

STI OUTLOOK 2002– COUNTRY RESPONSE TO POLICY QUESTIONNAIRE

IRELAND

1. General Framework and Trends in Science, Technology and Industry Policy.

An extended period of strong economic growth has put the policy focus in Ireland on productivity as the key to raising living standards and on industry as a contributor to overall productivity growth. In this context science, technology and innovation are seen as central to Ireland's continued economic and social success.

The key role for science, technology and innovation policy was signalled in the National Development Plan 2000 – 2006 which allocated € 2.5 billion for Research, Technology Development and Innovation (RTDI). € 1.5 billion of this is earmarked for RTDI for industrial development activities. This money will be used as a means of enhancing innovation and competitiveness, in order to increase output and employment.

This key role is reflected in the policies and initiatives of:

- **Forfás** - the national policy and advisory board for enterprise, trade, science, technology and innovation;
- **IDA Ireland and Enterprise Ireland** - the enterprise agencies for Irish industry ;
- **Higher Education Authority (HEA)** – the planning and development body for higher education;
- **Science Foundation Ireland** – the National Foundation for Excellence in Scientific Research and
- **Other state agencies** - supporting the evolution of Ireland as a 'knowledge-based society'.

IDA Ireland will continue to attract inward investment but will emphasise developing strategic business areas, clusters of excellence in which groups of companies, corporate and academic research facilities, venture capitalists and others congregate together to create an ambience conducive to innovation and entrepreneurship and will actively build links between international business and third level educational and other research based centres.

Enterprise Ireland has moved to strengthen the suite of measures supporting innovation in Irish industry. These measures include:

- The Research Innovation Fund to support projects with high commercial potential that arise within the academic community.

- Innovation Partnerships aimed at stimulating product and process development for industry through collaboration with the higher education sector.
- The Campus Company Programme designed to assist the commercialisation of R&D on college campuses.
- The Advanced Technology Research Programme (previously the Programmes in Advanced Technologies) will provide strategic expertise in a range of technology areas but with an emphasis on six key technologies (advanced manufacturing technologies, biotechnology, materials, optronics, power electronics and informatics) to assist industry to access new technology, improve the competitiveness of existing products and move into higher value areas.

The **Higher Education Authority** operates a Programme for Research in Third Level Institutes (PRTLTI) to enable a strategic approach by those institutes, to enhance the quality and relevance of graduate outputs and to support outstandingly qualified individual researchers and teams. In December 2001 the third cycle in the Programme was announced comprising €142.2 million to support research personnel and €170.0 for buildings and equipment. This latest round brings the total support provided by the Programme to €650 million since it started in 1999.

Science Foundation Ireland (SFI) – the National Foundation for Excellence in Scientific Research was formally launched in 2001 initially as a sub-board of Forfas but scheduled to be placed on a statutory basis in 2002. SFI manages a fund of over €635 million over the period to 2006 to support basic research in strategic fields relevant to Ireland's industrial development in biotechnology and information and communications technologies and related disciplines.

The Foundation announced in July 2001 the appointment of eleven principal investigators who with their teams can benefit by up to €1.3 million per year over a 3 to 5 year period.

In March 1999 the Government approved the establishment of an **Interdepartmental Group (IDG) on Modern Biotechnology** comprised of senior officials to provide a co-ordinated approach to biotechnology across relevant departments and agencies. The Group published a report in October 2000, which drew attention to the long-term strategic importance for Ireland of biotechnology and the need for a precautionary approach, public communication and consultation and an independent well resourced regulatory system. In 2001 arrangements have been made under the auspices of the IDG to establish a Bioethics Committee, which is being hosted by the Royal Irish Academy.

2. Public sector research and public research organisations

2.1. Technology Foresight Research Fund

Arising from a Technology Foresight process undertaken during 1998 and 1999 the Irish Government took a formal decision to strengthen the public research system significantly over the period 2000 – 2006. It agreed that additional public investment of over €635m would be allocated in that period. In relation to public research funding levels in 1999 this represents an increase of approximately 50% on an annual basis.

The underlying rationale for this investment is the need to upgrade radically the Irish research system to achieve levels of excellence that are on a par with world leaders. Initial concentration will be on areas of

biotechnology and of information and communications technologies (ICTs). While the Government accepts the need for a strong research system in the context of the policy to build a knowledge-based society in Ireland it also recognises the importance of the research base to support the high-technology sectors, which now comprise a significant component of national output and employment.

To implement this new research fund the Government established in 2001 a new organisation called *Science Foundation Ireland (SFI)* to develop Ireland as a centre for research excellence in strategic areas relevant to economic development. Initial emphasis will be on biotechnology and ICT and the overall governance of SFI will ensure industrial input into its priority setting processes. It is expected that third level institutions, primarily the universities, will be the major research performers funded by SFI.

2.2 *Research infrastructure in the universities*

The advisory task force on science, technology and innovation, which reported in 1995, identified under-funding of the university research infrastructure in the past as a major public policy issue. In 1998 the Government announced a three-year initiative to tackle this infrastructural deficit. The initiative was subsequently extended for a further five years and an amount of almost €700m was included in the National Development Plan (2000-2006) to strengthen the research and science capability of the higher education institutes. It will allow the development of schemes of post-graduate and post-doctoral supports for researchers and will facilitate the expansion of funding for peer reviewed projects in basic research.

