Scientific and Technological Education Investment Fund

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.

Scientific and Technological Education Investment Fund

Summary

Welcome for Investment

The Council warmly welcomes the new £250 million Fund, which represents a clear signal by the Government that Ireland's future economic growth depends increasingly on our becoming a knowledge-based society. In particular the Fund highlights the critical role of the third-level education sector in developing the scientific and technological skill levels in the Irish workforce. The Council particularly welcomes the fact that the new Fund has directly addressed a number of the areas highlighted in the Council's Statement of September 1997on STI expenditure priorities.

Innovative Funding Mechanism

The Council welcomes the innovative use of a three-year Investment Fund mechanism, which will allow both the Government and the institutions to plan investments beyond the usual one-year budgetary framework. However, some of the proposed investments, such as those in R&D equipment and facilities, are necessary on an ongoing basis. The Council urges the Minister for Education and Science to consider ways to sustain the investment over the longer term.

Consultations about the Fund

Formal consultations between the Minister for Education and Science and the Minister for Enterprise, Trade and Employment on the allocation of the Fund should be established as soon as possible. The Council is well placed to offer advice in this regard and should also be consulted formally.

Allocation of the Fund

In disbursing the funding the Council believes that it is important to make the evaluation of proposals open and transparent. A central aim also must be to minimise duplication in purchasing expensive items of equipment and fittings. The Council proposes that:

- A comprehensive inventory of the major items of equipment (e.g. over £200,000) in all third-level laboratories should be drawn up, as an important input to evaluating proposals from colleges for upgrading their equipment base.
- Where possible, exceptionally expensive and non-routine items should be shared between colleges within reasonable distance from one another.
- Specialisation between colleges, to optimise the use of human and physical capital, should be promoted. Each college would take a decision to concentrate on a number of areas where it has particular strengths and build them up through capital investment from the Fund. This would also promote greater co-operation between colleges in sharing relevant expertise, knowledge and facilities and improve the colleges' ability to collaborate with external firms and organisations. There are already examples of this type of co-operation in specialised areas such as the Programmes in Advanced Technology.

Mechanisms for Distributing the Fund

The Council believes that it is important to avoid establishing new mechanisms for the distribution of public funds in this area. Both the Higher Education Authority and Forbairt operate committees in relation to capital and current expenditure. There is an onus on the Government Departments and Agencies involved to co-operate in this respect.

In particular, the National Research Support Fund Board should be used to allocate the additional £5 million for research in 1998. This would strengthen the Board's mandate to fund

areas of national strategic importance across all sectors and advance the prioritisation of public research spending.

Equipment is the Priority

The Council considers that the issue of new equipment for the universities and institutes is of immediate concern and recommends that funding for this initiative be made available as a top priority for the Fund. Funding to upgrade the basic facilities for undergraduate teaching laboratories is particularly urgent.

Teacher Training and other S&T Investment in Schools

While welcoming the capital investment in information technology in schools, the Council points out that even more important in this respect is the need for investment in the training and re-training of teachers. Other aspects of science in schools need urgent investment also. There has been a long-term decline in the numbers taking physics and chemistry in the Leaving Certificate which will inevitably lead to manpower shortages in the high technology industries requiring these skills.

Private Donations to Fund

The Council urges early progress as regards donations to the Fund from non-Government sources and for that purpose the Fund should be actively promoted at home and abroad.

Scientific and Technological Education Investment Fund

Introduction

"(The investment) in each area is important to the development of a vibrant technological ethos within the education system which in turn will contribute to both the vocational needs of the students and the skill requirements of industry."

- Minister for Education and Science, introducing the Bill in the Seanad

1.1 The Fund, which is purely for capital investment, but represents new money on top of annual Estimates allocations, will be invested in seven broad areas i.e.

1.	Expansion programme to provide additional places at third-level to meet emerging skills shortages	£60 million
2.	Expansion to provide additional places at tourism and catering colleges	£20 million
3.	Capital infrastructure for PLC centres and additional apprenticeship places	£20 million
4.	Capital development (particularly at RTCs) to improve capacity and facilities	£80 million
5.	Renewal of equipment at third-level	£30 million
6.	New R&D facilities at third-level	£15 million
7.	Provision of computer equipment at primary and second-level	£25 million

1.2 The Government has also provided an additional £5 million in the 1998 estimates for current spending on Research and Development in third-level universities and institutes.

