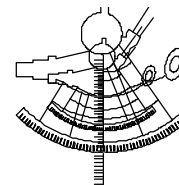


# European Trend Chart on Innovation

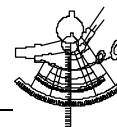


## Thematic Report Industry-Science Relations

October 2002

# European Trend Chart on Innovation

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Innovation is a priority of all member states and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aiming at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the member states. The 'First Action Plan for Innovation in Europe', launched by the European Commission in 1996, provided for the first time a common analytical and political framework for innovation policy in Europe.

Building upon the Action Plan, the 'Trend Chart on Innovation in Europe' is a practical tool for innovation policy-makers and scheme managers in Europe. Run by the 'Innovation' directorate of DG Enterprises, it pursues the collection, regular updating and analysis of information on innovation policies at national and Community level, with a focus on innovation finance; setting up and development of innovative businesses; the protection of intellectual property rights and the transfer of technology between research and industry.

The Trend Chart serves the 'open policy coordination approach' laid down by the Lisbon Council in March 2000. It supports policy-makers and scheme managers in Europe with summarised information and statistics on innovation policies, performances and trends in the European Union. It is also a European forum for benchmarking and the exchange of 'good practices' in the area of innovation policy.

The 'Trend Chart' products

The Trend Chart on Innovation has been running since January 2000. It tracks innovation policy developments in all EU member states, plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, Slovak Republic and Slovenia. The Trend Chart web site ([www.cordis.lu/trendchart](http://www.cordis.lu/trendchart)) will provide access to the following services and publications as they become available:

- a database of policy measures across Europe;
- a 'who is who?' of agencies and government departments involved in innovation;
- a series of country reports;
- a series of six-monthly trend reports;
- a number of benchmarking reports on specific themes;
- statistical reports such as the European Innovation Scoreboard;
- the six-monthly newsletters of the Trend Chart;
- the annual reports of the Trend Chart;
- and other publications.

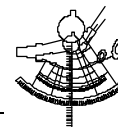
The present report was prepared by Alasdair Reid and Jacek Walendowski of ADE S.A. ([www.ade.be](http://www.ade.be)). The information contained in this report has not been validated in detail by the member states or by the European Commission.

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This document originates from the 'European Trend Chart on Innovation' of the European Commission (Directorate-General Enterprise).

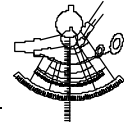
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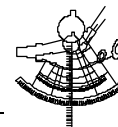


## Executive Summary

- The report considers two specific action lines monitored by the Trend Chart, namely I.2: Mobility of students, research workers and teachers; and III.4 Intensified co-operation between research institutes, universities and companies (or industry science relations, ISR). In total, the report covers 258 measures in 27 countries (two countries reporting no measures). However, **nine countries out of 27 account for over two-thirds of all measures.**
- The pace of introducing new measures relating to mobility and ISR has not evolved significantly from mid-2000 to September 2002. In the 12 months to September 2002, only two new mobility scheme type measures are identified and fourteen in favour of ISR (but eight of these are in Austria due to a significant reorganisation of funding schemes).
- During the period July 2000 to September 2002, there has been **no significant shift in priority** given to mobility schemes (stable at 2.38); while there has been **a decline in the priority** given to intensified co-operation (falling from 3.41 to 3.15).
- However, for both types of measures, there is a diverging trend in priorities between the current EU15 member states and the eleven candidate countries (CC11). **For mobility schemes, the priority has increased in the EU15 but steadily declined in the CC11; while the trend is the opposite for intensified co-operation.**
- On average, the favoured mode of delivery is schemes in favour of the 'transfer and exploitation of results' (a mode adopted by 50% of all schemes), but mobility (31%) and networking (30%) initiatives are also important modes. A more in-depth analysis of modes of delivery could be usefully carried out in the future to confirm certain trends suggested by this broad analysis. **For instance, mobility schemes are being merged into more general support schemes for SME innovation, while there seems to be a trend towards supporting the creation of network-based longer-term partnerships for ISR.**
- SMEs are a target of over two-thirds of all schemes with research institutes, universities and large firms/sectors also being important targets (in around 50% of all schemes). In the current EU15, there is a stronger focus on regional initiatives than in the candidate countries. Once again, the limitations of the data available and the resources available for this report make a more in-depth analysis impossible.

In terms of **methodological issues** relating to on-going monitoring of ISR policy:

- Ideally, the analysis conducted here which is largely based on 'number counting' policy schemes should be complemented by a more in-depth review; notably of trends in budgetary allocations for ISR schemes across countries. However, information on the financing of policy measures related to ISRs is insufficient for any robust conclusions to be drawn in this respect.
- Thematic trend analysis is made difficult by clearly diverging approaches to completing datasheets and country reports. Issues requiring attention include: reducing overlaps in definitions of action lines and achieving a common understanding of what types of measures should be classified under the action line ISRs. At present, many schemes are relatively classic applied research schemes with only a small component being related to improving ISR. The quality of the datasheets and country reports for the candidate countries needs to be improved since many datasheets are summaries of laws or government decisions rather than concrete policy measures.



## 1. Introduction and policy context

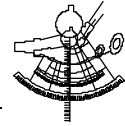
The aim of this report is to present and analyse recent developments in the field of industry-science relations (ISRs), especially with a focus on recently adopted supporting measures and/or programmes aimed at strengthening such linkages. More specifically, two action lines of the Innovation Action Plan will constitute the core of this report: mobility; and increased co-operation between research, universities and companies (Table 1).

**Table 1: List of priority areas and sub-areas of innovation policy**

Priority areas and sub-areas
<b>I. Fostering an innovation culture</b>
I.1. Education and initial and further training
I.2. Mobility of students, research workers and teachers
I.3. Raising public awareness and involving those concerned
I.4. Innovation and management of enterprises
I.5. Public authorities
I.6. Promotion of clustering and co-operation for innovation
<b>II. Establishing a framework conducive to innovation</b>
II.1. Competition
II.2. Protection of intellectual and industrial property
II.3. Administrative simplification
II.4. Legal and regulatory environment
II.5. Financing of innovation
II.6. Taxation
<b>III. Gearing research to innovation</b>
III.1. Strategic vision of research and development
III.2. Strengthening research carried out by companies
III.3. Start-up of technology-based companies
III.4. Intensified co-operation between research, universities and companies
III.5. Strengthening the ability of SMEs to absorb technologies and know-how

**I.2 Mobility of personnel:** In brief, this action line encompasses measures, actions and programmes aimed at encouraging and supporting personnel mobility, namely students, research workers and teachers from one country to another, from research/education community to industry. The global objective is defined as encouraging transfer of technology and know-how.

**III.4 Intensified co-operation between research, universities and companies:** It refers to different measures, actions and programmes which aim at promoting dissemination of knowledge/research results from research institutions and universities to industry. This may include financing research collaboration projects between science and industry; legal and contractual arrangements for the exploitation of research results with industry; encouraging the creation of university spin-offs, creation of support interfaces; training programmes of researchers, in order to close the gap between research capacity and industry needs etc.

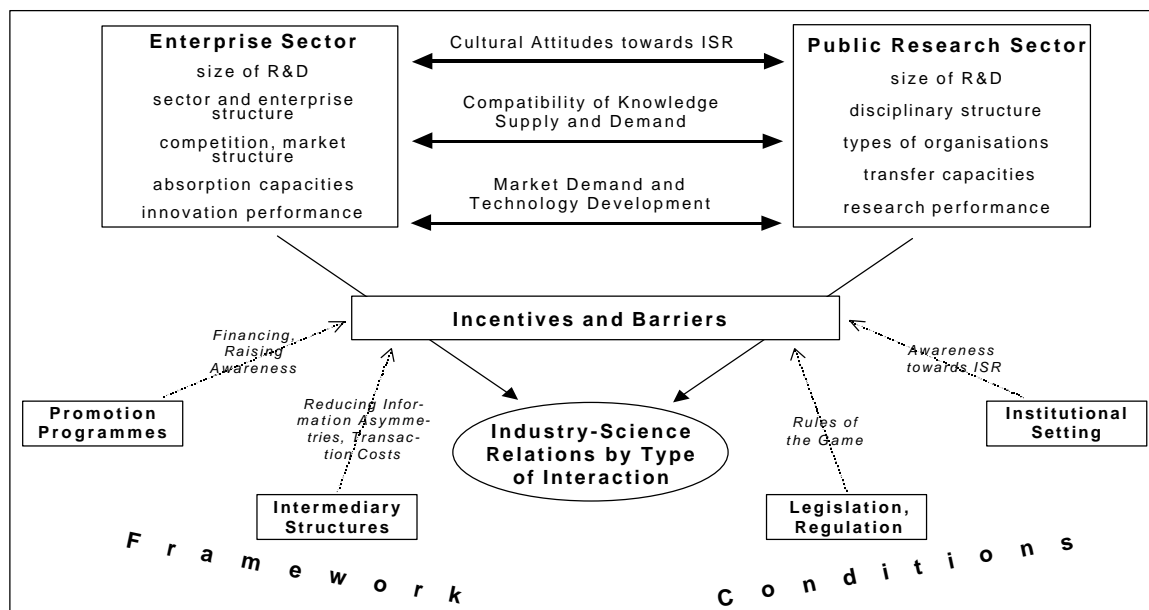


## 1.1 Policy issues and context

In Europe, a belief that there is a gap between high level and quality scientific performance and a lack of entrepreneurial capacities to transform research results into innovation, growth and jobs, has been labelled the 'European paradox'<sup>1</sup>. One explanation for this weakness are barriers or lack of incentives in national innovation systems which lead to low levels of exchanges between the research community and industry. Re-addressing this weakness and developing links between universities and industry can be achieved through both direct incentives (funding programmes for joint research activities between, support for spin-offs, etc.) and by improving the so-called framework conditions (e.g. legislative framework and institutional settings, entrepreneurial cultures in academic and public research institutes, etc.).

A 2001 report aimed at Benchmarking Industry-Science Relations<sup>2</sup> (commissioned by DG Enterprise, European Commission) and the Austrian Federal Ministry of Economy and Labour) provides a good review of issues in this field and complements on-going Trend Chart analysis on the same theme<sup>3</sup>. The diagram below summarises the conceptual framework used by the benchmarking report.

**Figure 1 : Conceptual model for analysing industry-science relations**



Source: *Benchmarking Industry-Science Relations in Europe. The Role of Framework Conditions. (2001).*

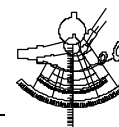
This model has the advantage of distinguishing between three groups of variables affecting ISR performance in a specific country. First: the characteristics of the main actors (enterprises and public/higher education research sector); second: framework conditions such as public promotion programmes, intermediary structures, legislation and regulations and institutional settings; third: performance indicators for ISR.

<sup>1</sup> This conclusion has been challenged recently, notably by Keith Pavitt who argued that this conclusion ignores the process of internationalisation of research. An alternative theory is that European research is not as strong as in the USA (especially in biotechnology and IT), that relatively less business R&D is performed in Europe because European firms are performing an increasing share of their R&D in the US, and that improved access to US research is one of the principal reasons for this. See Public Policies to support basic research. SPUR Electronic Working Papers Series. Paper n°53 (2000).

<sup>2</sup> European Commission, Enterprise Directorate General and Austrian Federal Ministry for Economy and Labour. Joanneum Research Institute, Austria. (2001), Benchmarking Industry-Science Relations - The Role of Framework Conditions.

<sup>3</sup> For instance the Trend Chart Policy Benchmarking Workshop on "The changing role of public support to academic spin-offs". February 2002.

## European Trend Chart on Innovation

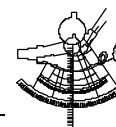


The Trend Chart monitoring, particularly the measure datasheets, essentially capture promotion programmes and intermediary structures; and where evidence is included from evaluations, etc. allows some insight into evolving industry-science performance indicators. The benchmarking report proposes a range of 'indicators for the performance of ISRs', reproduced in the table below. Most are too specific to be covered by the European Innovation Scoreboard although some are based on EU or OECD level data.

**Table 2: Indicators of the performance of ISR**

<i>Variable</i>	<i>Indicator</i>	<i>Year</i>	<i>Source</i>
Contract and collaborative research	R&D financing by industry for HEIs in % of HERD	1998*	OECD
	R&D financing by industry for PSREs in % of GOVERD	1998*	OECD
	R&D financing by industry for HEIs/PSREs in % of BERD	1998*	OECD
	Significance of R&D consulting with firms by HEI researchers	mrya	nat. rep.
	Significance of R&D consulting with firms by PSRE researchers	mrya	nat. rep.
Co-operation in innovation projects	Innovative manuf. enterprises co-operating with HEIs in %	1994-96	CIS2
	Innovative manuf. enterprises co-operating with PSREs in %	1994-96	CIS2
	Innovative service enterprises co-operating with HEIs in %	1994-96	CIS2
	Innovative service enterprises co-operating with PSREs in %	1994-96	CIS2
Science as information source for industrial innovation	HEIs used as inform. source by innov. manuf. enterpr. in %	1994-96	CIS2
	PSREs used as inform. source by inn. manuf. enterpr. in %	1994-96	CIS2
	HEIs used as inform. source by innov. service enterpr. in %	1994-96	CIS2
	PSREs used as inform. source by inn. service enterpr. in %	1994-96	CIS2
Mobility of researchers	Share of researchers in HEIs moving to industry p.a. in %	mrya	nat. rep.
	Share of researchers at PSREs moving to industry p.a. in %	mrya	nat. rep.
	Share of HE graduates at industry moving to HEIs/PSREs p.a. in %	mrya	nat. rep.
Training and education	Income from vocational training in HEIs in % of R&D expenditures	mrya	nat. rep.
	Number of vocational training participants in HEIs per R&D employees in HEIs	mrya	nat. rep.
	Share of students carrying out practices at enterprises during their study (placements, master thesis, PhD programmes etc.) in %	mrya	nat. rep.
Patent applications by public science	Patent Applications by HEIs (and individual HEI researchers) per 1,000 employees in NSEM in HEIs	mrya	nat. rep.
	Patent Applications by PSREs (and individual PSRE researchers) per 1,000 employees in NSEM at PSREs	mrya	nat. rep.
Royalty incomes by public	Royalties in % of total R&D expenditures in HEIs	mrya	nat. rep.
	Royalties in % of total R&D expenditures at PSREs	mrya	nat.

# European Trend Chart on Innovation



Science			rep.
Start-ups from	Number of technology-based start-ups in HEIs per 1,000 R&D personnel	mrya	nat. rep.
public science	Number of technology-based start-ups at PSREs per 1,000 R&D pers.	mrya	nat. rep.
Informal contacts,	significance of networks between industry and HEIs (exp. assessment)	mrya	nat. rep.
personal networks	significance of networks between industry and PSREs (exp. assessment)	mrya	nat. rep.

Source : *Benchmarking Industry-Science Relations: the role of framework conditions (2001)*.

Data from the survey carried out for the Global Competitiveness Report provides another source of information on the potential for the research base to co-operate with industry in terms of the quality and availability of scientific research institutions, services and scientists and engineers; and included a specific question on university/industry research collaboration. The table below presents the results for five questions from the GCR survey. Trend Chart countries are split between candidate countries (CC11, the survey did not include Cyprus and Malta) and the EU14 (Luxembourg was not included). Aside from the indicator on availability of scientists and engineers where the CC1 are equal to the EU14 (reflecting the relatively strong education systems of the central and eastern European countries), the candidate countries score significantly lower than the EU14.

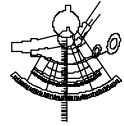
**Table 3 : Global Competitiveness Report: university/industry research collaboration**

Indicator	Quality of Scientific Research Institutions	Availability of Scientists and Engineers	Local Availability of Specialized Research and Training Services	University/Industry Research Collaboration	Brain Drain
<b>Description</b>	Scientific research institutions in your country, such as university and government laboratories, are (1=non-existent, 7=the best in their fields)	Scientists and engineers in your country are (1=non-existent or rare, 7=widely available)	In your industry, specialized research and training services are (1=not available in the country, 7=available from world class local institutions)	In its R&D activity, business collaboration with local universities is (1=minimal or non-existent, 7=intensive and ongoing)	Scientists and engineers in your country (1=normally leave to pursue opportunities elsewhere, 7=almost always remain in the country)
Bulgaria	4.0	5.3	3.9	2.8	2.5
Czech Republic	5.0	5.8	5.2	4.1	5.1
Estonia	5.2	5.5	4.9	4.1	4.4
Hungary	5.2	6.2	5.0	4.8	4.0
Latvia	4.3	4.6	4.5	3.7	3.3
Lithuania	4.7	5.7	4.5	3.3	3.3
Poland	4.5	5.3	5.0	3.8	3.9
Romania	3.2	6.5	3.4	1.6	3.3
Slovak Republic	4.4	6.4	5.0	4.6	3.4
Slovenia	4.8	5.2	4.3	3.8	4.2
Turkey	3.5	4.6	3.7	3.4	4.0
<b>CC-11 mean</b>	<b>4.4</b>	<b>5.6</b>	<b>4.5</b>	<b>3.6</b>	<b>3.8</b>
Austria	5.6	5.8	5.6	5.1	5.2
Belgium	5.8	4.9	5.2	5.4	5.4
Denmark	5.3	5.7	5.4	5.0	5.1
Finland	6.3	6.4	6.1	6.1	6.1
France	6.2	6.0	6.0	5.1	5.3
Germany	5.9	5.5	6.0	5.1	5.4
Greece	4.1	5.7	3.9	3.9	4.5
Ireland	5.6	5.8	5.1	5.1	4.6
Italy	4.6	5.4	4.9	4.2	4.1
Netherlands	6.2	5.6	5.6	5.2	5.5
Portugal	4.4	4.8	4.4	3.8	4.4
Spain	4.8	5.6	5.3	4.2	4.8
Sweden	6.0	6.0	5.7	5.7	4.8
United Kingdom	6.1	5.3	6.0	4.9	4.8
<b>EU-14 mean</b>	<b>5.5</b>	<b>5.6</b>	<b>5.4</b>	<b>4.9</b>	<b>5.0</b>
GCR Mean	4.6	5.1	4.5	3.9	4.0

Amongst the current EU countries, Finland stands out from the survey as having an exceptionally good research base and high level of research-industry collaboration. At the other end of the spectrum, Greece and Portugal score lowest on two indicators respectively, with Italy being most affected by a brain drain. Amongst the candidate countries, the Czech Republic and Hungary appear best placed with Romania and Turkey offering the least potential for industry-science relations. A brain drain seems to be a particular issue in Bulgaria.

