broadband switches to meet the requirements of small and medium-sized enterprises outside the main high-density areas will most likely need exchequer resources in the short term. The cost of this development has been estimated at £150m over five years. A beginning has been made in 1998 whereby an amount of £18m from Structural Funds has been reallocated to this initiative and it is hoped that substantial matching funds will materialise from industry.

The Council has already commented on the importance of the Information Society initiative and on the need to make very significant progress in this area if Ireland is to become a leading player in the knowledge-based economies of the future. High capacity international connections from Ireland to the Internet backbone are essential for this development. Ireland needs to be directly linked to the major international 'hubs' in Europe through which global telecommunications traffic is routed.

As well as upgrading the national telecommunications network there is a requirement to bring the HEAnet, Ireland's education and research network, up to the same capacity levels. Irish universities and institutes of technology are at a disadvantage compared with their counterparts in Europe and the US, most of which are now linked by high-speed, broadband networks to facilitate national and international communications and collaboration. The existing HEAnet, based on lease-line technology, should be upgraded to a high-speed network, which would improve and modernise both teaching and research methodologies in the colleges.

- An investment of £30m should be made in 1999, to be co-funded by Government and the private sector on the basis of competitive tendering, to continue the development of broadband facilities in regional locations throughout the country.
- The necessary resources should be provided to enable the HEAnet to be upgraded to broadband technology. An investment of about £3.8m is required over a three-year period.

4. Technology Skills and Expertise

4.1 Background

Tackling the changing needs of the labour market will be one of the most important elements of government policy over the next few years. This is well recognised by the Department of Finance in its 'Economic Background to the 1998 Budget'. Nowhere will this be more important or more difficult than in meeting the skills requirements of high-technology industry. Already significant skills shortages have appeared in some areas. The situation is exacerbated by the overall reduction in numbers completing second-level education as a result of the declining birth rate since 1980 and by the absolute decrease in the number of those taking physics or chemistry in the Leaving Certificate. At the higher end of the expertise spectrum - the production of PhDs - the supply situation is also threatened by the combined effects of a buoyant labour market (with tempting salaries for primary graduates) and an inadequate public support system for doctoral students, at a time when the demand in industry for PhDs is increasing.

4.2 Third-Level Education

The numbers entering third-level education have risen steadily from 22,000 in 1990 to 30,500 in 1996, when they represented 44% of the 17-18 years old cohort. While the intake to technical courses also increased in that period from 9,500 to 12,500, the percentage of technical intake declined from 45% in 1990 to 40% in 1995, as a greater proportion of the additional third-level places were in non-technical fields. The number of CAO First Preferences in science, engineering and technology considerably exceeded the level of available places. While last year's decision to provide for 1,450 additional places per year for computer science/software engineering and 750 additional places per year for technicians for the electronics industry is welcomed by the Council, much more needs to be done, as has been highlighted by the Forfás Expert Group on Future Skills, chaired by Dr. Chris Horn.

- The Expert Group on Future Skills has examined in detail the demand and supply position relating to industry and high-technology skills up to the year 2003. Even allowing for meeting demand via retraining, immigration and other mechanisms there still remains a very significant requirement for additional third-level places for computer science and engineering degrees (800 extra places) and at sub-degree level (1,400 extra places). ICSTI recommends strongly that these requirements are fully provided for in the 1999 Estimates/Budget.

4.3 Post-Graduate Training

The availability of sufficient numbers of full-time, post-graduate students going into third-level research is a critical concern. It is essential that the problems with support for these students should be finally resolved as quickly as possible.