ICSTI Statement on Expenditure Priorities for 1998

2.1 At the request of the Minister for Science, Technology and Commerce, the Council published its initial views last September on priorities for public spending on STI in 1998. The Council is continuing its work on mechanisms and criteria for prioritising public spending, through a Task Force dedicated to that purpose. In parallel, two other Council Task Forces are examining (i) the key technologies and capabilities which Ireland will require to sustain its future development and (ii) the infrastructural investment needed to enhance our STI performance.

2.2 In summary, ICSTI proposed the following spending priorities in its September Statement:

- **Science in Schools**
  - increased commitment to promote IT in schools
  - resources to improve science curriculum in primary schools
  - increased emphasis and resources on science, maths and technology at second-level
- **Third-Level Education**
  - resources to provide extra places for computer science/software graduates and electronic technicians
  - £10 million per year for equipment
- **Third-Level Research**
  - increase basic research funding from £2 million to £6 million per annum
- **Industrial Innovation**
  - extra £12 million for industry R&D grants
  - encourage new R&D performers and build long term R&D capability in firms
  - support industrial design
  - additional resources to improve college/firm links
- **Structural Funds**
  - ensure funding for STI continues after 1999
- **Areas of Strategic Importance**
  - establish a Strategic Innovation Investment fund to support STI priorities in areas of strategic national importance.

Scientific and Technological Education Investment Fund

Comments on New £250 million Fund

3.1 General Comments

- The Council has already extended a broad welcome to the new Fund. It represents a clear signal by the Taoiseach and the Government that future economic growth will be increasingly dependent on developing a knowledge-based society, where value is added to products and services through optimal use of knowledge and know-how.
- In this, Ireland is following the example of countries directly comparable with us in terms of population such as Finland, Denmark, Norway, The Netherlands and New Zealand, as well as others such as Canada and Australia. These countries are addressing similar issues as Ireland in terms of developing their economies in order to generate increased employment and higher living standards.
- It represents welcome recognition of the critical role of the education system, particularly the universities and other third-level institutes, in developing skills in the workforce in emergent areas of scientific research and technological development, thus increasing Ireland's national innovation capability.
- In particular, ICSTI welcomes the rapid response to its Statement of September 1997 on STI expenditure priorities. The new Fund has directly addressed a number of the areas highlighted in its Statement, e.g. IT in schools, additional third-level places for computer science/software engineering and electronics technicians, extra funding for equipment in third-level colleges. Additional current funding for third-level research is also being provided in 1998.
- While broad figures have been indicated for the scale of the investment in each of the seven priority areas, the Council supports the proposal that the exact allocations between the seven priority areas will be subject to an evaluation of proposals from institutions. This approach should be used to address some of the specific points which are made later in this Statement.
- The Council welcomes the innovative use of the 3-year Investment Fund mechanism. This will allow both the Government and the institutions to plan, with reasonable certainty, where and how the investments should be made. It will allow them to take account of medium-term perspectives rather than being pressurised into decisions because of end-of-year financial deadlines.
- However the 3-year Capital Fund approach also suggests a certain once-off solution to the various problems. The danger is that after the 3-year Fund has been disbursed the current deficiencies (e.g. in the area of equipment) could be allowed to recur. By definition, investment in R&D equipment and facilities, whether in industry or academia, must be sustained in order that the organisation stays in touch with the latest developments. For that reason the Council urges Government already to begin consideration of what mechanisms are necessary to sustain the proposed levels of investment over the longer term.
- While the Council welcomes the extra current funding for third-level R&D in 1998, it would also like to see the innovative, medium-term "investment" approach taken on this issue. The investment in R&D equipment and facilities will allow the universities and institutes to engage in more contract R&D with industry. But it should also enable them to perform more and better R&D projects on their own initiative. In order for them to do so, the colleges require some security of funding beyond a one-year horizon.
- ICSTI believes that an investment on this scale must be implemented against specified objectives for the Fund, criteria for the allocation of monies and evaluation of the results. (See Section 4 below). The 3-year Fund mechanism

provides the ideal opportunity to plan fully the investment in this way. The framework should also provide for wide consultations with relevant organisations. ICSTI, particularly through the planning work of its three Task Forces on public spending priorities, key technologies and innovation infrastructure, is well placed to offer advice on these aspects of the Fund's operation.

- The Council welcomes the fact that the Act relating to the Fund provides that the Minister for Education and Science will consult with the Minister for Enterprise Trade and Employment, and may also consult with the Council. These provisions preserve the concept of an interdependent "National System of Innovation", where (principally) industry, education and Government interact to strengthen our innovation capability. The Council requests that formal arrangements for such consultations should be put in place as soon as possible.