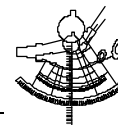
## European Trend Chart on Innovation

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Data from the European Innovation Scoreboard 2002 which highlight the low levels of business expenditure on R&D in the candidate countries, and survey evidence such as the GCR, would suggest that on average the forthcoming accession of 10 new member states to the EU is most likely to exacerbate the 'European paradox'. It may be possible for the candidate countries to benefit from the experience of some EU countries, such as the recent Estonian example of adopting the Competence Centre model for ISR developed in Austria and other EU countries. However, learning from good practices is a one thing but copying identical solutions to country embedded in different cultural, social and economic context could bring negative effects, especially in the context of the still restructuring research systems of the CCs.

# European Trend Chart on Innovation



## 1.2 New measures 2001-2002

### 1.2.1 Mobility of students, research workers and teachers

Only five measures have been introduced under this action plan priority during the period 2001-2002, and only two of these had mobility as their primary objective.

**Table 4: List of new measures in favour of mobility**

Germany	Facilitating start-ups from Public Research Organisations (EEF-Fonds) (DE 74)
Ireland	<b>FUSION (IE 29) – all Island Knowledge Transfer initiative</b> <b>FOCUS (IE 30) – all Island programme for recruitment of sales and marketing graduates</b>
Slovenia	Development of Business Incubators at Universities (SO 13-
Spain	<b>Torres Quevedo Programme to support the placement of PhDs and skilled personnel in enterprises (ES 30)</b>

The **Irish FUSION (IE 29)** scheme, previously termed the All Island Knowledge Transfer Initiative, replaces a previous initiative aimed at only the Republic of Ireland and now operates at 'all-Island' level under the auspices of the cross-border trade and business development body 'InterTradeIreland'. FUSION brings together three partners:

- A company – an SME with a technology-based development need;
- Knowledge centre – a 3<sup>rd</sup> level institute such as a college, university or technology centre;
- Knowledge carrier – a degree or diploma holder out of college/university within the last five years.

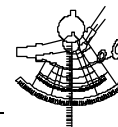
Each participating company has a specific technology-based development need and is subsequently matched with a knowledge centre with specialist expertise in this field. A graduate is then employed by the company for up to 18 months to work specifically on meeting the scoped development project. During this period, the graduate has full back-up support from access to the knowledge centre. In essence, the graduate acts as a conduit or knowledge carrier facilitating the transfer of knowledge from 3<sup>rd</sup> level HEI to company. The project will involve 40 companies, 40 colleges and 40 graduates, with the 40 companies recruited onto the initiative on a rolling basis over a 4-6 month period. A pool of 300 graduates has been established.

#### **Irish expert group on future skills needs**

One interesting example of policy development in this field is the work done by the Irish Council for Science, Technology and Innovation (ICSTI) Expert group on future skills needs. During 2001-2002 this group has been assessing whether the Irish higher education system is producing sufficient researchers for the knowledge economy and has produced a report which examines how Ireland might position itself to attract more foreign research graduates and post-doctoral researchers. As a complement to this work, the expert group commissioned an international consultancy to undertake a report in order to examine strategies and mechanisms that have been put in place by 'best practice' and competitor countries (the UK, the US, Denmark, Finland and the Netherlands) to attract foreign researchers.

Human capital for research and innovation is one of the main strategic objectives of the current Spanish government, notably as parts of the implementation of the 4th National Plan for Scientific Research, Technological Development and Innovation 2000-2003. The Ministry for Science and Technology (MICYT) has underlined its commitment to improving labour conditions and mobility of researchers and RTD personnel, with the general aim of favouring the transfer of knowledge and increasing the number of RTD personnel. Thus, through the IV National RTD Plan some new measures have been launched, and older schemes have been improved.

## European Trend Chart on Innovation



Complementary to the Ministry's goal is the new Law of Universities, which gives particular attention to human resources and foresees the creation of new university RTD professional profiles. The new Law encourages:

- mobility of researchers;
- engagement of professors to carry out mainly research activities;
- hiring technicians to support research in university departments;
- settlement of mixed centres among universities, public and private research centres and firms;
- start-up of new technology-based firms from university research activities.

In addition to these amendments to the legal/administrative framework, one specific new programme has been launched: the **Torres Quevedo Programme (ES 30)** aimed at the insertion of PhD holders in firms. This programme is the re-formulation of the former IDE Action (ES 2), running from 1997 to 2001, with the main objective of promoting innovation in firms through the placement of scientists. The programme's main goal is to transfer research results from R&D and innovation centres to enterprises through the mobility of PhD holders and skilled personnel. The new programme opens the scheme to technology centres as well as SMEs; and there have also been changes to financial support moving from a fixed grant to a percentage of labour costs.

### 1.2.2 Intensified co-operation between research, universities and companies

In total, during the period September 2001 to September 2002, 14 new measures were identified in the country reports in the field of intensified co-operation between research institutes, universities and companies. However, over half of these measures were due to the re-organisation or re-launch of a series of relatively standard applied research programmes in Austria.

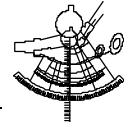
**Table 5 : List of new measures in favour of ISR**

Austria	<b>A3 (AT 51), ISB (AT 52), I2 (AT 53), FIT-IT (AT 54), ASAP (AT 55), TAKE-OFF (AT 56), Artist (AT 57), Sustainable development (AT 58)</b>
Belgium	<b>Technological Attraction Poles BE 59</b>
Denmark	<b>Innovation Consortiums (DK 17)</b>
Greece	<b>Research and Technological Development Consortia in Sectors of National Priority (GR 55)</b>
Norway	<b>MOBI (NO 30), ARENA (MO 32)</b>
United Kingdom	<b>Higher Education Innovation Fund (HEIF) (UK 38)</b>

The large number of changes in the Austrian case are due to what the country report describes as a 'big bang' reorganisation of research promotion programmes. In April 2002, the Ministry for Transport Infrastructure and Technology (BMVIT) presented its enlarged and consolidated research promotion programmes. The reorganisation combined:

- the introduction of new research promotion programmes FIT-IT (information technology, AT 54), National Space Programme (ASAP, AT 55), ARTIST (satellite development, AT 57), take off (aerospace programme, AT 56);
- the re-launch of existing programmes Sustainable Development (AT 58), Intelligent Logistics (AT 51, AT 52, AT 53).

All these programmes aim at bringing together scientists and engineers from Austrian universities and research institutes which have made significant contributions in the technology fields of each programme, to develop projects in partnership with industry. However, these programmes appear to be relatively classic funding mechanisms and the more novel and innovative programmes aimed at strengthening ISR remain initiatives, such as the K-plus programme (AT 23, AT 48) which aims to create centres where joint research between companies and universities at a pre-competitive stage is carried out. The K-Plus programme has directly inspired a new scheme approved by the **Estonian Government** in November 2002 '**Technology Competence Centres**' (no datasheet yet) which complements the existing SPINNO initiative in Estonia (ES 17) which aims to create an improved



entrepreneurial climate in universities and improved IPR management with a view to commercialisation.

### Belgium: Technological Attraction Poles (TAP) BE-59

This new measure supplements the already existing programmes aimed at supporting and increasing the country's scientific potential in vital leading edge domains. The new programme aims specifically at improving the relationship between research and development, and hence at increasing co-operation between universities and specialist sectoral centres, for example. Its purpose is to help to transfer findings from research into the growth domains that fall within the Federal Government's competencies, particularly where the transfer is risky. The TAP programme seeks to strengthen the innovation dynamic by enhancing the research potential developed on a national scale. It centres on the development and use of scientific and technical knowledge in order to devise methods, procedures and tools able to generate innovation in the industrial sector.

More specifically the research project must concern the fields of telecommunications, standardisation or the space sector or more than one of these domains. The objectives are 1) To consolidate the scientific and technical potential of activities relating to these domains; 2) To assist the transfer of knowledge and results of research or, in the case of the space sector, to prove the applicability of space technologies through concrete examples; 3) In the fields of telecommunications and standardisation: promote Belgium's participation in international activities in these domains; in the space sector: support the transfer of knowledge and methods from the domain of space to other domains of application through appropriate research.

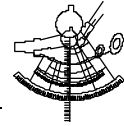
The programme is open to university institutions, public scientific establishments and non profit-making research centres. The research proposals should be of a maximum duration of three years and a network needs to be constituted consisting of a maximum of five teams, which must include at least one university establishment and one collective type research centre. The proposal should be launched by all partners together. Networks may be financed up to a maximum of EUR250,000 per partner. This funding may be redistributed within the network according to the role of each of its constituent partners. Each project must designate a coordination team. The coordination team may request a coordination budget not exceeding 2.5% of the total project budget. Further, a group of potential users of the results of the research will form a committee of users. This committee should meet at least twice a year.

Aside from the launch of the new Technological Attraction Poles scheme (BE 59), a number of other schemes at regional level have been reinforced or extended. In September 2002, the Flemish government approved a decree stemming from the Parliamentary 'Act on Innovation', laying down the conditions for financial support for **Interface activities of Flemish universities (BE 18)**. An annual amount of EUR1.3 million will be at the disposal of the universities for funding interface activities. A major change is that this level of funding is guaranteed for five years compared to the system in place since 1998, where the level of financial support for university interface services was decided annually ad hoc. This created uncertainty in terms of financial planning and prevented the development of new services. Another new aspect is that after five years a thorough evaluation will be conducted.

In the Walloon region, the pilot action in favour of **Technology Clusters (BE 60)**, originally launched in 2000, has been extended through a second call for proposals during 2002. The aim of the Technology Clusters projects is to encourage groups of firms and associated R&D institutes to develop joint R&D projects in one of the key technologies identified in a technology foresight exercise which took place between 1998 and 2000. The technology cluster projects receive limited direct funding, only for a coordinator, but specific actions can be eligible under existing regional schemes.

## European Trend Chart on Innovation

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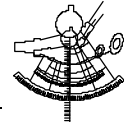


The new Danish scheme is entitled **Innovation Consortiums (DK 17)** which aims at intensifying co-operation between public and private research and strengthening applied research. The consortiums should constitute binding co-operation between research institutes, companies and technological service providers. The companies should finance 50% of the total and the public co-financing should cover the expenses to the research institutes. Some EUR13 million has been appropriated for the years 2003-2005.

In Greece, a set of calls for **Research and Technological Development Consortia in Sectors of National Priority** [GR 55] was launched as a follow up to the original EKVAN philosophy. The objective of the programme is to promote collaboration between business enterprises and public research entities with regard to long-term research and technological development projects aiming at producing innovative products or services and coping with the social and cultural needs which affect competitiveness in the economy. The measure will give priority to the sectors of athletics, renewable energy sources and energy saving, built environment and seismic risk management, natural environment and sustainable development, new forms of the organisation of business, employment and training, culture (knowledge-intensive tourism), food (agricultural development and aquaculture) and health (biomedical research, diagnostic and therapeutics procedures).

The Norwegian policy framework for supporting industry-science relations has also evolved over the period 2001-2002 with the launch of a number of initiatives. **MOBI** (NO 30) is to be a bridge-builder for the development of long-term relations and concrete co-operative projects between enterprises with limited R&D experience and various R&D facilities. Efforts have been made to strengthen the expertise of enterprises in various ways, in technological and non-technological spheres alike. MOBI is the heir to the previous BRIDGE programme (NO 10). A new sub-programme under MOBI is **ARENA** (also known as Regional Innovation Pilots NO 32). This programme is to stimulate the development of regional innovation systems and industrial clusters. The basic idea is that regional conditions are of great importance to innovation and value creation. By promoting regional co-operation between companies, R&D environments and innovation policy institutions, the programme will contribute to increased growth and international competitiveness at firm level.

Finally, in the UK, an increase in resources for knowledge transfer from the science base has taken place with the consolidation of a number of separate schemes into a continuation of the **Higher Education Innovation Fund (HEIF, UK 38)** as a permanent third stream of funding for universities. Additional funds (EUR270 million for 2004-2006) will also be provided for knowledge transfer from public sector research establishments. To date, under the broad umbrella of HEIF, over 70 universities have been supported in a range of activities such as the employment of specialist staff, establishing business incubators, improving the IP infrastructure and providing enterprise training for staff. A number of University Innovation Centres have been established, with more planned. The centres are intended to be top-class long-term research partnerships between major business interests and the university sector and at the 'Heart of cluster development and support for new start-ups and businesses that are growing in business incubators'.

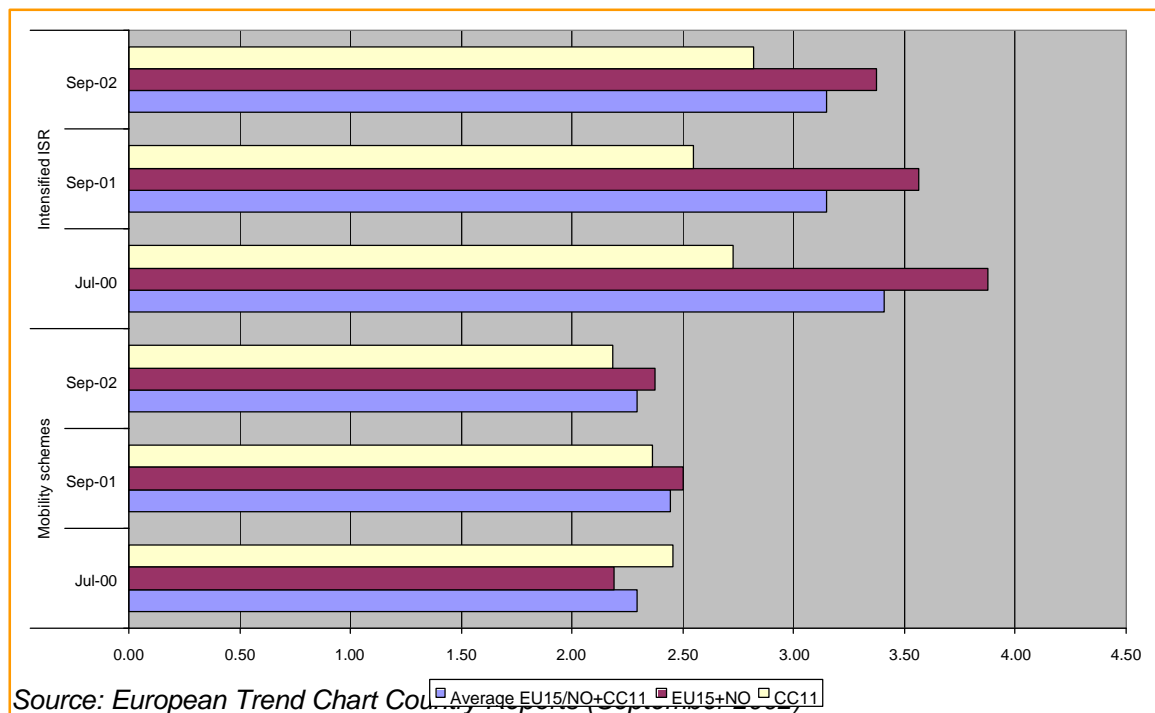


## 2. Policy trends

### 2.1 Trends in policy priorities

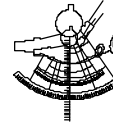
Figure 2 below is based on the latest Trend Chart Country Reports (September 2002) and presents an overview of innovation priorities according to action lines I.2 (mobility schemes) and III.4 (intensified industry-science relations). In general, it confirms that measures aimed at facilitating intensified co-operation between research bodies, universities and industry are given a higher priority than those for the promotion of mobility of researchers between science and industry.

**Figure 2: Trends in policy priorities for mobility and ISR schemes – July 2000 to September 2002**



On average, the priority given to **mobility schemes** as a means of promoting stronger knowledge flows between science and industry has remained static at 2.3 out of a maximum of 5, across the 28 countries reviewed (EU15 and Norway and 11 candidate countries, CC11). However, this hides a diverging trend between the EU15/NO and the CC11: in the former group, the priority given to mobility schemes increased from 2.19 in July 2000 to 2.5 in September 2001 before falling to 2.38 in September 2002; in the CC11, there has on the contrary been a steady decline falling from 2.45 in July 2000 to 2.36 in September 2001 to only 2.18 in September 2002.

# European Trend Chart on Innovation



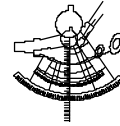
**Table 6: Overview of innovation priorities – mobility schemes and ISR**

Country	Mobility schemes						Co-operation research, universities and companies					
	Jul-00	Sep-01	Sep-02	July 00 to Sept-02 change	Sept 01 to Sept 02 change	Average July 00-Sept 02	Jul-00	Sep-01	Sep-02	July 00 to Sept-02 change	Sept 01 to Sept 02 change	Average July 00-Sept 02
Austria	2	3	2	0	-1	2.3	4	4	3	-1	-1	3.7
Belgium	2	3	2	0	-1	2.3	2	3	3	1	0	2.7
Denmark	3	4	4	1	0	3.7	6	5	6	0	1	5.7
France	4	4	3	-1	-1	3.7	4	4	4	0	0	4.0
Finland	2	2	2	0	0	2.0	4	3	2	-2	-1	3.0
Germany	2	2	2	0	0	2.0	4	4	4	0	0	4.0
Greece	2	2	3	1	1	2.3	4	3	3	-1	0	3.3
Ireland	1	2	2	1	0	1.7	3	4	3	0	-1	3.3
Italy	3	3	2	-1	-1	2.7	3	3	3	0	0	3.0
Luxembourg	2	2	2	0	0	2.0	4	1	1	-3	0	2.0
Netherlands	1	1	1	0	0	1.0	5	5	5	0	0	5.0
Norway	1	1	2	1	1	1.3	2	1	2	0	1	1.7
Portugal	2	2	2	0	0	2.0	4	4	4	0	0	4.0
Spain	2	3	3	1	0	2.7	5	5	3	-2	-2	4.3
Sweden	3	3	3	0	0	3.0	4	4	4	0	0	4.0
United Kingdom	3	3	3	0	0	3.0	4	4	4	0	0	4.0
Bulgaria	2	2	2	0	0	2.0	2	2	2	0	0	2.0
Cyprus	2	2	3	1	1	2.3	3	2	3	0	1	2.7
Czech Republic	1	1	1	0	0	1.0	2	2	3	1	1	2.3
Estonia	1	2	2	1	0	1.7	2	4	4	2	0	3.3
Hungary	3	3	3	0	0	3.0	6	6	5	-1	-1	5.7
Latvia	3	4	3	0	-1	3.3	4	2	2	-2	0	2.7
Lithuania	5	2	2	-3	0	3.0	3	3	3	0	0	3.0
Poland	1	1	1	0	0	1.0	1	1	2	1	1	1.3
Romania	5	5	4	-1	-1	4.7	3	2	3	0	1	2.7
Slovak Republic	1	1	1	0	0	1.0	2	2	2	0	0	2.0
Slovenia	3	3	2	-1	-1	2.7	2	2	2	0	0	2.0

Source: European TrendChart Country Reports (September 2002)

## European Trend Chart on Innovation

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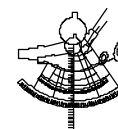
As can be seen from the detailed priority figures presented in Table 6 above, the decline in the CC11 is due in part to a significant fall in priority given to mobility schemes in **Lithuania**. In contrast in the EU, there have been few significant changes in priority given to mobility schemes

In terms of relative priorities amongst the countries surveyed, **Denmark** gave the highest priority to mobility schemes within the group of EU15/NO with an average priority of 3.7 over the period July 2000 to September 2002; while **Romania** is a clear outlier amongst the CC11 giving an average priority of 4.7. The Danish score appears to reflect a long-standing commitment to supporting mobility, notably through the Industrial Research Scheme (DK 5), which enables students to obtain their PhD through employment as researchers in private companies. The Romanian score reflects both significant policy concerns to counter a brain drain and make skilled personnel available to private enterprises and the significant funding allocated to the CORINT programme (the only one of its kind in the candidate countries). At the other end of the scale, **the Netherlands** gave the lowest priority (average of 1) to mobility schemes over the period 2000-2002; as did the **Czech and Slovak Republics** and **Poland**. In the case of the Netherlands, this low priority seems to be explained by a streamlining of measures which resulted in the merging of the former 'knowledge carriers in SMEs' measure into Feasibility Studies measure. This decision mirrors recent changes in neighbouring Flanders with a similar result, namely the disappearance of a specific scheme for human mobility.