At present, post-graduate students doing research are supported in a number of different ways. The Office of Science and Technology makes available about £1m each year via Enterprise Ireland to give a grant of £2,000 per year for three years to about 160 new students, supporting nearly 500 over the three year period. As students have to pay fees of between £1,500 and £2,000 per year, as well as meet normal living expenses, this grant has to be supplemented by whatever income the colleges can afford to give their students. Many doctoral students take part-time work to earn their living and this, while desirable on a small scale, has the potential to interfere with, and prolong, their studies. Other students, who are involved in projects funded by basic or strategic research grant schemes or by the Programmes in Advanced Technologies, are paid £5-6,000 per year or more for the duration of the project. At a time when demand from industry for high-level expertise is increasing, it is ironic that post-graduate studies are becoming a less attractive option for graduates who can either accept well-paid jobs in industry or elect to pursue their further studies abroad - a brain drain which the economy can no longer afford. A further complication is the recent significant fall in the number of UK students undertaking post-graduate study at UK universities, combined with a decline in Asian students coming to study in the UK due to the economic problems in that region. The reason why British undergraduates are not moving into graduate

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work, according to Professor Colin Blakemore, President of the British Association for the Advancement of Science, is "the utter inadequacy of salaries for research council studentships - about £6,000 a year. These are poverty levels". UK universities are, therefore, intent on compensating for these shortfalls by recruiting more students from overseas and Ireland is an obvious target (see 'Universities must fight to attract post-grads' - UK Independent 19.3.98).

High-technology industry needs an adequate supply of primary graduates for immediate employment but, equally importantly, it has a growing requirement for highly-trained specialists at PhD level. Other countries have recognised this need and are increasing their output accordingly; in Finland, for example, the number of doctorates rose from 650 in 1993 to 850 in 1996 and will exceed 1,000 per year shortly. In Ireland, doctorates have risen more slowly from 273 in 1991 to 335 in 1994 (latest available data), of which 228 were in science and engineering.

- The Department of Education and Science should assume responsibility for the support of suitably qualified post-graduate research students within a defined overall ceiling on numbers. The level of support should be adequate to cover living costs (at a time when costs of accommodation, particularly in Dublin, are rising steeply) as well as fees. A payment of £10,000 per year plus fees is recommended, to cover the researcher's salary and associated consumables/materials costs. A limit on the number of these studentships would be desirable to contain the level of additional exchequer funding required. The Department's new programme for S&T research should be used to fund this proposal.

4.4 Post-Doctoral Support

Post-doctoral researchers form the backbone of professional research groups in the third-level sector. Full-time academic staff - professors and senior lecturers - can only devote a small percentage of their time to supervising and doing research and, in academic environments in other countries, a major input into research planning, management and performance is made by post-doctoral employees working on contract. Post-graduate students, who are trainees learning to do research, undertake the bulk of the detailed work under fairly close supervision.

The Irish research environment is weakened by the absence of any formal support programmes for post-doctoral researchers. A beginning has been made to address this issue in the last two years via the Postdoctoral Fellowships funded by OST through Enterprise Ireland but these are limited to five per year, lasting only two years. With seven universities and 105 science and engineering departments involved, this is clearly inadequate. Of course, some post-doctoral researchers are supported by research contracts in the colleges, mainly EU Framework Programme projects, but the scale of the Basic Research Grants scheme is not large enough to support post-doctorates and funds mostly post-graduate students.

- The Department of Education and Science should consider establishing a special programme for post-doctoral support to increase the professionalisation of the research base in the colleges. A payment of at least £20,000 per annum for a minimum of three years would be required, plus some allowance for consumables/materials.

4.5 Third-Level Research

The Minister for Science, Technology and Commerce has recently emphasised his continuing commitment to fundamental research and stressed that the Basic Research Grants scheme will continue to be operated by the National Research Fund Board under the aegis of Enterprise Ireland. This scheme supports individual fundamental research projects selected by a peer review system.

The Minister also announced the establishment of a Working Group to examine future funding arrangements for basic research, in order to strengthen co-operation and co-ordination between the Departments of Enterprise, Trade and Employment and Education and Science, as well as Enterprise Ireland and the Higher Education Authority. The Council has already

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recommended that a single body should be established, in a partnership arrangement between the Departments and agencies involved, to ensure a greater national focus on, and co-ordination of, research funding in the third-level sector.