3.2 Donations to the Fund

- The Council would like to see early progress on the announcement that the Investment Fund will be enabled to receive donations from non-Government sources. To that end the Fund should be proactively promoted at home and abroad, including promotion of the existing tax incentives relating to private investment in third-level research equipment.
- The business sector has given a general welcome to the proposal for private donations to the Fund. However, the Council recognises the difficulties any private enterprise would have in making donations of a very non-specific nature, with little possibility of identifying the precise use to which the money would be put (let alone estimating any return on the firm's investment). The Council therefore suggests that the Fund should also be capable of being used by colleges to attract donations in forms other than direct contributions into the Fund. For example monies from the Fund could be matched by industry for items of equipment which might be equally beneficial to colleges and enterprise. Businesses could provide matching support for specific infrastructural investment with significant industrial relevance or potential for technology transfer. Another possibility could be for enterprises or individuals to make donations to fund research projects emanating from the capital investment by the Fund.

  This would appear to be an area where there would be substantial opportunities for firms to collaborate in providing matching funds to the colleges. The successful obtaining of such matching funds should be an important positive factor in the evaluation of funding applications, provided other criteria are also being met. The administration of the funds should therefore be flexible in terms of assessing donations/matching contributions relating to projects seeking support from the Fund.

3.3 Skills and Third Level Capacity and Facilities

- In its Statement on STI spending priorities last September, the Council pointed out that skills shortages were in danger of hampering Ireland's economic development. While measures were being introduced at that time to deal with shortages in specific skills, long term planning and investment was necessary to try to avoid this type of problem recurring in relation to future skills requirements (e.g. see Section 3.5 re physics and chemistry students at second-level). The Council therefore welcomes, in tandem with

the new Fund's investment in IT skills, the establishment of a partnership forum (involving the business and education sectors), an expert group on future skills needs, and an implementation group to monitor progress on recommendations from the other two bodies. The Council believes that, particularly through its work in relation to key technologies for Ireland's future development, it can contribute to the work on skills needs and to the disbursement of funds for that purpose.

- The proposed investments in Skills Development and in renewal of the Regional Technological Institutes sector should be used to redress the balance of their students/ courses in favour of technical subjects. In contradiction of their original remit, the rapid expansion of the institutes in recent times has seen a proportionally far greater number of students taking non-technical courses.

3.4 Equipment, R&D Facilities and Funding

- The Council considers that the issue of new equipment for the universities is of immediate concern and has already been sign-posted by STIAC and the subsequent White Paper on Science, Technology and Innovation. In its September 1997 Statement, the Council pointed out that many college laboratories are in critical condition, affecting the effectiveness and efficiency of education and research. The Council proposed that a dedicated fund of £10 million per year was needed to address this urgent problem.

  Funds to upgrade the basic facilities for undergraduate teaching laboratories in all colleges are a particularly urgent requirement. College library facilities are also in urgent need of modernisation and automation. The Council recommends that, as a top priority for the Fund, the monies be made available for this initiative immediately. While welcoming the allocation of £30 million over the life of the Fund, the Council again urges the Minister for Education and Science to consider what mechanisms are needed to sustain this level of investment beyond the 3-year period, given that the total equipment shortfall is estimated to be at least £50 million.

- The Council also proposed in its September 1997 Statement that in order to train and retain our best researchers, so that they can in turn help to produce top class graduates, basic research funding should be increased from the present level of around £2 million per annum to at least £6 million. We therefore recommend that the entire £5 million additional current funding in the 1998 Estimates be invested in basic research projects using existing mechanisms and criteria (see Section 4 below).

3.5 Primary and Second Level

- In the Statement last September, the Council pointed out that, as well as IT capital investment, the science curriculum in our schools also requires investment. It proposed that the performance of Irish school children in science and mathematics should be raised into the top ten countries in the world.
- The Council welcomes the Schools *IT 2000* project. It will address a serious deficiency in our educational system. The capital investment announced here is an important element of the project but even more important is the needed investment in teacher training and re-training which must be funded from current expenditure. In this context, a significant potential for co-operation

between schools and third-level colleges should be further explored and encouraged. At the same time, a certain perspective is required here; computers and information technology are means to an end rather than an end in themselves. Mastering them should only be one element of a fully-rounded scientific and general education which schools need to give to tomorrow's citizens of the knowledge society.