Turning to schemes in favour of intensified ISR, the average priority for the 28 countries reviewed declined from 3.41 in July 2000 to 3.15 in September 2002. Once again there was a difference in trends between the EU15/NO and the CC11: in the former group, the priority given to ISR schemes **decreased** from 3.88 in July 2000 to 3.56 in September 2001 to 3.38 in September 2002; in the CC11, the level of priority fluctuated from 2.73 in July 2000 to 2.55 in September 2001 to finish **higher** at 2.82 in September 2002.

The overall decline in the EU15/NO group can be attributed to three significant national changes in priority, namely a three point drop in **Luxembourg** and a two point drop in **Finland** and **Spain**. Amongst the CC11, the most significant changes are a two point increase in **Estonia** and a two point drop in priority in **Latvia**.

In terms of relative priorities amongst the countries surveyed, **Denmark** once again gave the highest priority to ISR schemes within the group of EU15/NO with an average score of 5.7 over the period July 2000 to September 2002; while **Hungary** was a clear outlier amongst the CC11 with an identical average priority of 5.7. At the other end of the scale, **Norway** gave the lowest priority (average of 1.7) to ISR schemes over the period 2000-2002; and **Poland** stood out amongst the CC11 with a priority score of only 1.3. The Norwegian score is more difficult to understand since a number of new measures have been launched in the last couple of years in favour of stronger ISR.



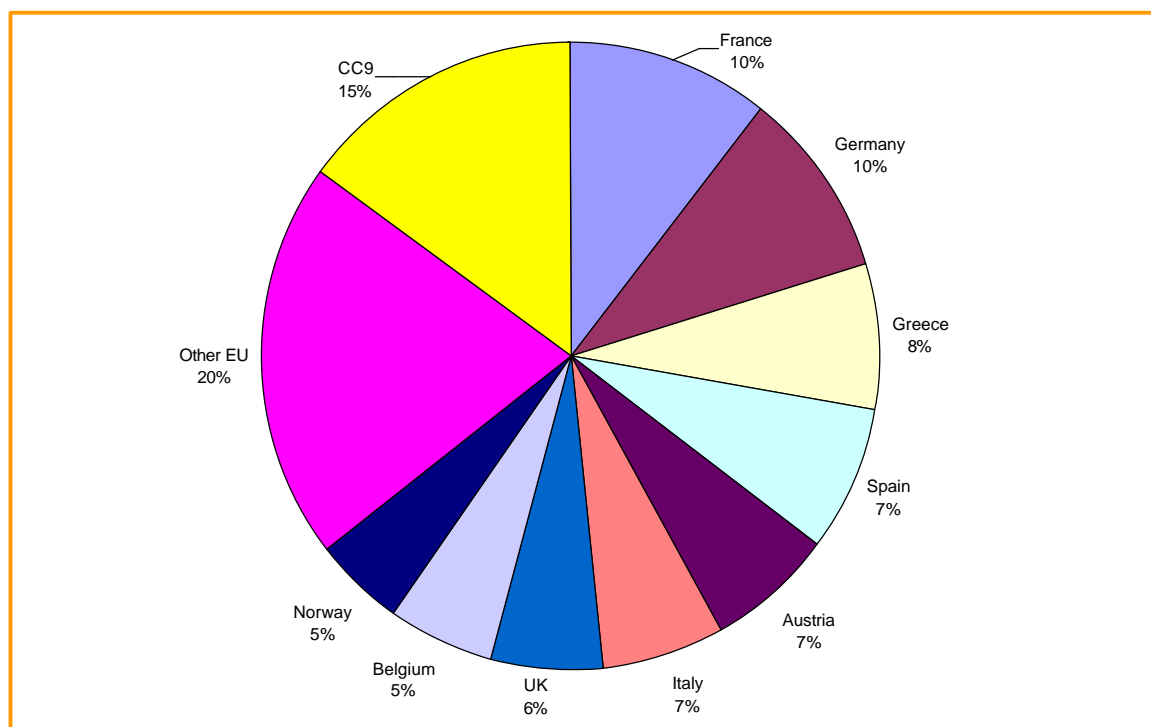
## 2.2 Modes and targets of current ISR measures

Annex 2 provides a list of all measures per country for both mobility and intensified co-operation schemes for which a Trend Chart measure datasheet exists. The table classifies the measures according to the mode of delivery (mobility of personnel, transfer and exploitation of results, information diffusion/promotion, demonstration projects and networks/clusters) and the targets (sectors/large firms, research institutes, SMEs, universities, young scientists, regions) of the measures.

The table in annex 2 covers 258 measures for 27 countries (two countries, Slovakia and Bulgaria, reporting no measures). As can be seen from the figure below, nine countries out of 27 account for over two-thirds (64%) of all measures. It is impossible to draw a firm conclusion about the importance of policy by number-counting schemes since this would require weighting of financial data, etc. in order to have a more precise perspective. However, in the absence of reliable and complete financial data in the database of Trend Chart measures, the analysis here is limited to number counting which at least allows some idea of the relative sophistication or variety of measures explored further through the analysis of modes and targets.

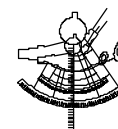
A first remark is that although there is some correspondence between size of economy/innovation system and number of measures (Germany and France reporting the largest number of measures), smaller countries are also present in this leading group (Austria, Belgium, Greece and Norway).

**Figure 3 : distribution of measures by country**



Source : *Calculations of ADE on basis of INBIS summary Trend Chart database of policy measures.*

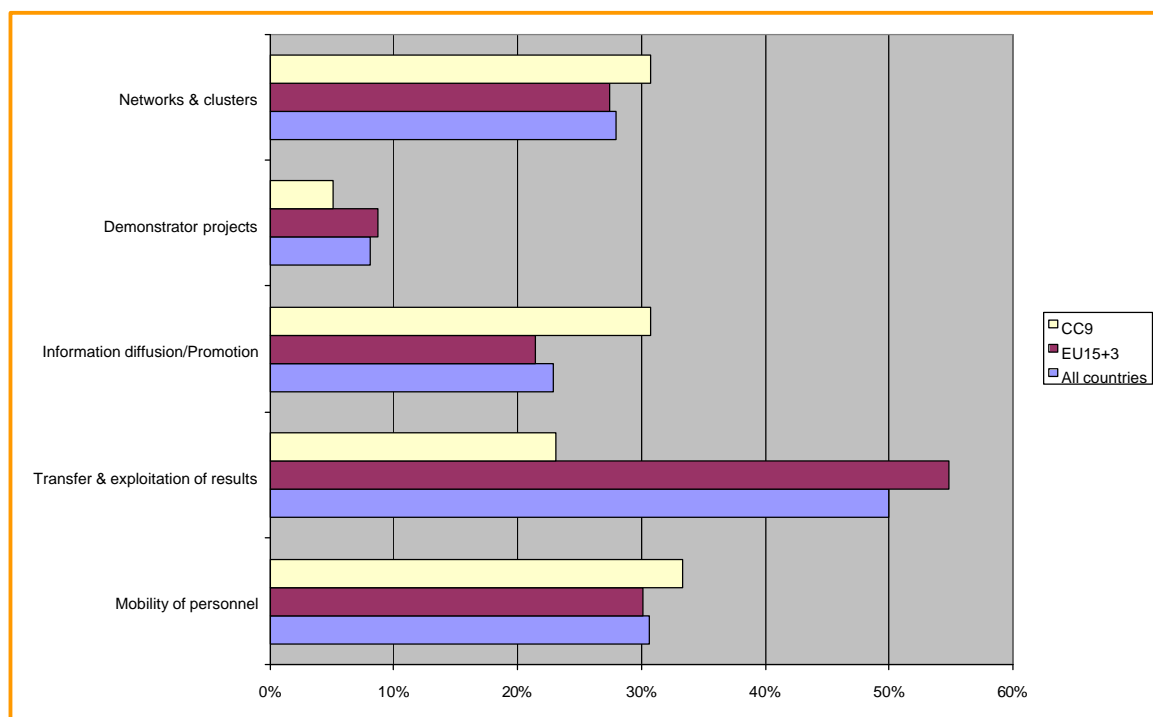
In the case of Austria and Belgium this seems to reflect the federalised nature of innovation policy; while in Greece the importance of Structural Fund supported programmes during the 2000-2006 period may be an explanatory factor. The low number of measures from the nine candidate countries (only 39 measures or 15% of the total) must be read as a sign of their still under-developed range of



policy measures in favour of industry-science relations. This conclusion has been confirmed by the recent studies carried out on behalf of DG Enterprise on innovation policy in the candidate countries<sup>4</sup>.

Across all 27 countries, the most favoured **mode of delivery** on average are measures focusing on the transfer and exploitation of results (50%), followed by those in favour of mobility of personnel (31%) and then networks and clusters (28% of all measures). There is some difference in the relative importance of modes of delivery between the more advanced economies (EU15, Iceland, Israel and Norway, EU15+3) and the nine candidate countries (CC9). In particular, the CC9 are more likely on average to favour mobility schemes than the EU15+3 but only half as likely (only 23% of all measures in the CC9) to promote the transfer and exploitation of results. Equally, much more importance was given to information and diffusion of information on research results, etc. This seems broadly consistent with the current state of economic development and innovation policy in the candidate countries, where retaining skilled human resources (e.g. avoiding a brain drain) and raising awareness amongst enterprises about the need to undertake research despite limited financial resources, etc. are currently higher priorities. Networks and clusters are almost equally important in both groups of countries, although this type of action is slightly more prevalent in the CC9 than in the EU15+3.

**Figure 4: Modes of delivery of measures in favour of NTBFs**



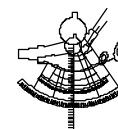
Source : *Calculations of ADE on basis of INBIS summary Trend Chart database of policy measures.*

In terms of the targets of the measures identified, SMEs (67% of all measures), research institutes (57%), universities (53%) and large firms/sectors (46%) were the most common. It is difficult to draw many conclusions from this except perhaps to note that smaller enterprises as opposed to universities or research institutes are the leading targets, which is encouraging from the point of view of promoting greater absorption of research results and stimulating demand for R&D.

Once again, there are significant differences between the EU15+3 group of countries and the CC9 with a stronger regional focus of measures in the former group (15% of measures in the EU15+3

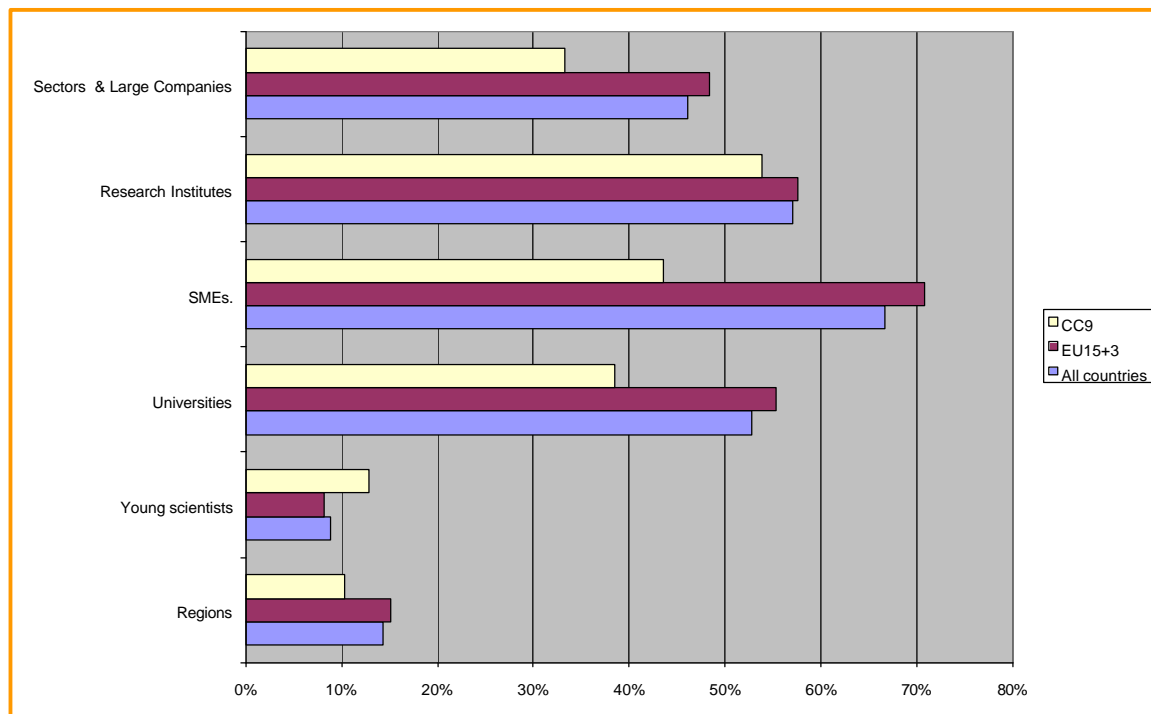
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<http://www.cordis.lu/innovation-policy/studies/>



compared to only 10% in the CC9); while all other categories of targets in the CC9 are significantly less important than the average for all 27 countries.

**Figure 5: Targets of measures in favour of ISRs**



Source : Calculations of ADE on basis of INBIS summary Trend Chart database of policy measures.

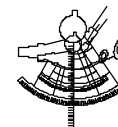
This suggests at a preliminary level that the measures in the CC9 are much more single target type measures while measures in the EU15+3 are open to a broader range of actors in the innovation system. Such as result could be interpreted as being a sign of a greater emphasis on an innovation systems-type approach in the more advanced economies, but such a conclusion would require much more in-depth analysis to be corroborated.

While the categorisation of measures into Action Lines (I.2 mobility and III.4 intensified co-operation between research bodies, universities and industry) gives a first general overview of cross-country trends, a more precise framework is essential for further analysis. A proposed framework for analysis of ISR measures is as follows:

- *Personnel mobility*: reflects the flexibility and a degree of support for research workers, students and teachers to work at the host organisation usually on a temporary basis, in order to diffuse knowledge and know-how;
- *Joint research projects*: joint research projects between various stakeholders, namely research organisations, universities and industry;
- *Formation of university spin-off companies*: has the objective of pushing technologies into the marketplace from the science community and serves as a signal to the business community about the potential of the research institutions;
- *Improving enterprise environment/supporting entrepreneurial ideas*: legislation and regulation including laws and other legal direction affecting either industry or science in ISRs.

**Table 7: Characteristics of ISR related measures/schemes**

## European Trend Chart on Innovation

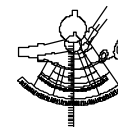


Country	Personnel mobility	Joint research projects	Formation of university spin-off companies	Improving enterprise environment/supporting entrepreneurial ideas
AT	v =	v v +	v +	o
BE	v =	v =	v v =	v =
BG	o	o	o	o
CY	o	o	o	o
CZ	o	o	o	o
DE	v v	v v	v v	o
DK	v =	v +	v =	o =
EE	v +	v +	o	o
ES	v v +	v +	o =	v +
FIN	n.a.	n.a.	v v	n.a.
FR	v v =	v v +	v v =	o =
GR	v =	v +	o	v +
HU	o =	o +	o =	o =
IE	v =	v +	v	v +
IT	v =	o =	o =	v +
LT	o =	o +	o =	o =
LU	o =	v =	o =	o =
LV	o =	o +	o =	o +
NL	o =	v =	o =	v +
PL	o =	o =	o =	o =
PT	v v =	v +	o =	o =
RO	o -	o +	o =	o =
SE	o =	v =	v v =	o =
SK	o =	o =	o =	o =
SO	o	o	o	o
UK	v +	v v +	v v =	v =

Source: Based on *European Trend Chart Country Reports (2002)* and *European Commission, Enterprise Directorate General (2002), University spin-outs in Europe – Overview and good practice.*

Symbols: **n n**: high significance; **n**: important; **o**: less important/missing

A low priority is given to the measures improving enterprise environment/supporting entrepreneurial ideas. The explanation is most likely due to differences in the tradition of technological innovation and entrepreneurship: where there is a lack of culture of entrepreneurship and innovations, the governments rather seek to improve the situation with a set of incentives such as tax reduction on R&D; reduction of tax burden; administrative simplification etc.



## 4. Conclusions

The report has reviewed trends related to two specific means of promoting ISRs, namely: mobility schemes encouraging 'knowledge transfer' through researchers, etc., and various types of funding schemes or other initiatives aimed at stimulating more sustained co-operation between research institutes, universities and enterprises. Overall, there have been few significant changes in the priorities given to these types of measures, with, broadly speaking, mobility schemes being given lower priority than ISR schemes. The analysis suggests however, a significant 'policy sophistication' gap between the current EU member states and the candidate countries. Only Estonia and Romania in the latter group of countries appears to be developing significant new schemes in favour of intensified ISR and mobility, respectively. Very few new measures have been adopted over the 12-month period up to September 2002: only Ireland and Spain have introduced new schemes aimed primarily at mobility; while some 14 new measures have been launched in favour of intensified ISR. Overall, no 'leapfrog' measures have been undertaken in the group of reviewed countries.