The Council is concerned that, despite efforts made to date, the level of funding of the Basic Research Grant scheme supported by the Office of Science and Technology (£3m in 1998) is still well below the £6m recommended by STIAC in 1995 and endorsed in the recent independent evaluation of the scheme carried out for Forfás by Technopolis Ltd. The Council acknowledges the potential contribution of the Department of Education and Science's new programme for S&T research to building up the research infrastructure in the colleges, when allied with the capital allocation from the £250m Scientific and Technological Education (Investment) Fund. The Council wishes to reiterate its view that a strong research system in the third-level colleges is an essential support mechanism for the electronics, software, pharmaceutical and other high-technology industrial sectors, as well as being vital for attracting, training and keeping our best students for a scientific career in industry and academia. The £15m allocated to research equipment in the £250m Investment Fund over three years is welcome but is still not adequate to rectify the existing equipment deficit and should be supplemented out of the new £150 million capital fund for third-level research.

International statistics collected by the OECD show that higher education research in Ireland, at 0.27% GDP in 1995, is well below the EU and OECD averages at 0.38% GDP and even further below Norway/Denmark/Finland (0.44%) and Sweden (0.79%). In Norway, Denmark and Finland the academic research system is complemented by a wide range of public sector research institutes, whereas Sweden, like Ireland, is amongst the lowest in the world for research performed in the public sector. Sweden, however, compensates for this lack by its very high level of research performed in the higher education sector, reflecting the dominance of its industrial sector by high technology firms. The Council believes strongly that, to remain internationally competitive, Ireland must strengthen its academic research infrastructure to support the needs of our high-technology industry.

The Council is convinced that a strong research system will not be developed unless measures are taken to strengthen the Basic Research Grants scheme. At present, between 65% and 70% of its funds are used to support post-graduates working on the research projects funded by the scheme. If the Council's proposal in section 4.3, for additional support for post-graduate researchers, is accepted by the Department of Education and Science it would allow the Basic Research Grants scheme funded by OST to support a higher level of activity for the same financial input and to focus on areas of strategic importance.

- A single body should be established by the Department of Education and Science and the Department of Enterprise, Trade and Employment to co-ordinate the funding of third-level research. This body, in consultation with the two Departments, should rationalise the approach to funding of post-graduate students and fundamental research projects along the lines recommended here by ICSTI. The Government should allocate additional resources, if required, to allow the Basic Research Grants scheme to reach the level of activity envisaged by STIAC and the CIRCA Group report on University Research Funding.
- The Department of Education and Science should disburse during 1999 the £15m included for research equipment in the £250m Scientific and Technological Education (Investment) Fund and should consider additional funding in future years.

5. Science in Schools

5.1 School Curriculum and Teacher Training

The Council, in its recent Statement on Science in Primary Schools, called for additional resources to strengthen the science curriculum in primary schools. The total revision of the primary school curriculum, and the inclusion of a specific science subject under the new heading of Social, Environmental and Scientific Education, is welcomed by the Council. The rapid introduction of an approach to science in the curriculum which is imaginative and constructive, and not in any way dominated by excessive rote learning of laws, theories and other abstract concepts, can lead to a significantly enhanced confidence among children, including the development of curiosity and the skills of methodical enquiry.

Last year's Statement also called for increased emphasis on science and technology subjects in secondary schools, with consequential resources being provided to facilitate this. Additional capital resources of £25m were provided in the Scientific and Technological Education (Investment) Fund for computer equipment in schools. Significant resource constraints still exist, however, in relation to laboratory facilities in other areas of science, particularly physics and chemistry. The Council welcomes the recent announcement by the Minister for Education and Science that additional resources will be made available next year to address this problem and the related issue of teacher training.