Two new Research Councils have recently been established, one for the Humanities and Social Sciences and in 2001 the Research Council for Science Engineering and Technology. It is expected that both Councils will provide financial support for researchers as well as funding on a competitive basis for research projects.

3. Government support for private-sector R&D and innovation

3.1. *Changes to enhance the effectiveness of policy instruments used to provide public support for private sector R&D and innovation*

Within the National Development Plan 2000-2006 (NDP), the Productive Sector Operational Programme identifies 'the insufficient investment in RTDI as a constraint to the sustainable growth of indigenous industry which must move from low value added, low productivity sectors towards sectors characterised by high levels of innovation, quality, productivity and value added.' Thus, the relatively low level of industry R&D in Ireland continues to be a major challenge for industrial policy makers.

Under the NDP, the direct funding of R&D in the enterprise sector is provided for by two particular schemes – the *Competitive RTDI* scheme and the *R&D Capability* scheme, and the *Innovation Management* scheme provides company training in R&D management. See Annex 1 for details.

In Ireland, low corporate tax rates are a national economic policy aim and have provided the Industrial Development Authority (IDA) with a significant competitive advantage in attracting foreign multi-national manufacturing companies to Ireland. However, concurrent efforts to increase BERD levels have been hampered by that same corporate tax regime. Research by Forfás (1998) has shown that decisions to locate R&D functions in Ireland, especially by multinational enterprises, are adversely affected by low tax rates as firms prefer to incur R&D costs where they can be offset against higher taxes.

In the context of the increasing internationalisation of R&D, the effectiveness of traditional instruments *i.e.* direct supports, for promoting technological innovation in companies is being questioned. There is a need to better understand the levers that either stimulate or stifle company-level innovation and there is a need to develop appropriate policy responses. For the present, it is envisaged that the two aforementioned schemes will be used to offset the disadvantages of a low tax regime and as a mechanism to encourage firms to establish sizeable R&D facilities in Ireland. Meanwhile, in 2002, Forfás the body responsible for industrial, science and technology policy advice to Government will study measures to stimulate business R&D including tax based incentives.

3.2. *Changes in the balance and/or priority of public support of business R&D and innovation*

The *S&T Sub-Programme* (1994-1999) gave a particular emphasis (over 40% of the total budget for the period) to the direct support of business R&D through the *Industry R&D Initiative*. Projected allocations in the *Industry RTDI* element of the NDP indicate that over 50% of the total allocation will be for the direct support of business R&D through the *Competitive RTDI* and *R&D Capability* schemes.

3.3. *Assessments of the relative effectiveness of different policy measures*

The most recent assessment of the Industry R&D Initiative accompanies this questionnaire.

4. *Enhancing collaboration and networking among innovating organisations*

4.2. *Major Initiatives to Strengthen Industry/Science Relations*

The *Irish Council for Science Technology and Innovation (ICSTI)* in a review published in February 2001 identified the need for a more positive culture and a framework of incentives in the area of commercialisation of publicly funded research. Actions were recommended that funding agencies take steps to encourage commercialisation of research they sponsor, host institutions make commercialisation of research essential to their mission and that greater efforts be made to ensure adequate financial support to take projects from bench scale through first stage venture capital.

As previously indicated Enterprise Ireland operate a range of support measures to foster industrial academic partnerships. A Research Innovation Fund was set up in March 2001 to support projects with high potential for commercialisation put forward by researchers. Under the National Development Plan 2000 – 2006 Enterprise Ireland is developing seed and venture capital for small and medium enterprises in Ireland in partnership with the private sector.

5. *S&T Human Resources*

The Government appointed an Expert Group on Future Skills Needs in 1997 to identify, in a systematic way, the skills needs of different sectors of the economy and to advise on the actions needed to address them. In three annual reports since then the Expert Group has addressed a number of sectors which are heavy users of scientists and engineers, namely the Life Sciences sector and the IT sector. It has also undertaken detailed studies of the supply and demand for researchers in all sectors of the economy.

The initial emphasis of the Expert Group's work was on skills shortages in the IT sector, particularly in software. A sizeable gap was identified between the output of the higher education institutes and the

requirements of industry. Arising from the Group's findings the Government allocated significant additional resources to the institutes to increase the number of places in computer science and allied subjects.

The Expert Group's study on researchers was prompted by the additional public resources made available for research in the National Development Plan 2000 – 2006. This will give rise to a substantial increase in the need for researchers with a doctorate qualification and some post-doctoral experience as well as for PhD students. When allied with the expected needs of the enterprise sector as it moves towards an innovation driven approach to knowledge and learning, with a greater emphasis on research at every level, this is expected to lead to a human resources deficit in the Irish S&T system in the near future. The Expert Group's third report, published in 2001, recommended the following:

- National research policy should aim to achieve a substantial increase in the output of doctorates, particularly in science and engineering.
- Action should be taken to promote research as a career option for undergraduate students and to increase the attractiveness of science and engineering courses for school leavers.
- Measures should be taken to attract researchers from abroad, in line with the proposals continued in a study undertaken for the Expert Group by Technopolis Ltd.