### Mobility schemes

Despite access to skilled human resources being often cited as a major constraint for innovation in the enterprise sector, governments appear to have given a relatively low priority to this type of policy measure. Nevertheless some countries, particularly those faced with issues related to the international flow of talent (either the threat of a brain drain or the opposite: the need to attract new skilled human resources) do appear to be trying to develop new methods in this field (e.g. Ireland). Research-industry mobility is still seen as one important method to increase exploitation of public or higher education research results and several member states (e.g. Spain and the UK) are allocating additional resources to this type of measure. However, there seems to be **a debate developing over the need for specific schemes targeting mobility versus more holistic schemes in which the recruitment or subsidising of wage costs of researchers, etc. is one mode of delivery**. In certain countries (e.g. the Netherlands, Flanders in Belgium), the priority given to 'streamlining' policy frameworks has recently led to the discontinuation of mobility schemes which have been absorbed into broader schemes supporting innovation and knowledge transfer to SMEs.

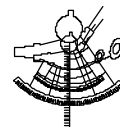
### Intensifying ISR

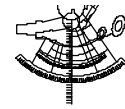
As noted above there have been 14 new measures introduced. However eight of these are in Austria due to a significant reorganisation of the funding system for applied research. The new Greek programme can also be classified as a more traditional applied research funding mechanism. In other countries introducing new measures, there seems to be a greater focus on developing strategic 'consortiums' such as the Technological Attraction Poles at Federal Level in Belgium, or the Flemish Innovation Networks and Walloon Technology Clusters; the Innovation Consortium programme in Denmark similarly appears to promote the concept of broader longer-term partnerships between science and industry as do the MOBI/ARENA (regional consortia of knowledge institutes and firms) programmes in Norway. In the UK, a key action of the Higher Education Innovation Fund, which has been redesigned to create a permanent third stream of funding for universities, is the development of University Innovation Centres. These centres are intended to be top-class long-term research partnerships between major business interests and the university sector.

These new initiatives in addition to existing measures such as the competence centres approach in a number of countries (Austria, Estonia, Hungary, Sweden) or the AIB and Bioregion initiative in Austria or the EXIST programme in Germany may suggest **a shift towards more systemic and longer-term approaches to promoting ISR through sectoral or regionally-based networks of actors; and a move away from shorter-term classic funding programmes for joint industry-academic research**<sup>5</sup>. However, such a conclusion will need to be corroborated by future analysis such as in the framework of a Trend Chart Benchmarking workshop.

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<sup>5</sup> A similar conclusion is reached by the Background paper on policies for the Policy Benchmarking Workshop on "The changing role of public support to academic spin-offs". See [www.cordis.lu/trendchart](http://www.cordis.lu/trendchart)





## Annex 1: Extracts from September 2002 Country Report

### *EU Countries*

#### **Austria**

Austria's EU membership opened up community programmes aiming at increasing mobility, such as LEONARDO, SOKRATES or TEMPUS, for Austrian students. Unlike these European programmes, Impulse Projects (AT 19), FFF Young Researchers Programme (AT 28) and the Young Innovators scheme (AT 17) aimed to initiate contact between students and industry. All three measures have a different target group: while the Impulse Projects promotes post-doctoral workers, the FFF supports undergraduates and the Young Innovators Scheme students at upper secondary schools.

The mobility of university researchers was discussed as part of the reform proposal by the Ministry for Education, Science and Culture, which intends to change the terms of employment for university researchers. This plan is intended to increase the mobility of university researchers between national and international institutions and between the economy and academics. These goals could be achieved by changing the contractual relationship for assistant professors: The latter can no longer become public servants which would give them a status where their employment could not be terminated by the employer. This issue is strongly disputed and has caused strikes at some of the universities.

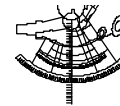
The ongoing efforts to increase spending on R&D will elevate demand for skilled research employees: additional R&D funding needs additional researchers which carry out research and development work. As the supply from the education system is more or less fixed in the short term the Council for Research and Technology Development has allocated EURO7.27 million for a higher endowment of existing mobility grant schemes for Austrian researchers. Special emphasis has been given to create incentives for Austrian researchers abroad to return to Austria. Starting in 2002 a new programme line intends to establish a grant system to attract foreign researchers to Austria.

Intensified relations between research, universities and industry are one of the main goals of the Austrian innovation policy. The most important programme in this field is the k plus programme (AT 23, AT 48) which aims at installing centres where joint research between companies and universities at a pre-competitive stage can be carried out. Two other projects with a similar object are k ind/k net (AT 27) and Tech Gate Vienna (AT 24). The Impulse Polytechnics-Industry project (AT 22) can also be added to programmes of this kind. Contacts between research and industry are also promoted by the Relay Projects Science-Industry (AT 20), the Impulse Projects (AT 19), and the FFF Young Researchers Programme (AT 28).

In April 2002 the BMVIT launched and relaunched a number of programmes addressed at research institution and enterprises:

1. FIT-IT (<http://www.fit-it.at/>), AT54 - Research programme for information technology. This programme concentrates on high-quality research in the area of information and communication technologies. The programme will offer more than EURO10 million within a two-year time-frame. FIT-IT continually searches for topics likely to be an important part of IT future.

As a first topic of FIT-IT, the programme will concentrate on embedded systems research. Embedded systems are not only common in everyday household appliances and electronic tools, they also represent an important and rapidly growing field of IT research. Scientists and engineers from Austrian universities and research institutes have in the past made significant contributions to the field of embedded systems. This strength in research is paralleled by a number of innovative Austrian companies that develop solutions for embedded systems, e.g. in the area of car-related secure real-time embedded systems.



Although funding of FIT-IT research projects is currently restricted to Austrian companies and research institutes, one of the programme goals is to co-operate with initiatives in other countries and on a European level. The programme is very much interested in making contacts with other similar or complementary initiatives.

The first round of project financing stimulated 27 project proposals of which 20 were research oriented. The volume of these proposals amounted to more than EURO21 million; the requested funding was about EURO12 million while the allocated budget for projects funding was EURO3 million. Thus only 25% of the research proposals will receive financing.

2. ASAP - National space programme (AT 55): This programme is intended to fund development work which precedes and supports ESA and bilateral projects. Furthermore it should help to integrate spin-offs in terrestrial applications. Currently EURO7,27 million are allocated to this programme. The national space programme is complemented by the ARTIST programme (AT 57) which aims at establishing broad acceptance and use of satellite navigation systems. EURO2 million will be spent to achieve this objective.

3. Sustainable development (<http://www.nachhaltigwirtschaften.at/english/index.html>), AT 58: This programme is motivated by increasing pressures to reduce the consumption of energy for economic processes in general. Research activities, which receive finance of about EURO40 million are grouped around three topics: Factory of the Future, House of the Future, Energy Systems of the Future.

4. A3 – Austrian Advanced Automotive Technologies (AT 51), ISB - Innovative Rail Systems (AT 52), I2 - Intelligent Infrastructure (AT 53) all focus on intelligent solutions for logistic problems.

The 'A plus B' (academia plus business, AT 47) programme, managed by TIG, tries to stimulate the formation of university spin-off companies. Financial support for the yet to be established university spin-off centres will also be awarded via a competitive tender procedure. Their task will be to help would-be entrepreneurs from project conception to business activities.

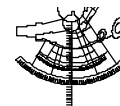
To improve the links between economy and science is one of the most important action lines of the Council for Research and Technology Development. The Council has allocated additional funding for competence centres (AT 23 and AT 27) and has highlighted its priorities for the education system.

## Belgium

The mobility of human resources for innovation and research between the research community and business is the prerogative of the regional governments in Belgium. Differing approaches can be identified between Flanders and Wallonia: the first has chosen to including mobility as an eligible activity within measures targeted at funding innovation projects in SMEs; while the latter has developed a family of separate measures under the FIRST label.

In **Flanders**, a measure (KIV SME Innovation Flanders) previously existed to support the recruitment of researchers in SMEs, who had not yet been engaged in research and development, with the aim of implementing an innovation project. The project had to be proposed in partnership with a research centre. This scheme came to an end in February 2001 and was replaced by the new 'KMO' measures which were intended to provide a simpler more catch-all type funding for SMEs innovation projects (see section 3.2).

In **Wallonia**, the regional administration created, since 1989, a number of targeted mobility schemes each based on the same basic 'FIRST' model but with slightly different objectives or eligibility criteria. Currently three sub-schemes are in operation: FIRST 'Hautes-Ecoles' (**BE 38**); FIRST Spin-off (**BE 37**) and FIRST Europe (**BE 39**). The first of the three schemes is only open to research centres associated to the 'Hautes Ecoles' (third level, non-university, higher education establishments). The other two calls are open to Universities and 'Hautes Ecoles'. The FIRST Europe scheme must be initiated by a



firm with operations in the Objective 1 zone covering the province of Hainaut. The FIRST Europe Scheme is also co-financed under the Objective 2 programme (covering parts of the provinces of Liège, Namur and Luxembourg) and Objective 3 programme covering the rest of the region excluding Hainaut. The creation of a 'FIRST international' extending the scheme to the recruitment of researchers from third countries has been under discussion (with an objective to attract skilled researchers to the region).

Over the period 1999-2001, a total of 207 researchers were funded under the scheme (not including FIRST Enterprise grants). In 2001, 11 grants were awarded for FIRST Spin-off projects (funding of 1.3 MEUR); 8 for FIRST Hautes Ecoles (0.8 MEURO); 11 grants (out of 16 proposals) for FIRST Objective 1 (0.5 MEUR funding, Walloon region co-funding only); 10 grants (out of 12 proposals) for FIRST Europe Objective 3 (0.5 MEURO)<sup>6</sup>.

The government of Brussels-Capital Region has not developed the same range of instruments and only supports recruitment of personnel in companies under a measure (see section 1.4 below) inherited from the federal government (through the process of devolution). The **federal government** provides tax incentives for the hiring of additional technical and research staff but this is covered under section 2.6 below.

All Belgian authorities give a strong emphasis in their policy documents and measures to this priority. The **federal government** launched a new measure 'Technological Attraction Poles' in 2002 (see box below).

The main measures in **Brussels-Capital Region** aimed at supporting greater interaction between universities and enterprises are encapsulated in the new regional Ordinance (see section 0.3) and in particular funding of interface services in the two major universities (ULB and VUB) of the region. The new Ordinance simply provides a legal basis for this funding which has existed for a number of years.

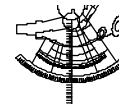
### **New measure: The Technological Attraction Poles (TAP) BE-59**

This new measure supplements the already existing programmes aimed at supporting and increasing the country's scientific potential in vital leading edge domains. The new programme aims specifically at improving the relationship between research and development, and hence at increasing co-operation between universities and specialist sectoral centres, for example. Its purpose is to help to transfer findings from research into the growth domains that fall within the Federal Government's competencies, particularly where the transfer is risky. The TAP programme seeks to strengthen the innovation dynamic by enhancing the research potential developed on a national scale. It centres on the development and use of scientific and technical knowledge in order to devise methods, procedures and tools able to generate innovation in the industrial sector.

More specifically the research project must concern the fields of telecommunications, standardisation or the space sector or more than one of these domains. The objectives are 1) To consolidate the scientific and technical potential of activities relating to these domains; 2) To assist the transfer of knowledge and results of research or, in the case of the space sector, to prove the applicability of space technologies through concrete examples; 3) In the fields of telecommunications and standardisation: promote Belgium's participation in international activities in these domains; in the space sector: support the transfer of knowledge and methods from the domain of space to other domains of application through appropriate research.

The programme is open to university institutions, public scientific establishments and

<sup>6</sup> Annual Report of the DGTRE 2001.



non profit-making research centres. The research proposals should be of a maximum duration of three years and a network needs to be constituted consisting of a maximum of five teams, which must include at least one university establishment and one collective type research centre. The proposal should be launched by all partners together. Networks may be financed up to a maximum of EUR250,000 per partner. This funding may be redistributed within the network according to the role of each of its constituent partners. Each project must designate a coordination team. The coordination team may request a coordination budget not exceeding 2.5% of the total project budget. Further, a group of potential users of the results of the research will form a committee of users. This committee should meet at least twice a year.

As mentioned in section 0.3, the Flemish government approved on 13 September 2002 an act that sets out the support framework for interface activities between the Flemish universities (BE 18). The decree aims at promoting co-operation between Flemish universities and companies, the economic valorisation of academic research and the creation of spin-offs. An annual amount of EURO1.3 million will be at the disposal of the universities for this purpose.

A major change is that the funding period now lasts for five years compared to the system in place since 1998, where the level of support for university interface services was decided annually ad hoc. This created uncertainty in terms of financial planning and prevented the development of new services. With the approval of the act, ad hoc decisions will be replaced by a structural measure from 1 October 2002 onwards<sup>7</sup>. The new act provides sustainable support in order to allow planning and functioning in the long term. Another new aspect is that after five years a thorough evaluation will be conducted. The measure will be managed by the IWT-Vlaanderen.

In Wallonia, funding for university interfaces (**BE 47**) has been provided since 1998 and all Walloon universities receive funding for the hiring of one (for small universities) or two (large universities) supplementary personnel in university-industry interfaces. The funding is provided to cover the salary of experts within the interface personnel in charge of fostering the valorisation of research results in industry. The mission of these additional experts is to help with the writing of business plans and as a follow-up to feasibility analyses of projects for the exploitation of research results. They have to establish contacts with potential industrial partners, and with investors willing to finance these developments. They also advise university staff involved in research funded by the Walloon region of IPR issues.

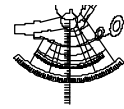
## Denmark

Although in Denmark no new specific measures have been introduced under this heading of mobility of researchers, students and teachers, the further aim is to identify and remove administrative barriers to attract and keep hold of foreign knowledge workers. Under the **Industrial Research-scheme (1970)** students can to obtain their PhD degree through employment as researchers in private companies.

As regards to the intensified collaboration, one new measure was introduced, namely **Innovation Consortiums (2002)**, which aims to strengthen co-operation between companies, research and technological service institutes. More specifically, the companies finance 50% of the total budget, and public co-financing covers the expenses to the research institutions. Approximately EURO13 million has been appropriated for the years 2003-2005.

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<sup>7</sup> The Flemish Science Policy Council (VRWB) issued an **Opinion (n°76 of 13 December 2001) concerns the support for interface activities at Flemish universities**. Overall, the VRWB agrees with the proposed reform of the Interfaces. Critical remarks concern mainly the insufficient budget (EURO1.3 million for 2001-2002), the need to focus the five-year plan and consequently the evaluation of a limited number of actions and clearly defined objectives, the advice to use a distribution key that is not too complex and to avoid development of services at IWT-Vlaanderen that overlap with interface services.



## Finland

Even though the mobility of personnel is considered to be one of the most important mechanisms of knowledge transfer, mobility between Finnish universities and the business sector has been more modest than expected. Thus in its 1996 review, the Science and Technology Policy Council recommended the promotion of expert mobility and the intensification of its monitoring (Science and Technology Policy Council of Finland 1996).

Overall, the mobility of highly educated personnel increased during the 1990s. In 1998, nearly one in four highly educated employees changed job (compared to 17% in 1992). The mobility of educated research personnel was slightly higher, being clearly highest in the ICT sector (Statistics Finland 2001).

According to a recent survey on the significance of measures aimed at increasing personnel mobility between industry and science, the most significant factors have been long-term relations between companies and universities in graduate mobility, co-operation in graduate education between universities and industry (e.g. joint supervision of doctoral and master's theses), and coordinating structures for considering the requirements of industry in university education programmes. Additionally, many doctoral and master's theses have been funded by industry in Finland.

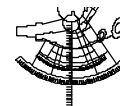
The research exchange between the public and private sectors is still minor. Besides a lack of effective programmes for the promotion of mobility, the major limiting factor is said to be disparity in earnings (Kangaspunta 2001). The latter factor does not encourage company experts to move to the public sector. There are also factors that discourage researchers from creating new start-ups. In addition to financial risks, the founder may lose his/her professional reputation should the business fail.

Close co-operation between companies, research organisations and universities is considered a specific strength of the Finnish system of innovation. The single most important ongoing activity within this field has been Tekes' national technology programmes (FI 12). The technology programmes aim to gain new technology expertise and product development options in the important business areas of the future. The programmes also offer good frameworks for international R&D co-operation.

The technology programmes are demand-oriented in the sense that they have been planned with the needs of companies in mind, and have been implemented in collaboration with companies. The planning takes place in workgroups and seminars involving firms, universities and research organisations, and the explicit aim of the programmes has been to promote collaboration between these parties. Each programme has a steering group, a coordinator and a representative from Tekes. Universities of technology and the Technical Research Centre of Finland (VTT) have led most of the programmes. The duration of the programmes ranges from three to five years and their average volume ranges from EURO5 to hundreds of millions of euros. Tekes usually finances about half the costs of the programme. The programmes have also functioned as good frameworks for international R&D co-operation, e.g. within the EU's framework programmes.

Many of the completed programmes have been assessed by foreign evaluators. The main benefits lay in the close co-operation between research institutes and the industry, the widespread involvement of small- and medium-sized companies, and a high level of international co-operation. In some cases technology programmes have been criticised for being too technology-oriented and too fragmented, and not allowing room for unconventional approaches (Tuomaala et al. 2001)

Apart from Tekes' ongoing technology programmes, the cluster programmes (FI 8) represent a significant public support for collaboration. The cluster programmes have aimed to support R&D that strengthens industrial clusters by promoting co-operation in certain industrial fields, or around certain themes. According to the evaluation published in December 2000, there are some signs of success, although it is too early to project any final results (Prihti et al. 2000).



Moreover, there are various initiatives and schemes that concern the establishment of framework conditions conducive to innovation at regional level, most notably the Centre of Expertise Programme (FI 05; see Chapter 3). Part of the R&D funds channelled e.g. through the TE centres (FI 13) finance co-operative R&D projects. The EU's Structural Funds, in particular the Objective 2 RTDI funds and measures, also play an important role since they are typically integrated into regional projects of domestic origin.

## France

Although there are no new measures related to this action line in the relevant period, the measures introduced by the government before related to this subject are still in use (FR 3, FR 6, FR 7, FR 14, FR 31). Moreover, the Ministry of Research continues to simplify access to these measures at regional level. In most of the regions, these measures are part of the pluri-annual contract between the regions and the state (CPER).

Besides these measures, the innovation law allows, encourages and favours the creation of innovative enterprise by all research actors<sup>8</sup>. Some of the requirements for co-operation with enterprises for research personnel are as follows:

- The enterprise should valorise the research results
- The researcher should keep in touch with the public service
- The researcher would join the enterprise as a partner or as the director
- A contract must be concluded

The researcher needs to ask for a written authorisation, before the enterprise is registered. This authorisation is given for two years, renewable twice. It is interesting to observe that this authorisation cannot be rejected, except for exceptional cases and for reasons related to the respect of moral and material interests of the public service.