- Time is of the essence in introducing the new science curriculum into primary schools. Even now, it will be many years before the first impacts are felt at second or third level. Ireland cannot afford to delay in preparing its citizens for a modern society and for careers in the high-technology economy of the next century. The necessary resources should be made available immediately to enable the new science course to be introduced in the very early days of the new primary school curriculum.
- The Council welcomes the proposal of the Minister for Education and Science to increase the number of teacher training places for both primary and second-level teachers. The Council recommends that specialist physics and chemistry teachers should be adequately represented among new teachers and welcomes the provision of extra reserved places for graduates of physics and chemistry on H.Dip courses. This is particularly necessary in the light of the introduction of new physics and chemistry syllabi at Leaving Certificate from September 2000 and the proposal that a science or technology subject will be part of the core curriculum at Junior Certificate level. The Council also recommends that consideration be given to the use of special resource teachers in the training of science teachers; that is, the introduction of a cadre of trainers who have been given a special grounding in the teaching of science and who, in turn, would pass their expertise to both trainee and qualified teachers. Such an approach was successfully used when the 'new maths' curriculum was introduced in the 1970s.
- Serious efforts must be made to improve the facilities for science teaching in second-level schools and to make the science curriculum more attractive to students. This will require significant support from the S&T community and from those advising students on their career and subject paths. While the recent announcement about additional resources for laboratory facilities and for teacher training is welcome, the scale of the problem is very large and the importance of providing adequate resources cannot be over-emphasised.

5.2 Science Centres

Ireland lacks one important resource for supporting the teaching of science in primary and second-level schools which all other EU Member States have in some form, that is, a national science centre and/or a regional network of science centres. Through outreach activities in schools and communities, science centres can effectively support more formal science education. The establishment of science centres could contribute significantly to increasing

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the confidence of school students, and of the general population, in dealing with science and technology.

In view of competing proposals for a large-scale national science centre, the government should seek to develop a plan for a network of smaller science centres which could be supported by the proposers of those projects and by third-level institutions and science-based companies in their respective regions.

- An allocation of £0.5m should be made in 1999 to support the development of a plan for a network of science centres (including feasibility study, consultancy etc.) with a view to securing EU, private sector and government funding for its implementation.

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6. Public Sector Research and Development

The Council is concerned at the low national priority which appears to be accorded to strengthening the research infrastructure in general, not only the third-level colleges but also public sector research institutes (of which there are very few in Ireland) such as Teagasc and the Marine Institute. The Council has identified the low level of research performed by the public sector in support of its strategic objectives as a weakness in the Irish innovation system. Ireland lags comparable countries in both performance and funding of R&D by the public sector, as the table below illustrates.

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

From a total public expenditure allocation of almost £13 billion in 1998 the State only allocates some £66 million 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 not just in supporting the productive sectors of manufacturing, services and national resources but also in areas such as environmental, health and social problems where good research can make a significant contribution to good decision-making. At a time when there appears to be some scope for modest flexibility in levels of national investment the Government should consider diverting some extra resources to investing in the public sector research infrastructure, in accordance with the guidelines recommended by ICSTI in its Statement on Prioritisation of State Expenditures on Science and Technology (June 1998).

The Council again urges the introduction of a national strategic innovation investment fund to finance the accelerated development of those areas of science, technology and innovation of strategic importance to Ireland's competitive position.

- Government should consider reallocating additional resources to public sector research and development to support its own strategic objectives. Levels of public sector R&D in Ireland are among the lowest in the OECD.

7. 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 1996 mid-term review of Structural Funds programmes has highlighted science and technology as an important national investment priority.

Since the introduction of major new initiatives for Irish science and technology with the Structural Funds programme that began in 1989 the levels of business sector 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 1996 mid-term review of the Community Support Framework (CSF) recognised the crucial importance of R&D to competitiveness and growth, and commented 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 round of Structural Funds finishes in 1999.

- Government should ensure that, when the current round of Structural Funds runs out in 1999, adequate funding is redirected to S&T activities, either from new Structural Funds programmes or through a replacement of EU funds by exchequer finance or private funds.
- The Council will make specific proposals for the next round of Structural Funds.