These recommendations are expected to be incorporated in future research policy for Ireland.

6. International co-operation and globalisation

In the main, the EU Framework Programme represents the primary mechanism for international co-operation between Irish-based and overseas firms, universities and research institutes.

An S&T bi-lateral agreement between Ireland and China was concluded in 2001 and active promotion of that agreement, through inward and outward-bound missions, is underway.

Science Foundation Ireland, described in Section 1.1 of this Questionnaire, actively seek applications from overseas researchers who are prepared to undertake their research in Ireland. The Basic Research Grant Scheme, operated by Enterprise Ireland, is also open to overseas researchers.

Enterprise Ireland also manage an initiative which supports firms in identification and undertaking of joint venture, either for manufacturing or R&D, and licensing opportunities overseas, see Annex 1 for details.

In 2001, Forfás undertook an assessment of the case for Irish membership of CERN, EMBL, ESO and ESRF. The outcome was to recommend that Ireland should join EMBL and, subject to negotiations about membership type, Ireland should also consider joining ESRF and ESO at an early stage. The conclusion in relation to CERN, which would involve a high level of membership costs, was that Ireland should not join CERN at this point. There is a need to develop the scientific capability, required to take full advantage of the opportunities for high level collaborative scientific work which full membership would provide, more fully in Ireland.

SUB-MEASURE : COMPETITIVE RTDI

<u>Total NDP expenditure</u>	<u>€531.44m</u>
CSF participation	€153.89m (29%)
Exchequer participation	€19.48m (3.7%)
Private sector participation	€358.07m (67.3%)

1. This sub-measure is a successor to the Research and Technology Initiative that operated up to 1999. The sub-measure involves the allocation of grants to firms for high quality, high-risk, commercially focused, industry-led product and process development projects leading to sustained R&D investment.

Funds are allocated on a competitive basis.

2. The overall objective is to bring about a substantial net increase in the level of high quality research and development undertaken within companies in Ireland. The sub-measure is particularly directed at established companies that are planning to undertake their first R&D projects and those which are significantly developing their existing R&D activity¹. Formal collaboration is encouraged within the RTDI scheme, either between companies or between the company and a research establishment, including a third level college.

3. The direct beneficiaries for the funding will be manufacturing and internationally traded service companies (indigenous and FDI) based in Ireland.

4. Implementing body: Enterprise Ireland

SUB-MEASURE : R&D CAPABILITY

<u>Total NDP expenditure</u>	<u>€744.29m</u>
CSF participation	none
Exchequer participation	€260 (35%)
Private sector participation	€484.29 (65%)

¹ Enterprise Ireland define a 'first time performer' as a company which has received not more than £200k under any national R&D grant schemes since the beginning of the Measure 6 Scheme in 1993.

1. This sub-measure provides assistance for large-scale, long-term investment aimed at building up the R&D infrastructure/capability (human and facilities) within companies and must represent a clear “step-up” in the development of the R&D function compared to the company’s current situation.
2. The primary objective is to encourage multinational enterprises in Ireland to do more R&D here and also to encourage R&D-based firms to locate activities in Ireland.
3. The direct beneficiaries for the funding will be MNEs and for indigenous companies, the R&D Capability scheme targets the same two categories of companies as the Competitive RTDI scheme and is also intended for technology-based start-ups who need funding to support a programme of R&D projects.
4. Implementing body: Enterprise Ireland and the IDA

SUB-MEASURE : INNOVATION MANAGEMENT

Total NDP expenditure €48m

No CSF or private sector participation

1. This measure will provide financial and specialist supports for
Workshops on Innovation Management
 - Consultancy on management and exploitation of R&D
 - Placements and exchange of staff
 - Post-experience qualifications in R&D management and exploitation
2. The objective is this sub-measure is to help Irish companies develop their R&D management skills and maximise the commercial effectiveness of their innovation activities.
3. The direct beneficiaries for the funding will be service providers who can develop the necessary training courses and provide the specialist skills through Enterprise Ireland to their client companies.

4. Implementing body: Enterprise Ireland

SUB-MEASURE : COLLABORATION IN AN INTERNATIONAL CONTEXT

Total NDP expenditure €38.5m

No CSF or private sector participation

1. This sub-measure is effectively a continuation of the existing *Technology Transfer/Business Partners Programme*, managed by Enterprise Ireland. The measure supports the identification of joint venture, either for manufacturing or R&D, and licensing opportunities for Irish firms and supports them in the undertaking of the subsequent agreements using, if necessary, other Enterprise Ireland solutions for technical, marketing or financial problems.

2. The objective of this sub-measure is help firms identify and source their business and technology partnership as well as the role which these partnerships can play in their overall technology strategy.

3. The direct beneficiaries for the funding will be Enterprise Ireland, technology transfer brokers and other technology intermediaries.

4. Implementing body: Enterprise Ireland