Once the authorisation is given there are several possibilities offered to the researcher:

- The researcher may be on secondment: the salary is paid by the enterprise
- The researcher may be a delegate: the salary is paid by the original organisation
- The researcher may be a delegate for a research valorisation organisation (if the enterprise is not created)

At the end of the six-year period the researcher can continue to work for the company. In that case they need to end their association with the organisation of origin or go back to their organisation of origin. It is important to observe that at any time during this six years the researcher can change their status within the company or end their link with the company and go back to their original organisation.

Although only one possibility for this type of mobility was here analysed, there are other ways of research and enterprise co-operation that go along the same lines above described:

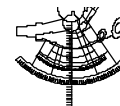
- The researcher leaves for a company already created
- The researcher can carry out a consulting activity in a company
- The researcher can participate to up to 15% of the social capital of an enterprise
- The researcher can participate to the supervisory board of a public limited company

Co-operation between research, universities and companies is one of the main priorities of the French government. All of the measures explaining the importance given by the government to the subject have been studied before: **RRITs** (FR 17), the **CNRTs** (FR 29), the **incubator structures** (FR 12), the **seed-capital funds** (FR 13) and the project of **Technological Platforms**.

Another important issue is the development of **SAIC (Services d'activités industrielles et commerciales – Industry and trade activitie services)**. The 1999 Law planned this option for a

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<sup>8</sup> Innovation Research University Enterprise, New Possibilities for the research personnel co-operation with enterprises. Practical Guide. Ministry of National Education, Research and Technology.



university or a higher education institute to create SAICs in order to structure and manage all their activities of research valorisation. All the industrial and trade activities of HEI can be managed by SAIC except training activities. The three first decrees concerning SAIC's organisation were published in 2002. A fourth one about the human resources recruited outside the permanent HEI staff statute will be published soon.

At European level, France plays an important role in the Eureka programme. During the last Ministerial Eureka conference, France was placed first for the initiation of 25 projects for a total of EURO80 million. French public financing was also important:

- The ANVAR assists 25 projects for a total of EURO12 million;
- The Ministry of Research has provided EURO2 million for five projects;
- The MINEFI has financed projects for a total of EURO5.2 million.

## Germany

In Germany, the Federal Government announced the **Emergency Programme** (2000), in order to address the shortage of IT specialists. This programme facilitates the entry of top IT specialists from abroad. In the first phase, up to 20,000 IT specialists could find jobs in German host companies. However, as a consequence of current economic recession the demand for such specialists has considerably declined.

Another governmental programme is **ProInno** (1999), which supports the exchange of research personnel between industry and public research institutions. Also, a special action is being taken in East German SMEs to support to stimulate an uptake of R&D and innovation in the new Länder. In the scope of the **Innovation Assistant** programme financial support is provided for SMEs that employ graduates in the course of developing an innovation project. It should be emphasised here that all Länder run separate exchange and mobility programmes. Some of them are called the Innovation Assistant.

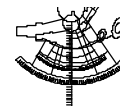
With the new **Action Programme on Knowledge Creates Markets** (2001) several measures have been designed and implemented to strengthen existing linkages between industry and science and ease the transfer of new technologies and know-how. The most recent development was marked with the launch of the new programme on **Strengthening Commercialisation Offensive** (2001) by improving the commercialisation of research findings of Higher Education Institutes (HEIs) and public sector research establishments (PSREs).

The following three programmes also focus on intensifying co-operation between public research institutions and private business sector. The **InnoNet programme** (2001) encourages undertaking collaborative research projects which have to involve at least four SMEs and two public research organisations. Another important sources of knowledge are the **Universities of Applied Sciences** (1992). The main objectives of the Federal Ministry for Education and Research are to increase the inclusion of these universities in the project grants and support the universities' research personnel.

Finally, the co-operation between industry and science is channelled through some other R&D promotion programmes. For example, the so-called **IGF** programme offers direct grants for R&D projects which are carried out jointly by companies operating in the same field of sector and/or technology. According to the Trend Chart database the envisaged expenditure is approximately EURO87 million in 2000 (reduction with comparison with 1999).

## Greece

Mobility remains low in Greece but there are schemes aiming at improving it. Mobility was in the past served through the YPER [GR 11] programme. Mobility is partly served by European programmes and partly by the university placement programmes. Overall the number of schemes and budgets indicates that compared to other countries it remains a lower priority in the Greek agenda. The YPER targets are now taken over by PENED [GR 41]. Mobility between industry and academia is assured directly by a student placement programme [GR 38] but also indirectly through networking activities such as R&T



consortia [GR 55]. Greece, a country known for a large scientific diaspora, promotes also transborder mobility. A less successful past scheme was substituted by the ENTER Programme in 2001 [GR 44] which is operational. This programme aims at attracting qualified researchers from abroad with the following main goals:

- The transfer of R&T information and know-how from abroad to the Greek research units or vice versa, in issues crucial for the development of their activities;
- Networking Greek research teams with corresponding foreign partners.

The programme is open for proposals. Fifty-one proposals were submitted, while 15 have been accepted with a total budget of EURO10.7 million.

International mobility is supported through bilateral agreements. Five new or renewed international collaboration agreements were signed in this period with Turkey, Hungary, UK, Slovenia, Czech Republic, China and France.

Greece has a limited culture of research organisations and industry. The last decade was marked by an effort to create such a culture, initially with smaller, less ambitious programmes and then through the EKVAN [GR 16], which was the basis for the currently launched Research and Technological Development Consortia in Sectors of National Priority [GR 55].

A new call for the support Liaison Offices [GR 10] is expected soon. The programmes Supporting entrepreneurial ideas through tertiary education structures [GR 53], AKMON [GR 43], Excellence in the GSRT supervised research centres and institutes [GR 49] and PENED [GR 41] launched by the GSRT in the framework of the Operational Programme 'Competitiveness' aim *inter alia* at reinforcing co-operation between research, universities and companies. This will be accomplished through the necessary condition of being a company (user) co-financer in the projects.

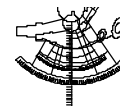
## Ireland

In Ireland, the mobility of students, research workers and teachers has been encouraged with two recent initiatives introduced by the cross-border trade and business development body (InterTrade Ireland). One of the initiatives is called **Fusion** (1989) and aims at bringing together three parties from a company, a knowledge centre and a graduate from the college/university. In brief, the graduate acts as a driving force or knowledge carrier facilitating the transfer of knowledge from the college/university to the company concerned. The **Focus initiative** (1989) is targeted at SMEs that would like to develop new business opportunities. The goal is to identify real market opportunities and deliver actual sales on the cross-border basis. The project will involve 20 companies and 20 graduates.

In short, public measures seek through research collaborations to help firms to access appropriate technologies, use them effectively and develop partnerships that enhance their capability and competitiveness. Under the RTI Collaboration (responsibility of the Office of Science and Technology) some measures have been undertaken, within the 2000-2006 National Development Plan. The **Research Innovation Fund** is targeted at research ideas with commercial potential that arise from the carried out research. The scheme is established to encourage scientists to become engaged in research projects which may lead to new products, processes and services in strategic technologies. **Innovation Partnerships** which provide with grants for researchers in higher education to undertake R&D projects in collaboration with one or more industry partners.

## Italy

In Italy, the implementation of the objective on the mobility of students, research workers and teachers began with the adoption of the **Law n°196 of the 24<sup>th</sup> of June 1997**. However, it has not been recently reported that new measures have been taken under this action line. The lack of new initiative on intensified co-operation between science and industry can also be noted.



The D.L. 297/1999 represents an important innovation in this field: it covers all MIUR interventions concerning the coordination, promotion and implementation of measures aimed at sustaining research and innovation in industry by means of a unique fund which absorbs all the previous ones (MURST Decree 8 August 2000, Official Journal n.14 18 January 2001) [IT-36].

## Luxembourg

At the present time<sup>9</sup>, the absence of complete university master's degrees in Luxembourg puts students in the position of having to continue their studies abroad. Due to this forced mobility as well as because of the immediate economic interest, higher education policy has mainly focused on higher postgraduate courses which constitute a direct link towards (public) research. Thus, the majority of public research centres (PRC) co-operate within higher education establishments:

The PRC Gabriel Lippmann is attached to the University Centre, the PRC Henri Tudor is attached to the Higher Institute of Technology (Institut Supérieur de Technologie) (IST) and the PRC-Health operates in close contact with the Luxembourg Central Hospital (Centre Hospitalier de Luxembourg (CHL)).

At this level, postgraduate degrees are most often awarded in collaboration with well-known foreign establishments. In addition, research work associated with these degrees also implies transnational collaboration. It can therefore be reasonably considered that the mobility of researchers is, to a large extent, ensured.

Research training grants of the Ministry of Culture, Higher Education and Research allow students and companies to be put in touch and the scientific interests and research of the former to be directed towards the very technological needs of the latter. These grants are awarded for a maximum period of three years to Luxembourg or foreign scientists or technicians to enable them to complete their doctorate (or post-doctorate work) or to collaborate in an R&D project. Research can be carried out at a university or a research centre abroad, in a PRC in Luxembourg or in a company based in Luxembourg (**LU 7**).

So far the promotion of student reception in companies within the framework of the Leonardo da Vinci community programme for student mobility has given rise to a certain amount of interest within Luxembourg companies.

The foundations of this co-operation were laid with the 1987 law on research in the public sector and technology transfer to private companies, which took shape through PRCs' co-operative projects with private companies. It is expected that the approach of poles of technological competence will help to strengthen links between PRCs and companies.

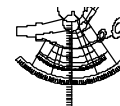
The law of 9 March 1987 on R&D lays down conditions for the setting up of public research centres within public organisations or public higher and university education centres. PRCs are responsible for undertaking research as well as technological development and transfer activities aimed at promoting scientific progress or technological innovation. Their aim is also to promote, on a national and international level, the transfer of technologies and scientific and technical co-operation between Luxembourg or foreign PRCs and companies. They can undertake R&D and technological transfer activities in fields covered by higher education in Luxembourg. At present, there are three PRCs: PRC Gabriel Lippmann, PRC Henri Tudor and PRC-Health.

The PRC Gabriel Lippmann was set with the ordinance of 31 July 1987 and is qualified to operate in the following fields: Material analysis, environmental technology and biotechnology, information technology, economic and social aspects of today's world.

The PRC Henri Tudor was set with the ordinance of 31 July 1987 and is divided up into service groups, resource groups and laboratories:

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<sup>9</sup> See changes foreseen in above section 1.1.



- Activity poles: information and communication technology; industrial technology; environmental technology.
- Service groups: SITEC, continuing education centre; data communication services in co-operation with Restena; Technology Watch Centre, which includes the library jointly shared with IST and the technology watch centre.
- Resource groups: Technological Resource Centre for the manufacturing industry; Technological Resource Centre for the Disabled and Elderly; Technological Resource Centre for Health; Multimedia Resource Centre; Building Information Technology Resource Centre.
- Laboratories: Production Systems Automation; Biomedical and Image Processing; Software Engineering; Applied Micro-Electronics; Multimedia Engineering.

The PRC-Health was set up with the ordinance of 18 April 1988. It is responsible for undertaking and coordinating research, development and technological transfer activities aimed at promoting, nationally and at an international level, scientific progress and technological innovation in fields relating to the various departments of the National Health Laboratory and the CHL. It is also responsible for development, research and technological transfer in all fields of medical science, including the promotion of public health, treatments, prevention of human diseases, virology, immunology and cancer research. This has allowed the promotion of an effective and essential collaboration with research organisations in the private and public sectors as well as on a national and international level.

Within the context of their attributions in matters of technology transfer, the PRC also organise specialist training courses, creating tools for information, sensitisation and documentation in the subjects in which they specialise.

## The Netherlands

In the Netherlands, one of the new knowledge transfer facilities is a programme on **Knowledge Transfer Entrepreneurs SMEs** (2001). More accurately, it is intended to stimulate SMEs in the adoption of technologies that already exist but are new to companies. Since the early 1990s the collaboration between science and industry has been one of the priorities on policy agendas and several initiatives have been adopted. One of them concerns the **Leading Technological Institutes** and aims at bringing together existing knowledge and resources in a particular field of technology (1998). Also, the foresight study on education and research (Ministry of Education, Culture and Science, 2001) proposed a more demand-driven funding of universities as one of the solutions to promote the development of the knowledge economy.

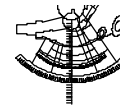
## Portugal

The need to promote people mobility and to improve the linkages between universities and industry has been addressed by several operational programmes in education; employment, training and social development; POE; POSI and POCTI. In 2001 a new regulation on the integration of doctors and masters in companies and technology centres was published (PT 22) under POCTI, with an aim to improve companies' in-house capabilities. The mobility issue was also included in PROINOV through the action line 'Enhancing education and training'.

In the period under review, the main development in this regard was the intention to launch the QUADROS programme and the creation of R&D groups in companies. QUADROS is, to an extent, in the vein of the old programme on 'Jovens Técnicas para a Indústria – JTI' (Young technicians for Industry). It will provide support for SMEs to recruit youngsters with a degree in scientific, engineering, economics and management. The long-awaited diploma on the creation of R&D groups in companies<sup>10</sup> is about to be published. It will be placed in the context of the IDEIA programme and is aimed at creating in Portuguese companies small teams (of up to three people) exclusively concerned with technology development activities.

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<sup>10</sup> See, Simões, Vitor Corado, *Monitoring, updating and dissemination developments in innovation and technology diffusion in the member states – The TREND CHART: Portugal*, Covering period May-September 2001, October 2001



This continues to be a key topic in the political discourse on innovation. The operational programmes for 2000-2006 (POE, POCTI and POSI) include several actions for promoting co-operation between universities and industry. The main initiative taken in this field before September 2001 was the POCTI/POSI measure on R&D activities by consortia (PT 21). Although with less relevance, the measure for supporting the dynamisation of technology, training and quality systems – MTTQS (PT 20) – was also aimed at promoting co-operation, through the support of pre-competitive research projects between technology organisation and business enterprises. The Innovation Journeys, organised by the Innovation Agency and held in late 2001, enabled to present to the general public the results of 120 consortia projects supported by the Agency which had already reached prototype phase.

In the period under review several measures were taken to promote university-industry co-operation. Some are of a more indirect nature, such as the PME Digital Initiative (PT 27), the creation of the Industrial Property Support Offices – GAPI (PT 26) or even the revision of SIME (PT 16). Others are regional, focused on encouraging co-operation at regional level, namely the launching of the regional programmes on innovation actions LISACTION (PT 28) and LISAlgarve (PT 29). The most relevant was, however, the POE mobilising projects for technological development (PT 23). As mentioned above and in our last report<sup>11</sup>, this measure provides incentives for the setting up of consortia between S&T organisations and companies to carry out projects focused on the development of innovative products, processes or systems. The projects supported should have a multisectoral impact and may raise partial, specific projects to be carried out by companies, through the pooling of complementary capabilities.

The recent PPCE programme includes two topics dealing with the S&T co-operation issue. The first concerns the reorientation of public laboratories supervised by the Ministry for the Economy to undertake applied research addressing the needs of industrial fabric as well as providing, together with technological centres, technological support to companies (IV. 2). This is intended to strengthen the role of technology diffusion by public laboratories, thereby increasing the links between them and industrial companies. Closer relationships are expected to foster trust and give rise to co-operative development projects. The second is the support to 'applied research projects, involving universities, public research institutions and companies, aimed at creating new products and patents' (V. 5).

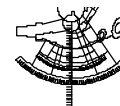
The last topic was translated into the IDEIA – *Investigação e Desenvolvimento Empresarial Aplicado* (Applied Research and Development in Companies) programme. As indicated in 3.2. above, it is addressed to generate bridges between S&T organisations and companies or, in other words, to promote the fit between R&D supply and demand. More specifically, it will support the research and development activities of company-led consortia involving at least one firm and one S&T organisation. The rationale behind the programme is the promotion of technology transfer to industrial companies, as well as the transformation of R&D efforts into new products, processes or services. Eligible projects should involve a minimum expenditure of EURO75,000 and a maximum duration of three years; projects below EURO100,000 will be granted non-reimbursable incentives, while those above that amount will benefit from reimbursable grants. The merits of projects will be evaluated on the basis of three criteria: project coherence, impact on the companies involved (competitiveness, foreign market penetration, innovation capacities), and indirect impacts on product technology development and diffusion of co-operative relationships. It is still to be seen how IDEIA will be implemented, and how it will be articulated with the other measures on R&D consortia already in place (the POCT/POSI R&D activities by consortia and the POE mobilising projects for technological development).

## Spain

The importance of Human Capital on Research is one of the main strategic objectives of the government of this period (since the implementation of the *IV National Plan for Scientific Research, Technological Development and Innovation 2000-2003*). The MICYT has manifested in this period its

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<sup>11</sup> Simões, Vitor Corado *Monitoring, updating and dissemination developments in innovation and technology diffusion in the member states – The TREND CHART: Portugal, Covering period March 2002, April 2002.*



commitment to improve labour conditions and mobility of researchers and RTD personnel, with the general aim of favouring the transfer of knowledge and increasing the number of RTD personnel. Thus, through the IV National RTD Plan some new measures have been launched, and traditional schemes have been improved.

Accompanying the Ministry's goals the new Law of Universities, which gives particular attention to human resources and foresees the creation of new university RTD professional profiles. The new Law encourages:

- - mobility of researchers;
- - engagement of professors to carry out mainly research activities;
- - hiring technicians to support research in university departments;
- - settlement of mixed centres among universities, public and private research centres and firms;
- - start-up of new technology-based firms from university research activities.

In addition, some changes are expected in the professors' categories and recruitment process. Two key programmes are relevant: the **Ramón y Cajal Programme** (ES 25) and the **Torres Quevedo Programme** (ES 30).

The **Ramón y Cajal Programme** (ES 25), launched in 2001, is aimed at the permanent insertion of researchers into the Spanish research system. This programme is the response to research community claims about the lack of job opportunities in the national public research system. The programme co-finances the cost of researchers contracts in a Public Research Institution (RTO and universities) for five years. It is a reform of a previous measure based on a three-year return-grant system for Spanish researchers who had developed their RTD training out of Spain. The new measure extends the coverage of contracts (up to five years) and reinforces the commitment between research institutions and researchers.

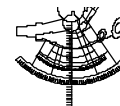
On the other hand, the **Torres Quevedo Programme** (ES 30) is aimed at the insertion of doctoral candidates into firms. This programme is the re-formulation of the former IDE Action (ES 2), running from 1997 to 2001, with the main objective of promoting innovation in firms through the placement of PhDs. The programme's main goal is to transfer research results from R&D and innovation centres to enterprises through the mobility of PhDs and skilled personnel.

The **Research Personnel Training Grants** and the **University Professors Training Grants** are traditional schemes under the IV National RTD Plan. Both grants systems have been present for a long time in the RTD political instruments, but since 2001 some improvements have been added. For instance, the grant amounts have been increased after several static years.