- There is a need also to examine critically other aspects of science in schools, mainly in relation to the worrying fall in the numbers taking chemistry and physics in the Leaving Certificate. If this trend is not addressed promptly the current skills shortages in the software area are likely to be augmented shortly by similar shortages in relation to engineering in general and to chemists and physicists for the chemical/pharmaceutical and the information and communications technologies industries. In particular, there is a need for capital investment in science and technology subjects at second-level. The Council believes that the Minister should consider using the new Fund to provide that investment with the objective of increasing the numbers taking science subjects to Leaving Certificate level.

Objectives, Criteria and Mechanisms for Distributing the Fund

4.1 Objectives and Criteria

- From an STI perspective, the essential objective of the Investment Fund should be to promote economic and social development by:
    - Supporting priority current and future needs in terms of knowledge, skills, research and technological development, to allow Ireland to compete to the highest international standard.
    - Promoting competition among institutions and transparency in public funding.
    - Promoting greater collaboration among institutions and with external firms and other organisations. There are already many examples of the ability and willingness of the colleges to collaborate in this way in major research areas, notably in the Programmes in Advanced Technology, and the Fund should be used to strengthen this process.
    - Promoting involvement by other public sector and private sector (particularly industrial) bodies in projects.
    - Evaluating the benefits and measuring the impact of funded projects. In relation to the three initiatives for the third-level infrastructure - renewal of the regional technological institutes, investment in new equipment in the universities, capital investment to support the promotion of R&D and technology transfer in third-level colleges - the Council is particularly concerned that this major upgrading of one of the key components of the Irish system of innovation should yield the maximum possible return on investment in terms of employment and innovation potential.
    - In disbursing the funds the Council believes that a central aim must be to minimise, as far as is practical, duplication in the purchasing of expensive items of equipment and fittings. Of equal importance is the need to make the evaluation of proposals as open and transparent as possible while striving to avoid overlap or duplication with relevant existing structures. Both of these aims are to some important extent inter-connected and the Council's proposals that follow are designed to address both issues.
        - The opportunity should be taken to carry out a comprehensive inventory of the major items (e.g. over £200,000) of equipment in all third-level laboratories, as an important input to the task of evaluating proposals from universities and institutes for renewing and upgrading their equipment base.
        - Where possible, exceptionally expensive and non-routine items should be shared among universities and institutes within reasonable distance of one another.
        - It would also be desirable to take this opportunity to reinforce a process of specialisation between colleges which would optimise the use of human and physical capital. Each college would take a decision to concentrate on a number of areas where it has particular strengths, build these up by applying for capital investment over and above normal replacement levels and, by implication, accept that it would not be at the leading edge in other disciplines. The areas of specialised expertise should be set down by each college in a Charter, which describes its Research and Development policy. This would also promote greater co-operation between colleges in sharing relevant expertise, knowledge and facilities and

improve the colleges' ability to collaborate with external firms and organisations. Such an approach would require the full co-operation of all third-level organisations. It would also require external advice and assistance from a body with an established reputation for fairness, impartiality and expertise in these areas.

4.2 Mechanisms for Disbursing Funds

- The Council believes that it is particularly important to avoid the establishment of new mechanisms which would duplicate some or all of the work of existing structures for the distribution of capital monies. For example, both the Higher Education Authority (HEA) and Forbairt operate committees for this purpose. In the latter's case capital funding forms part of the annual allocations to the Programmes in Advanced Technology and to the Technology Service Centres, mainly located in the regional technological institutes.

  In relation to current research projects, the National Research Support Fund Board allocates public funding for basic and applied research projects to third-level colleges, including some capital expenditure. The Board, established in 1995, was particularly charged with bringing greater visibility to the selection process. It is representative of Government Departments, education and business interests and has acquired considerable knowledge about the research capabilities of both the universities and the regional technological institutes.

  There are also structures within, for example, the Department of Agriculture and the Department of Health and Children/Health Research Board for distribution of capital and current funding for research projects.

  It was against this background that the Council proposed in its September 1997 Statement that a new Strategic Innovation Investment Fund, covering all Government Departments, should be established, to ensure that public resources are selectively focused on those areas of strategic importance to Ireland's economic development.

  The new Fund should also ensure that the investment is targeted at national strategic areas of opportunity and need. There is an onus on the Government Departments and Agencies involved to co-operate in ensuring this happens and to use existing mechanisms, strengthened if necessary, to achieve this end. The Inter Departmental Committee set up by the Government to prioritise public expenditure on S&T, which is chaired by the Minister for Science, Technology and Commerce, should be consulted in this regard.

  The National Research Support Fund Board should be used to allocate the additional £5 million for research in 1998. This would further strengthen the Board's mandate to fund areas of national strategic importance across all sectors and advance the objective of prioritising public research spending.