On the other hand, the MCYT has introduced some modifications favouring the flexibility and mobility of researchers working in public research organisations attached to the MCYT. These modifications, approved in the framework of the Draft Law of Fiscal, Administrative and Social Measures, allow the mobility of researchers among different public research organisations as well as their mobility among enterprises, by having their original employment assured for four years. In the same direction, an amendment to the Science Law allow public research organisations to operate in a more flexible way, permitting greater co-operation fields and modalities between them and companies.

The strengthening of the Science-Technology-Enterprise system and the interactions between research providers and companies is one of the most notable targets of the Spanish innovation policy. The IV NP foresees mechanisms to reinforce co-operation and reduce obstacles to the formation of alliances and co-operation networks.

It is worth mentioning an indirect instrument to foster co-operation between research centres, universities and firms, that supports the interface units (Technology Transfer Offices, OTRIs) allocated in public research institutions or non-profit research bodies (**ES 10**). Although this is an old instrument, it is still in force. Furthermore, the IV NP intends to reinforce the role of these units, which form part of the S-T-E system. They channel firms' technological demands to the public system and facilitate technology knowledge transfer between the agents of the S-T-E system.



The PETRI Programme (ES 7), that stimulates technology and knowledge transfer from universities and public research bodies to enterprises, is continuously running.

In 2001, a new call of the PROFIT programme (**ES 17**) devoted to increase technological innovation performance within firms was launched. In this programme, although it is not a co-operative mechanism, different means of participation to facilitate co-operation among public research bodies and enterprises, are envisaged.

Some new measures were implemented in 2001. One of these is the **PIIC scheme: concerted industrial research projects (ES 24)**. Managed by the CDTI (Centre for Industrial Technological Development), an agency of the Ministry of Science and Technology, PIIC unifies two measures running in the previous National Plan for R&D&I: co-operative projects and concerted projects (ES 8). PIIC aims to finance pre-competitive research initiatives, with high technical risk and non-immediately-marketable results. Projects must be presented by industrial companies and developed in collaboration with universities, research centres and/or technology centres.

The other new measure for fostering co-operation between science and companies was launched at the end of 2000 to promote **Scientific and Technological Parks (ES 23)**, mainly aimed at helping promoting entities inside universities or public research institutions to design scientific and technological co-operative spaces. This mechanism was updated in 2001 and 2002.

## Sweden

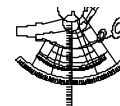
In Sweden, the primary objective is not to promote mobility but to increase the number of researchers within areas of strategic importance to Swedish industry. One of the examples is **building competence centres** (1995), a joint venture between universities, industrial firms and research institutes. Currently, enterprises and research organisations from both sides of Öresund region work together work in a **R&D project**. The collaboration between expertise and R&D-resources will strengthen the industrial competitiveness of the region.

## United Kingdom

In the United Kingdom, policy attention is focused on encouraging the development of linkages between industry and science, generally through collaborative projects. Although not directly influencing mobility of researchers, the implementation of the **Directive on contract research staff** (implementation as of October 2002) into UK law is most likely to have a positive impact on the supply of researchers. The issue concerns the modifications of contracts for researchers. Prior to the adoption of new law researchers had been employed on 'term contracts' and did not enjoy the same benefits and rights as permanent researchers.

In the framework of **HEIF** (Higher Education Innovation Fund, 2001), over 70 universities were supported in a range of activities such as the employment of specialists; establishing business incubators; improving the IP infrastructure and providing enterprise training staff. With regard to establishing the new centres, the range of funding will be provided. Furthermore, the DTI (Department of Trade and Industry) has announced that it intends to continue funding a new set of collaborations between industry and the universities with its established **Link** programme. The new focus of this programme is towards basic technology that can be commercially exploited through technology transfer in areas of superconductivity, photonics, nanotechnology, data storage and several power-saving technology areas.

In the scope of the **PSRE Fund** some EURO16 million was awarded, and of this total EURO6.3 million was used, in order to establish a seed fund. Finally, one of the transfer schemes on **Realising our Potential Award** ceased its activities. The reason behind this decision was partially not meeting the set objectives.



## ***Associated countries***

### **Israel**

MAGNETON (little MAGNET) is a sub programme of MAGNET (IL 5), a programme promoting 'Generic Pre-Competitive Technologies and R&D'. While activity in MAGNET is organised through consortia of several industrial companies and academic units, in MAGNETON a one-to-one connection is sufficient. The direct object is to facilitate co-operation between research, universities and companies.

In 2002 a new programme, NOFAR, made its first step in the framework of MAGNET for promoting initial applied research in the life sciences by industry and the universities. The programme is designed to support applied academic research in biotechnology in order to promote the transfer of that technology to industry.

Grants are up to 90% of the approved expenses; there are no royalty payments.

### **Norway**

There are at the moment no new measures targeting the mobility of students, research workers or teachers. One reason for this may be that policy-makers are uncertain whether there is a need for new measures in this field. Some statistics indicate a rather high mobility rate for people with a high formal education.

The major problem is not to move researchers from the universities and colleges into society, but to keep them in the institutions. This is why the government has announced that it will implement new measures in order to secure the recruitment of new permanent scientists in the public research institutions.

In order to ensure a sufficient number of new doctoral candidates, the government aims to establish 1600 new doctorate positions by 2007.

The Research Council of Norway has appointed a new Commission with members from universities, research institutes, industry and the public sector. The commission, called KomInn ('come in!'), is to assess possibilities for increased mobility of researchers from other countries to Norway. It will make two surveys of factors encouraging foreign researchers to apply for research positions in Norway.

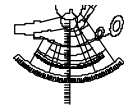
Among policy actions that may be considered are the use of centres of excellence, tax agreements with other states, salary improvements, international calls for positions, awards, measures targeting researchers' families, promotion of Norwegian research abroad, adjustments of immigration laws and more. The Commission will present its recommendations in the spring of 2003.<sup>12</sup>

The public user-oriented R&D programmes are to strengthen the collaboration between firms and universities, colleges and R&D institutes (NO 02). The NT-programme (NO 03) is to develop networks between companies and knowledge institutions, and so is FORNY (NO 11), TEFT (NO 12), and MOBI (NO 30), including ARENA (NO 32).

On April 19 2002 the new government presented a proposal regarding changes in the law of intellectual property rights to parliament. The proposal was based on the Bernt Commission's green paper on the commercialisation of results from university and college research (published in March 2001). Professor Jan Fridthjof Bernt of the University of Bergen led the commission. The commission felt that commercialisation should be considered an integrated part of the institutions' duty to disseminate knowledge.

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<sup>12</sup> For more information, contact Lena Cecilie Endresen in the Research Council of Norway: [Ice@forskningsradet.no](mailto:Ice@forskningsradet.no)



The majority of the commission believed that researchers ought to retain the full property rights of an invention (as it is today). It was argued that this is necessary in order to defend the freedom of scientific research. A minority would like to transfer this right to the institution. They argued that the institution needs these rights in order to promote commercialisation in an efficient way.

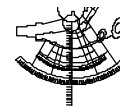
The whole commission held that the income following from such commercialisation should be split between the researcher, the institution and the research units. Commercialisation can be strengthened by the use of various incentives, practical organisational changes and information on the importance of such activities. The commission argued that the institutions should develop relevant strategies and establish 'innovation centres' with professional advisers, internally or externally. A summary of the report can be found in the Norwegian Trend Chart Report for June 2001.

In its proposal to Parliament the new government argued that universities and colleges should be more involved in the commercialisation of R&D results, especially in the form of patents, so that society gets more out of its investments. The law is to be changed so that universities and colleges may claim the right to exploit inventions made by teachers and researchers commercially.

To secure the researchers' right to diffuse their knowledge, teachers and scientific personnel employed by these institutions will have the right to publish their findings, even if this may stop the institution from commercialising the invention. The researchers must inform the institution if they believe they have made an invention that can be patented. In order to stop the institution from taking over the intellectual property right, the researcher must make use of his or her right to publish the results within one year after the institution was informed.

Incomes from the commercialisation of inventions are to be divided between the institution and the researcher. The law does not say anything about percentages or on how the institution is to spend its part of the income.

When the research project is to be financed by external sources, a contract must be set up between the financiers, the institution and the researcher regarding the intellectual property rights before the research project starts.



## **Candidate Countries**

### **Bulgaria**

The governmental programme included some measures which might contribute to the mobility of students:

- Provide stimulus for independent student work and creating conditions for a more effective educational process;
- Align the educational process and scientific activity of young people to market needs;
- Creating conditions for practical training and for gaining of professional experience by summer work (apprenticeship);
- Creating conditions for post-graduate education;
- Developing a system for start-ups of small technological firms by senior students.

The main hamper for the mobility of research workers and teachers is the high rate of unemployment. Bulgaria's national unemployment averages around 17%. In addition to this, the Ministry of Education co-finances 50% of the projects, in the framework of the Co-operative Research Programme but this is not effective. In January 2002, the Ministry of Education launched, within the industry section of technology and innovations, a web page titled 'Intellectual exchange'. It is aimed to further the development of contacts between inventors, business and investors and is directed at product and technology innovation of industrial production.

### **Cyprus**

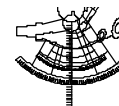
The following programmes support, mainly indirectly, mobility of research workers, students, and teachers in Cyprus:

- The **Common Programme for Scientific and Technological Co-operation** (2000-2002), is still implemented, and finances the exchange of scientists from the two countries. HEIs, research centres, enterprises and organisations from the public and private sector involved in R&D projects were eligible to submit proposals.
- Cyprus' connection with the **European Research and Academic Network QUANTUM/QMED**, the COST Programme for research co-operation in Europe, as well as the EUREK? programme, promote researchers' mobility.
- Within the framework of IAESTE (International Association for Exchange of Students for Technical Experience) Cyprus secures industrial placements abroad, for a number of **higher technical institute students** during the summer vacations.
- The programme **Students in Research - MERA** awards educational travel in a research centre in Greece to high school students.

The creation of the new Centre for Technology Research and Development to carry out applied research and development in specific high-tech fields, is being created after collaboration between the Ministry of Commerce, Industry and Tourism and the University of Cyprus. It is expected to further promote the co-operation between research, universities and companies.

The fourth call of the 'Annual Programme of Financing of Research Projects' as well as the 2001 PENEK Programme established the participation of the final user, guaranteeing greater exploitation of the results and allowing the participation of more companies in the process [CY 3 and CY 20]. The 'Common Programme for Scientific and Technological Co-operation of Cyprus and Greece 2000-2002' of the RPF and the GSRT gave, also, incentives for the participation of companies able to exploit the research results [CY 21].

### **Czech Republic**



One of the government's short-term priorities is to support development programmes facilitating mobility of students and academic staff from the tertiary sector.

In accordance with the implementation of the Bologna and Sorbonne Declarations and the creation of the Common European Higher Education Space, development programmes have been elaborated to facilitate the mobility of students and academic staff from the Czech tertiary sector. In this fashion, the government will adhere to the fundamental principle of the Bologna Declaration, removing barriers and supporting the mobility of students and academic staff, as well as to the basic EC strategy documents.

Nevertheless, should universities become fully involved in the development of the Common European Higher Education Space and be equal partners of EU institutions, they will need to be provided with support in the development of study programmes in foreign languages, which will further open them to foreign students. It is also necessary to financially support Czech students so that they are provided with opportunities to spend at least part of their studies abroad.

No measures have been introduced under this action line within the relevant period. However, the government continues to view this area as an important focus for policy.

## **Organisation for Promotion Energy Technologies (OPET Czech Republic)**

The OPET Network is an initiative of the European Commission, which aims to disseminate information on, and promote the benefits of, new innovative energy technologies. The OPET network includes more than 50 centres in Europe and Asia. The OPET Network is supported by the Enterprise Directorate-General, under the [INNOVATION Programme](#), in collaboration with the Energy Directorate-General, under the demonstration component of the [JOULE-THERMIE Programme](#).

OPET (Organisation for Promotion Energy Technologies) Czech Republic co-operates with SMEs, industrial companies, regional authorities and research organisations to promote innovative energy technologies, particularly in the areas of renewable energy sources, rational use of energy in industry, buildings and transport, solid fuels and hydrocarbons. Main OPET activities are:

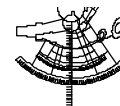
- the elaboration of a strategy of energy savings;
- energy audits (non-nuclear energy);
- transnational technology transfer of innovative energy technologies;
- information on energy-oriented programmes of the European Commission;
- initiation of co-operation between Czech companies and Research, Development and Technology (RTD) institutions and their European counterparts.

The web page [www.czechrtd.info](http://www.czechrtd.info) aims to provide information of the Czech RTD landscape, in particular to those researchers who work outside the Czech Republic but want to find a partner there. The main focus is on activities developed to foster the European Research Area and the Sixth Framework programme of the EU. Web pages are maintained by the Czech National Contact Organisation for the EU Framework Programmes, which is hosted by the Technology Centre of the Academy of Sciences of the Czech Republic.

## **Estonia**

The mobility of students, research workers and teachers is mainly due to their own initiative as there are very few programmes that include the mobility of personnel. There are some centres to help students to go to study abroad like the Archimedes Foundation and CIMO (Centre for International Mobility) in Finland. On the research level the exchange tends to be made through personal contacts.

The new scheme called 'The Competence' is intended to fill research vacancies in the enterprises. The objective of the programme foresees the encouragement of enterprises to hire researchers to work with their development projects.



Tartu Science Park was formed in close co-operation with IT and telecommunication enterprises. A Information and Communication Centre (started in early 2001) is also located at the site, allowing students interested in product development to gain practical experience in addition to their regular university curricula. This is done through workshops, study visits to enterprises, briefings on new technologies and enterprises sharing their experience (including experience from successful student start-ups). As a first major initiative the Park launched, together with private sector firms, a contest for business ideas and plans among students for developing new mobile technology applications. The aim was to encourage creativity, highlight the importance of teamwork and enable ideas formed in an academic atmosphere to be implemented first on paper and later in working life. The Centre sometimes also helps to bring together enterprises looking for qualified labour and students seeking contacts for future career planning.

The Mobile Application Initiative (MAI) is the former name of the present Ericsson Mobility World (EMW). It still operates in Tallinn Technical University under the name of MAI Centre. The Mobile Applications Initiative centre is a collaborative project of Tallinn Technical University, Estonian Mobile Telephone and Ericsson, which involves co-operation partners, offers services and spreads knowledge for the development of the mobile Internet market.

The services provided by the Tallinn MAI Centre include package training (1-2 day sessions), the testing of developed applications and the marketing of applications via the Ericsson Mobility World network. In autumn-winter of 2001/2002 a new course of multimedia methods application was also launched. The courses offered by the MAI Centre are mainly intended for individuals, but have also been organised for enterprises, e.g. Ericsson, OÜ Oskando, etc.

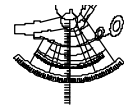
Direct co-operation contracts between universities and leading industrial firms promote the application of university research results in companies, as well as providing thesis topics for bachelor, master's or doctoral degrees which are co-supervised and entered in a database. Furthermore, firms provided a training base for students and assist in educating skilled engineers or other highly qualified specialists.

The competence centres (different from the planned technology competence centres) created within the Phare HESR project some years ago have wound down their function in their present form and will develop into leading Tallinn Technical University (TTU) centres for development, planned to be established in late 2002. As of now the environmental technology and information technology centres have been liquidated. Two different centres have been formed since the beginning of 2002 (materials technology; gene/biotechnology), and they are to be renamed into leading or development centres. The tenders for the forming of both types of centres have been launched at the TTU.

The Tallinn Technical University has a twin-university initiative with the Helsinki Technical University. A memorandum of intent outlining extensive co-operation was signed at the end of May 2001, also including Budapest Technical University. The co-operation in the case of Tallinn and Helsinki has more perspective and potential due to geographical proximity. The universities have started aligning curricula and plan an extensive exchange of students and research workers, as well as setting up joint centres for degree studies. Moreover, co-operation on using technical infrastructure and participation in joint research projects is also envisioned. In addition to expected synergies, the optimising of the use of material resources and intellectual potential is also pursued. Therefore, such a university co-operation can also act as a 'pulling-centre', promoting rapid transfer of global innovation results and their applications.

The National R&D strategy 'Knowledge-based Estonia' stresses the development of bridging mechanisms between research and business as one of the main lines of activity in increasing the intensity of R&D activities until 2006.

The most significant programme is SPINNO [ES 17], which was launched during the final months of 2001. The goal of the programme is the promotion and implementation of research results. This programme supports activities which contribute to the increase of entrepreneurship in universities and the development of a systemic higher education environment, which should promote entrepreneurial



activities. The activities include the development of a regulative framework, patent and license policy, promotion of the emergence of spin-off firms and their growth, including the creation of access to capital markets and co-operation networks with enterprises. This year's allocations for the programme are approximately EURO0.85 million and an extra EURO0.79 million for 2003. An evaluation of the programme will also be held next year and its continuation will depend upon the results rendered.

One of the first projects of the Centre for Strategic Initiatives planned for spring 2002 was carried out with representatives from leading enterprises and strategic thinkers of various fields of life. The project will focus on the identification and analysis of (international) trends in regards to technological development (emerging trends/breaking trends). This will aid the search to identify new opportunities for Estonian enterprises as well as for the general innovation of social affairs.

Public policy foresees the development of R&D co-operation between academic institutions and the business sector. The SPINNO programme [ES 17] already supports this kind of activity, and has carried out infrastructure projects to this end. The Tallinn Technology Park project is in the process of being established, to be situated on the territory of the Tallinn Technical University. The TTU Innovation Centre will be one sub-unit of the whole park. This will favour the formation of new technology-based firms and the transfer of scientific research to market-oriented R&D.

The Engineering (Technology) Centre as a structural unit of the university was formed in 2001. The main functions of the technology centre are:

- the development of innovative technologies according to TTU priority spheres;
- contributing to the improvement of the infrastructure of market-oriented competence centres.

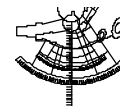
Structural reorganisations are in progress at the Tartu University Innovation centre, which will lead to its closure; its functions will be partly handed over to the Tartu University Technology Institute, but the latter is still in its launching stage. It is not clear which functions of the innovation centre will be handed over to which structural units of the Technology Institute.

The training of spin-off enterprises and researchers carrying out technology-related projects will, in future, be provided by the Tartu University Entrepreneurial Centre, which will be part of the Tartu University Technology Institute structure, but has not yet been formed. Detailed plans of activities are therefore not available as yet. The issues to be handled will be related to technology-intensive businesses – product development, intellectual property protection issues, fund-raising etc. The selection of information channels will also be decided in the future, since the strategic and tactical marketing plan of the TU Technology Institute is not yet ready.

The Tallinn Technical University signed a co-operation agreement with the Technical Universities in Budapest and Helsinki for extensive co-operation in research and study. There is especially a high potential in co-operation between Tallinn and Helsinki universities, with a perspective of a possible twin-university model, which would increase the interest of large firms and international capital, as well as enhancing the development of an Estonian 'Technopolis'. Tallinn Technical University has already started to align its curricula with Helsinki, planning an extensive exchange of students and researchers, as well as co-operating in sharing infrastructure and scientific research.

The PHARE 2000 ESC program and the Oil Shale Expertise Centre will be developed along the Tallinn Technical University Oil Shale Institute. The Food Technology Competence Centre at the Agricultural University and Material Technology Competence Centre at Tartu University.

Two Estonian institutions, the Institute of Physics and the Estonian Biocenter in Tartu, have been designated the status of centres of excellence within the framework of EU FP5, which allows them to join the network of international centres of excellence. These centres also form the basis for promoting co-operation between research institutions and universities. They also promote research in companies as well as training qualified specialists.



## Hungary

The National Research and Development Programme (NRDP) was proclaimed in the document 'Science and Technology Policy 2000'. For 2002, the budget of the NRDP is HUF10bn (EURO41 million) and focuses on projects run by universities and academic research centres co-operating with private enterprises. Applicable results could potentially be financed by the NRDP by public authorities or co-financed by companies.

The launching of the Széchenyi plan has greatly increased the range of career opportunities available to scientists. As part of the S&T agreements, scientific exchange programmes have been set up with 30 member countries in 14 active programmes. The EU's Fifth Framework Programme also hosts competitions, which provide additional opportunities for scientists. Similar opportunities are made available by the National Science Research Fund.

The co-operative research centres (CRC) focus on establishing links between Hungarian higher education institutions, other non-profit research facilities and members of the corporate and business innovation sector, in which education, research development and knowledge and technology transfer can be integrated for strategic purposes. The CRCs can only be established together with private business partners.

Selected CRCs are so far:

- Budapest University of Technology and Economics - Inter-University Centre for Telecommunication and Informatics (ETI-KKK);
- Semmelweis University - CRC for Rational Drug Design;
- University of Miskolc - CRC of Mechanics and Material Sciences (MeAKKK);
- University of Pécs - South Transdanubian CRC;
- University of Veszprém - CRC of University of Veszprém.

## Poland

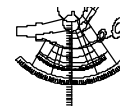
Generally the mobility of all employees (including research workers, teachers and students) is extremely low, primarily due to the lack of cheap accommodation, combined with the low salaries of the scientific staff. No measures currently address this issue explicitly. Many talented people, living in small towns and villages, have no resources to move and live in towns with larger scientific centres or high-tech industries, and thus have little chance of developing into highly trained scientists or researchers.

The main source of data on innovation in Poland is the Central Statistical Office (GUS), which is currently developing and implementing a new conceptual framework to conduct innovation surveys, based on internationally agreed methodological standards. In 2002, the GUS published the results of two surveys (not censuses) which were conducted in 1998-2000:

- 1) *Działalność innowacyjna przedsiębiorstw przemysłowych w latach 1998-2000 [Innovation activities in industrial enterprises in Poland in 1998-2000]*
- 2) *Działalność innowacyjna przedsiębiorstw w sektorze usług 1997-1999 [Innovation activities in the service sector 1997-1999]*

Below, there is a summary of the above surveys concerning co-operation between research, universities and companies.

In 2000 and 2001, the science and technology system was significantly affected by a slowdown in economic activity. R&D activity in industrial enterprises turned out to be very sensitive to the business cycle. According to the comprehensive survey on innovation in industry (manufacturing, mining and utilities sectors), only about 17% of surveyed firms with at least 10 employees introduced technologically new or improved products or processes in 1998-2000.



In technological innovations, Polish industrial enterprises rely mainly on their own resources. According to the results of the survey, 63.3% of innovators implemented innovations developed mainly internally, as against only 7.1% of firms reported to have implemented innovations developed mainly externally by others. The share of innovators reporting to have implemented the innovations developed mainly by domestic research institutions was about 1.5%.

Expenditure on innovation in Polish industrial enterprises employing more than 49 persons experienced a sharp increase between 1995 and 1999. In this period, it almost quadrupled. In 2000, this positive trend was reversed and innovation expenditure was, for the first time in the past decade, lower than in the previous year, and it was a significant decrease, by about one-fifth in absolute terms. However, it should be kept in mind that in the previous year, 1999, expenditure on innovation was significantly higher than in 1998, by more than one-fourth (27.2%).

The most striking feature of the overall structure of innovation expenditure by type of innovation activities is a very low share of in-house R&D, especially in small firms. In 2000, in manufacturing enterprises employing 10-49 persons: the share was only about 5%.

According to the survey, 29% of innovating enterprises in the industrial sector in Poland had co-operation arrangements on innovation activities with other enterprises or institutions during 1998-2000, against 26% in the manufacturing sector in the EU countries in the period 1994-1996.

A gradual increase in the shares of innovation co-operators from small to medium and large enterprises was observed. Of the total of small enterprises with 10 to 49 employees surveyed, i.e. innovators and non-innovators, the share of firms involved in joint innovative projects was only 2.6% while in the sub-population of very large firms with more than 999 employees it was as much as 52.4%.

The principal factor used to measure the outputs of innovation activities or the impact of innovations on the performance of the firm is the proportion of sales due to technologically innovative products put on the market within the last three years in total sales. An upward trend in the output of innovation has been observed in Polish industry in the 1990s. The output changed from less than 10% in the early 1990s to about 20% in 1997-1999, in manufacturing sectors even more than 20%. Output of innovation is measured by the share of sales related to technologically innovative products.

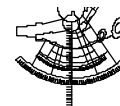
Again in 2000, this positive trend was broken down and the proportion of innovative products in total turnover in manufacturing enterprises decreased from about a quarter in 1999 to slightly less than one fifth.

## **Slovenia**

The mobility of students, researchers and teachers between academia and business remains a problem in Slovenia. There is a bias amongst researchers to do 'pure' science research. In general, the corporate environment does not provide for the publication of research, a crucial career development measure for academicians. One objective of the Young Researchers Program was to increase mobility, but many involved with this programme remain at research institutes.

The new law is expected to increase available resources for projects tailored to the private sector as opposed to pure research. In 2000, the then legislature created research programme groups, allocating funding for a five-year research period. Because these contracts won't expire until the end of 2004, it is difficult to see how the new law will have a real impact before 2005.

One new measure introduced this year was the development of business incubators at universities (SO 13). This measure is intended to promote the transfer of innovation resulting from university research into businesses. In some cases it is expected that the university researcher who did the initial development will stay on with the new company.



No measures have been introduced under the ISR action line within the relevant period. However, the government continues to consider this area as an important focus for policy.

There is currently a lack of co-operation between research, universities and companies. Recent policy debate regarding pure science research versus economic or national need-based research illustrates this problem. There is a strong cultural bias for researchers to not be associated with business. In part, this is due to the problem of not being able to publish research findings, which is very important when aiming to have a career in academia.

Many programmes provided by the Ministry of Economy and Ministry of Education, Science and Sport are aimed at improving this situation. The newly introduced measure promoting the development of a common educational and developmental research infrastructure (SO 12) is geared to address this inflexibility.

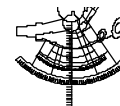
## **Latvia**

Although numerous types of reforms are taking place in Latvia, much of the development is structural and not educating the larger public. Information is often re-produced and does not reach the audience concerned. The National Concept on Innovation (LV 20), which was accepted by the Cabinet of Ministers during February 2001, attempts to address the existing information vacuum. The Concept outlines topics such as science research and education as one of the four basic components of the National Innovation programme and discusses information flow as one of the essential ways of fostering innovation culture. Some government institutions have strengthened their public relations units, as in the case of the Ministry of Justice.

One of the latest developments within this area is the adaptation of the Electronic Administration Concept: the strategic plan for modernising the government's administration (LV 40). Through this plan, the Government of Latvia has set as a priority goal the modernisation of the governmental body, by implementing e-administration, thus insuring high quality and effective service for society. Currently the Ministry of Economy is creating the National Innovation Program (LV 55), expected to define guidelines for the creation of innovation culture and a society open to innovation.

On August 15, 2002 the Cabinet of Ministers passed the decree No.436 (LV 56) On Sustainable Development Priorities for Republic of Latvia. For the next four years society's understanding will be broadened on innovation and its awareness raised as to the processes in education reform.

In Latvia, establishing links between science and industry takes place in technology centres and science parks. For example, in 2000 the Latvian Development Agency initiated the Development Project of Science and Technology Park. Additionally, grants are made available for market-oriented research projects. The average grants are approximately EURO20,000.



On June 20, 2001, the Law on regulating professions and certifying professional qualifications (LV 35) was passed by Parliament. The law establishes a strict procedure for when a professional status can be acknowledged and used, and defines the terminology to be used to identify professional status and specialisation. The goal of this law is to secure the level of professional adequacy by pegging it to quality standards along an established criteria. This will protect the interests of society and safeguard professions, which hold an important social status, from an influx of unqualified staff, by creating higher standards for these professions. It will also aid the certification of professional accreditation abroad. The Cabinet of Ministers is to certify future professional titles. It is also planned that transitional qualifications will be granted to professions such as teachers, academic personnel, professionals from scientific establishments. A special provision contributes to the acknowledgement of professions by foreign citizens, which especially pertains to EU citizens. This measure is relevant to establishing a corresponding professional system and is a step toward Latvia's accession to the EU.

Unfortunately, the higher education quality assurance system still lacks a more detailed specification of its spheres of activity as well as relevant legislative acts, which would ensure a constant self-assessment and external assessment system. Moreover, it is deficient in regard to full transparency of control processes pertaining to the quality of education and its results. The education content and the quality evaluation reform in general education have also been delayed. Furthermore, the introduction of new teaching methodologies at schools has been slow and thus reflects the lack of mobility of teachers, researchers and students. At present, there are no changes envisaged regarding this issue.

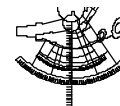
The number of young people having applied for entry to universities to study IT-related courses, such as computer skills and computer science, increased during 2000 (in 1999 it was 3.4% and in 2000 totalled 5.2%). The actual number of enrolled students is similar to the above (in 1999 it was 3.4% and in 2000 it totalled 5.1%). This increase was achieved by a re-distribution of study areas without incurring additional costs. Similarly it is also planned to increase the number of students in 2001. However, without additional funding for higher education it is quite hard to attract qualified teachers to universities, because salaries in IT enterprises are three to four times higher. Additional financing is also necessary for expanding university libraries, updating computer hardware and increasing Internet connections. As a result, universities are forced to gradually increase study fees.

Latvian universities are not capable of satisfying the demand for IT specialists. On March 27, 2001, the Prime Minister issued the ordinance on establishing a Working Group for developing a joint project on founding a Latvian-Danish Information Technology College. It is planned to finance the educational plan and content base of the college from the EU PHARE program on Professional Education 2000. The opening of the international IT college will take place in 2002.

On October 13, 2000, the Cabinet of Ministers approved the concept of training highly qualified IT specialists, for implementing projects of scientific research. This program is anticipated to start in 2002 and aims to train IT specialists in new systems and engineering technologies, new domains of computer applications, new telecommunication technologies and computer networks, as well as scientific obstacles in regard to establishing an information society.

The development of the national accreditation system, where the Latvian National Accreditation Bureau (LATAK) carries out assessments, accreditations and supervision of institutions is still in progress. On May 1, 2001, the following 11 institutions were newly accredited by the National Accreditation System: eight testing laboratories for water, waste water, emission, concrete, tile adhesive, construction materials, welded joints, household electrical devices, IT devices, low voltage devices, lighting devices, electrical measuring, regulation, control equipment and laboratory devices testing; three personnel certification institutions operating in the area of professional qualification testing of pharmaceutical workers, certification of welders and managers in the field of electrical construction and installation.

## Lithuania



The Government of the Republic of Lithuania is proceeding with the implementation of measures previously taken in this field: participation of the Republic of Lithuania in EU training and educational programs such as Leonardo da Vinci II and Socrates II [LT 12, LT 07]. This measure also relates to action line 1.1. Education and initial and further training.

However no new relevant steps were taken in order to encourage the mobility of students, research workers and teachers.

Technology parks and innovation centres in Lithuania continue to be connecting links between science and industry. These institutions, specialised laboratories and centres of universities are the sources for establishing centres of new enterprises (laser systems, biotechnology, IT, bio-energy etc.). There is no system facilitating the interaction between science institutes and private companies. Moreover, there is no special state system dispersing financial aid for the promotion of such interaction. The programme on innovation rests upon the objective to intensify the interrelations between science and companies. However, no specific new actions have been taken yet.

The document 'Measures for implementation of the Government's Programme for 2001-2004' [LT 14] foresaw the specific objective in this field: to prepare the concept for development of science and technology parks and business incubators. It targets the creation of favourable conditions for co-operation between science and technology.

## Romania

The CORINT programme intensifies the link between R&D and companies, and promotes co-operation between foreign and Romanian companies and research units, and the mobility of researchers.

Private companies have already started to collaborate with universities in order to secure future qualitative human resources for their needs. Companies such as Procter & Gamble, Unilever, L'Oreal, Orange Romania and others have put in place programmes that stimulate research in universities, focusing on the co-operation between universities and companies.

The Ministry of Education and Research put in place a yearly financial support programme for the mobility of students, research workers and teachers. It includes financial support (usually partial) to over 800 persons with activity in R&D covering all the domains.

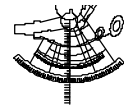
The RELANSIN programme is the most important component of the National Plan for RDI, having as its objectives to activate the national economy through the development of research and innovation. In 2001, there were 1,425 projects registered, of which 272 received financing. RELANSIN received financing worth €12.03m, representing 45% of the total financing of the National Plan for RDI in 2001.

Specifically, this co-operation is also sustained by the sub-programme 2 'Integration - Complex Projects' of RELANSIN. This sub-programme foresees the realisation of products/technologies/new services with a high degree of complexity. Their development requires technological and R&D co-operation and integration of a whole group of economic units.

The CALIST programme of Quality and Standardisation, another component of the National Plan for RDI, indicates that research and development organisations, or universities should provide project management, in partnership with private companies. This provision of CALIST sets a framework for co-operation between research, universities and companies.

The CORINT programme intensifies the link between R&D and companies, and promotes co-operation between foreign and Romanian companies and research units.

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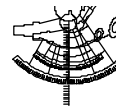
The Faculty of Power Engineering, which is responsible for the management of the MENER (National Environment and Energy programme) component of the National Plan for RDI, has developed links with the industry and includes five research centres. It undertakes research/development studies financially supported by industrial enterprises, as well as consulting activity and quality assessment certificates as a result of the tests performed on industrial products using the faculty laboratory facilities.

The Faculty of Power Engineering also has links with industry through the student association BEST, a non-governmental, non-profit organisation created after the model of junior enterprise organisations. BEST appeared as a result of collaboration between the Faculty of Power Engineering – Bucharest Polytechnic University, ADEME France and Ecole des Mines de Paris. BEST had R&D projects with Romanian and foreign partners: BULL Romania, DIGITAL, RENEL, RADET, Chamber of Commerce and Industry from Paris. BEST intends to establish new contacts with companies from Romania and abroad in the domain of energy and information technology research.

## **Slovakia**

No measures have been introduced under this action line within the relevant period. However, the government continues to consider this area as an important focus for policy.

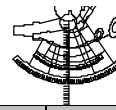
# European Trend Chart on Innovation



## Annex 2 – Analysis of modes of delivery and targets for ISR measures of Trend Chart

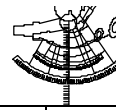
Country	Instruments	Date	Modes						Targets						
			Mobility of personnel	Transfer & exploitation of results	Information diffusion/Promotion	Demonstrator projects	Networks & clusters		Regions	Young scientists	Universities	SMEs.	Research Institutes	Sectors & Large Companies	
Austria	AT 8 1) ERP Technologie Programme2) ERP SME-Technologie Programme3) ERP Special Programme on Growth and Technology	1962													1
Austria	AT 16 Technologiemarketing Austria (TecMa)	?		1						1	1		1		
Austria	AT 17 Young innovators scheme	1989			1	1									
Austria	AT 18 BIT (Büro für Internationale Forschungs- und Technologiekooperation)	1993			1		1				1	1	1		
Austria	AT 19 FWF Impulse Projects (1997-2000)	1997	1							1		1			
Austria	AT 20 Relay Projects Science-Industry (1995-2000)	1995		1							1		1		
Austria	AT 22 Impuls Polytechnics-Industry (1997-2003)	1997		1							1				
Austria	AT 23 Kplus programme	1997		1							1	1	1		
Austria	AT 24 TechGate Vienna	1999		1								1	1		
Austria	AT 27 Kind/K net	1999		1			1								
Austria	AT 39 Technologies for a Sustainable Development	1999		1					1		1	1	1	1	
Austria	A plus B (AT 47)	2000		1								1			
Austria	AT 50 Protec 2002+	2002		1		1						1	1		
Austria	AT 54 Forschung, Innovation, Technologie: Informationstechnologie - FIT-IT	2002			1						1	1	1	1	
Austria	AT 55 Austrian Space Application Programme - ASAP	2002			1		1				1	1	1	1	
Austria	AT 56 TAKE OFF - The Austrian Aeronautics Programme	2002	1	1							1	1	1	1	

# European Trend Chart on Innovation



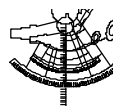
Austria			2	10	4	2	3		1	2	9	10	10	5
Belgium	BE 1 Collective research centres	1948	1	1	1							1		1
Belgium	BE 12 HOBU-Fonds ('Non-university Higher Education Fund')	1997		1	1							1	1	1
Belgium	BE 14 KIV: KMO Innovation Vlaanderen ('SME Innovation Vlaanderen')	1997	1								1	1	1	
Belgium	BE 18 (VI) University Interfaces (1998-2001)	1998		1							1			
Belgium	BE 27 (VI) Incubators & Innovation Centres (1994- )	1997		1								1	1	
Belgium	BE 38 FIRST doctorate enterprise	1999	1								1		1	
Belgium	BE 39 (Wa) FIRST-Europe (1999- )	1999	1	1							1	1		
Belgium	BE 42 Mobilising programmes	1991	1	1							1	1	1	1
Belgium	BE 43 (Wa) Technological guidance (1995- )	1995		1								1		
Belgium	BE 44 Horizon Europe	1991	1				1				1	1	1	
Belgium	BE 47 (Wa) University Interfaces (1999-2002)	1999		1								1		
Belgium	BE 56 Vlaamse Innovatiesamenwerkingsverbanden (VIS)	2001			1							1		1
Belgium	BE 57 Generic Basic Research at Universities	2000-2001		1			1				1		1	
Belgium	BE 58 Programme for the stimulation of innovation in SMEs	2001		1								1		
Belgium			6	10	3	0	2		0	0	7	11	7	4
Cyprus	CY 20 Programme for the Support of Young Researchers in Cyprus	2000			1		1			1			1	
Cyprus	CY 21 Common Programme for Scientific and Technological Co-operation of Cyprus and Greece (2000-02)	2000	1	1								1		1
Cyprus			1	1	1	0	1		0	1	0	1	1	1
Germany	DE 3 HSP III - Special Programme for Higher Education Institutions	1996	1	1	1						1		1	
Germany	DE 16 InnoRegio (1999-2005)	1999			1	1	1				1	1	1	
Germany	DE 17 Promotion of Joint Industrial Research Associations (1952- )	1952	1	1			1				1	1	1	1
Germany	DE 19 Grants for R&D in SMEs in Eastern Germany	1992	1	1								1	1	
Germany	DE 21 EXIST – start-ups from colleges and universities (1998-2001)	1998	1	1			1		1	1			1	1
Germany	DE 23 Biotechnology Initiatives	1997	1	1	1						1	1	1	1

# European Trend Chart on Innovation



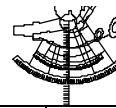
Germany	DE 25 Lead Projects (1997-2003)	1997		1						1	1	1			
Germany	DE 26 InnoNet (1999-2003)	1999	1	1	1		1			1	1	1			
Germany	DE 28 ProInno	1999	1		1					1	1	1			
Germany	DE 36 Networks of Competence (1999-2002)	1999					1		1						
Germany	DE 42 Applied Research at Polytechnic Colleges (1992- )	1992		1	1					1					
Germany	DE 45 Green Card: Emergency programme to satisfy personnel demand in the IT sector	2000	1								1		1		
Germany	DE 48 INSTI - IPR at Higher Education (AKPat, InWert)	1996			1					1	1		1		
Germany	DE-53 Learning Regions (2000-2004)	2000	1				1		1	1	1				
Germany	DE 57 Innovative Regional Growth Poles	2001	1	1		1	1		1	1	1	1	1		
Germany	DE 58 Institutional Reform at Public Sector Research establishments	1997										1			
Germany	DE 59 Institutional and Employment-related Reforms at Higher Education Institutions	2001							1	1					
Germany	DE 67 Direct Research Promotion - Natural Sciences, Climate, Environment, Energy	1957			1		1			1	1	1	1		
Germany	DE 68 Direct Research Promotion - New Technologies	1969			1		1			1	1	1	1		
Germany	DE 69 Direct Research Promotion - Information and Communication Technology	1967			1		1			1	1	1	1		
Germany	DE 70 Direct Research Promotion - Biotechnology, Health, Design of Working Conditions	1970			1		1			1	1	1	1		
Germany	DE 71 Direct Research Promotion - Transportation, Astronautics, Construction	1962			1		1			1	1	1	1		
Germany	DE 72 Commercialisation of Intellectual Property at Public Science	2001		1			1		1	1		1			
Germany	DE 74 Facilitating Start-ups from Public Research Organisations (EEF-Fonds)	2001	1	1			1					1			
Germany	DE 75 NEMO - Management of Innovation Networks for East German SMEs	2002		1			1				1	1			
Germany				11	12	12	2	15		5	2	18	17	19	11
Denmark	DK 5 Industrial Researcher-scheme	1970	1										1		
Denmark	DK 6 Icebreaker projects	1998	1							1		1			
Denmark	DK 07 Centercontracts	1995		1			1			1	1	1	1		
Denmark	DK 08 GTS-institutes	1996		1			1			1	1	1	1		

# European Trend Chart on Innovation



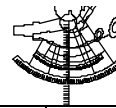
Denmark	DK 11 Innovation Post-Doc Scheme	2000	1							1	1	1	1	
Denmark	DK 13 Regional growth centres	2001							1			1	1	
Denmark	DK 15 Industrial Innovator Scheme	2001	1								1	1	1	
Denmark	DK 16 150 per cent tax deduction on certain research expenditures	2002											1	1
<b>Denmark</b>			<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>		<b>1</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>3</b>
Spain	ES 01 CDTI Financial support	1978		1								1		1
Spain	ES 2 IDE Action to support the placement of doctorates in enterprises	1997	1		1							1		1
Spain	ES 06 ATYCA Initiative (1997-1999)	1997		1					1		1	1	1	1
Spain	ES 07 PETRI Programme (1995- )	1995		1								1		
Spain	ES 08 Concerted and co-operative industrial R&D projects (1994 )	1994		1		1					1	1		1
Spain	ES 09 FEDER - Fostering R&D and Innovation in Objective 1 and 2 Regions (1997-1999)	1997		1							1	1		
Spain	ES 10 Financial support of non-profit Technology Transfer Offices (1996- )	1996		1							1		1	
Spain	ES 12 Co-operation projects – P4 Modality (2000-2003)	2000		1		1					1	1	1	
Spain	ES 13 R&D projects National Programmes (2000-2003)	2000		1								1		1
Spain	ES 14 National Food Programme (2000-2003)	2000		1		1					1	1	1	1
Spain	ES 15 National Programme of AgroFood Resources and Technologies (2000-2003)	2000		1		1							1	1
Spain	ES 16 National Programme of Environment: R&D and Innovation Projects (2000-2003)	2000		1							1	1	1	1
Spain	ES 17 PROFIT: Programme to encourage technological research (2000-2003)	2000	1	1	1							1	1	1
Spain	ES 18 Fiscal incentives for R&D&I activities	2000			1							1		1
Spain	ES 20 Special Actions of National Programmes (2000-2003)	2000		1	1						1		1	1
Spain	ES 23 Credits for activities developed in Scientific and Technological Parks	2001				1	1							
Spain	ES 24 PIIC-Projects for industrial and concerted research	2001		1								1		1
Spain	ES 25 'Ramón y Cajal' Programme (RyC)	2001	1								1		1	
Spain	ES 30 Torres Quevedo Programme	2001	1									1		1
<b>Spain</b>			<b>4</b>	<b>14</b>	<b>4</b>	<b>5</b>	<b>1</b>		<b>1</b>	<b>0</b>	<b>9</b>	<b>14</b>	<b>9</b>	<b>13</b>

# European Trend Chart on Innovation



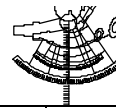
Finland	FI 5 Centre of expertise programme (1994-2006)	1994		1		1			1		1	1		1
Finland	FI 8 Cluster programmes	1997					1		1		1	1	1	1
Finland	FI 10 Technology transfer from universities and research organisations (1999-2001)	1999		1	1				1		1			
Finland	FI 12 Tekes Technology programmes	1984		1	1						1	1	1	1
Finland			0	3	2	1	1		3	0	4	3	2	3
France	FR 3 Support for the recruitment of researchers and R&D engineers	1988	1									1		
France	FR 6 Support for the recruitment of technicians on innovative projects	1988	1									1		
France	FR 7 CIFRE convention	1981	1									1	1	
France	FR 8 Call for projects on key technologies	1996			1						1	1	1	1
France	FR 12 Creation of Incubator structures (1999- )	1999		1			1					1	1	
France	FR 14 Support for the recruitment of post-doctorate in SME's	1988	1									1		
France	FR 17 Technological Research and Innovation Networks (1998- )	1998		1			1						1	
France	FR 29 National Centres for Technological Research (2000- )	2000		1								1	1	1
France	FR 30 Technological Research Diploma (DRT)	1997	1									1	1	
France	FR 31 Youth and Innovation	1996									1			
France	FR 33 Technology Platforms (PFT)	2000	1		1		1		1	1	1			
France	FR 34 RIAM (Research and Innovation for Audiovisual and Multimedia)	2001			1		1					1	1	1
France	FR 37 RMNT (French Research Network in Micro and Nano Technologies)	1999		1			1						1	1
France	FR 38 RNTL (National Network of Research and Software Innovation Technologies)	2000		1			1				1	1	1	1
France	FR 39 RNMP (National Network for Materials and Process)	2000		1			1							
France	FR 40 RITEAU (Research Innovation Technology Network Water and Environment Technologies)	2000		1			1				1	1	1	1
France	FR 41 PACO (New Energies and Fuel Cells)	1999		1			1				1	1	1	1
France	FR 42 GenHomme (Human Genetics and medical Innovation Network)	2000		1			1				1	1	1	1
France	FR 43 RNTS (National Network for Health Technologies)	2000		1			1				1	1	1	1
France	FR 44 PREDIT	2002		1			1				1	1	1	1

# European Trend Chart on Innovation



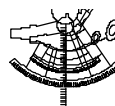
France	FR 45 RITMER	2001		1			1			1	1	1	1	
France	FR 46 RGC&U (Civil and Urban Engineering Network)	1998		1			1			1	1	1	1	
France	FR 47 Supersonique	2000		1			1			1	1	1	1	
France	FR 48 Genoplante	1999		1			1			1	1	1	1	
France	FR 49 Terre et Espace	2000		1			1			1	1	1	1	
France	FR 50 RARE	1997		1			1			1	1	1	1	
France	FR 51 SAIC	2002		1						1		1		
France			6	18	3	0	18		0	1	16	22	21	16
Greece	GR 8 Programme for the Development of Industrial Research & Technology (PAVE?)	1986	1	1	1							1		1
Greece	GR 10 Liaison Offices	1995	1	1						1			1	
Greece	GR 11 Targeted Research Scholarship Programme - YPER	1994	1	1						1			1	
Greece	GR 12 Co-financing Programme - SYN	1992	1						1		1		1	
Greece	GR 16 EKVAN (1997-2000)	1997	1									1	1	1
Greece	GR 17 Development of microelectronics technology and micromechanics (1998- )	1998	1											1
Greece	GR 18 Special Programme for Research and Innovation in the Transport Sector	1998			1		1				1		1	
Greece	GR 19 Research and innovation in Agricultural Biotechnology (1998- )	1998	1											1
Greece	GR 20 Sectoral Programme for Nutrition	1998		1						1		1	1	1
Greece	GR 21 Programme in the Field of Industrial Waste Disposal	1998									1		1	1
Greece	GR 23 Special Action: Language Technology	1998							1		1	1	1	1
Greece	GR 24 Special Action: Development of Support Technologies for People with Specific Needs - AMEA	1997									1		1	
Greece	GR 25 Open Gates	1994			1					1			1	
Greece	GR 26 AXIA – Exploitation of successful projects of STRIDE and EPET 1 (?-?)	1994	1											
Greece	GR 28 Technology Transfer Offices for Technology Parks	1995		1										
Greece	GR 32 Bilateral Co-operations for Research and Technology	1964	1				1				1		1	1

# European Trend Chart on Innovation



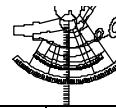
Greece	GR 44 Programme for the Placement of Researchers from Abroad to the Greek R&T System - ENTER	2001	1				1				1		1	
Greece	GR 49 Excellence in the GSRT Supervised Research Centres and Institutes	2001											1	
Greece	GR 51 International Co-operation in Industrial Research and Development Activities in the Pre-competitive Stage	2002	1			1	1				1	1	1	
Greece	GR 53 Supporting entrepreneurial ideas through tertiary education structures	2002			1					1	1			
Greece			11	5	4	1	4		3	2	12	5	14	7
Iceland	IS 5 Information and Environment Research Programme - The U+U Programme	1999							1	1	1	1	1	
Iceland			0	0	0	0	0		1	1	1	1	1	0
Ireland	IE 11 Science & Technology Personnel Placement	1989	1							1		1		
Ireland	IE 12 Marketing Personnel Placement	1989	1									1		
Ireland	IE 13 Personnel Training	late 70's										1		
Ireland	IE 14 Training Standards – Excellence through People	late 70's	1						1			1		1
Ireland	IE 15 Recruitment Services	late 70's	1						1			1		1
Ireland	IE 22 Technology Centres (1989- )	1989		1	1						1			
Ireland	IE 23 Graduate Enterprise Programme (1995- )	1995	1						1	1	1			
Ireland	IE 24 Campus Companies Programme (1996- )	1996		1							1	1		
Ireland			5	2	1	0	0		3	2	3	6	0	2
Israel	IL 05 MAGNET	1992		1							1	1	1	1
Israel			0	1	0	0	0		0	0	1	1	1	1
Italy	IT 01 Special applied research fund (1997- )	1997		1		1						1	1	1
Italy	IT 02 Employment in the field of research (1997- )	1997	1	1								1		1
Italy	IT 03 Support for the promotion of scientific culture (1997- )	1997		1	1								1	
Italy	IT 04 Autonomous research projects in the regions lagging behind (1995- )	1995		1		1						1		1
Italy	IT 05 Research centres in the regions lagging behind (1995- )	1995		1								1		1
Italy	IT 07 Measures aimed at sustaining innovation (1997- )	1997		1								1		1
Italy	IT 08 Research assignments to public research laboratories and SMEs (1998- )	1998	1									1		

# European Trend Chart on Innovation



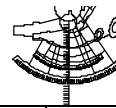
Italy	IT 11 Reorganisation of Fund for Research Support (1999- )	1999	1								1	1	1	
Italy	IT 15 Reorganisation and establishment of public research centres (1999)	1999	1					1						
Italy	IT 18 Large research projects (1988- )	1998				1			1	1		1	1	
Italy	IT 23 Reordering of promotion bodies and establishment of Sviluppo Italia (1999)	???		1										
Italy	IT 25 CSF Objective 1 2000-2006/PIA (2000-2006)	2000		1							1		1	
Italy	IT 26 Agreement Sviluppo Italia – MURST (2000 - )	2000		1					1	1		1		
Italy	IT 32 MURST Directive 1310 (1999- )	1999		1							1			
Italy	IT 33 MURST Directive 760 (1999- )	1999		1				1		1	1		1	
Italy	IT 36 Decree for the implementation of the Fund for Research Support	2001									12	1	1	
Italy	IT 37 Decree for the implementation of the Fund for Technological	2001								1	1	1	1	
Italy			4	11	1	3	0		3	1	4	23	7	11
Luxembourg	LU 7 Research training grants (Bourse Formation-Recherche)	1987	1										1	
Luxembourg			1	0	0	0	0		0	0	0	0	1	0
Netherlands	NL 01 Business-oriented Technological Co-operation Projects (1997- )	1997		1								1	1	1
Netherlands	NL 06 Knowledge Carriers in SMEs	1994	1									1		
Netherlands	NL 07 BIT Industry oriented International Technology Co-operation (1997- )	1997		1		1								1
Netherlands	NL 13 EET (Economy, Ecology and Technology) programme (1997- )	1997		1										1
Netherlands	NL 14 SMO Subsidies Maritime Research (1997- )	1997		1										1
Netherlands	NL 16 Industry facility	1993			1							1		1
Netherlands	NL 19 Technological Top Institutes (1998-2006)	1998		1							1	1	1	1
Netherlands	NL 29 ICES/KIS (1998- )	1998		1				1				1	1	1
Netherlands	NL 31 Technology Foundation STW (1981- )	1981		1							1		1	1
Netherlands	NL 37 Technological Co-operation	2001	1			1					1			
Netherlands			2	7	1	2	0		1	0	3	5	4	8
Norway	NO 10 BRIDGE Programme (1994- ) (* modified 1998 – covers programmes below)	???		1			1					1		
Norway	NO 11 FORNY II – research based innovation & establishment (1999-2004)	1994		1					1	1			1	

# European Trend Chart on Innovation



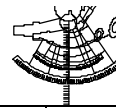
Norway	NO 12 TEFT – tech. transfer from technological research institutes to SMEs (1994-2003)	1999		1							1	1	
Norway	NO 14 SME Competence (1994-2003)	1997	1	1					1	1	1		
Norway	NO 22 Regional Development SME State-colleges - RUSH	1995		1							1		
Norway	NO 23 SME Colleges (1994-2003)	1999		1									
Norway	NO 28 Value creation 2010	2001	1				1				1	1	1
Norway	NO 30 MOBI	2002	1		1			1			1	1	1
Norway	NO 31 Centres of Excellence	2001			1						1	1	1
Norway	NO 32 Regional Innovation Pilots	2001			1		1		1		1	1	1
Norway	NO 42 Start Norge	?					1				1		
Norway			3	6	3	0	4		2	2	7	8	6
Portugal	PT 02 Recruitment of Doctorates and Masters (1996-1999)	1996	1								1		1
Portugal	PT 07 Development of Technological Capabilities at enterprise level (1997-2001)	1997		1							1		
Portugal	PT 09 Financial incentives to R&D industrial projects (1994-1999)	1994		1							1	1	1
Portugal	PT 10 Innovation and Technological Transfer measure (1994-1999)	1995		1		1					1	1	1
Portugal	PT 16 SIME (2000-2006)	2000		1							1	1	1
Portugal	PT 18 Industrial Property Use Incentive System (SIUPI)	2000			1								1
Portugal	PT 22 Integration of Doctors and Masters in Companies and Technology Centres	2001	1										1
Portugal	PT 23 Mobilising Projects for Technological Development (POE)	2001									1	1	1
Portugal	PT 26 Industrial Property Support Offices (GAPI)	2001			1			1			1	1	1
Portugal	PT 28 LISACTION	2002			1			1			1	1	1
Portugal	PT 29 INOVA Algarve	2002			1			1			1	1	1
Portugal			2	4	4	1	0		3	0	7	9	7
Sweden	SE 02 Seed Finance (1980s-)	1968		1							1		
Sweden	SE 04 Competence Centre Programme (1995-2006)	1995		1							1		1
Sweden	SE 07 New Graduate Schools (1996-)	1993		1				1	1		1		
Sweden	SE 09 New liaison functions (1997-2002)	1997		1			1				1		
Sweden	SE 11 Active Industrial Co-operation (?-?)	1998	1	1			1				1	1	1
Sweden	SE 19 VINNVAXT Regional growth through dynamic innovation systems	2002			1		1		1		1	1	1

# European Trend Chart on Innovation



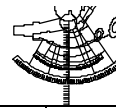
Sweden	SE 25 Öresundkontrakt	?	1	1						1	1	1	1	
Sweden	SE 27 VINST - Researchers in collaboration with smaller high-tech companies	2001		1							1			
Sweden			2	7	1	0	3		2	1	5	6	2	3
UK	UK 01 Foresight Programme (1993-2001)	1993		1	1		1				1	1	1	
UK	UK 18 Teaching Company Scheme (1987- ) (funding doubled in 2000)	???	1								1	1		
UK	UK 19 Faraday Partnerships (1999-)	1999	1			1					1		1	
UK	UK 20 Foresight LINK (1995- )	1995		1		1			1		1		1	
UK	UK 22 Higher Education Reach-Out to Business and the Community (1998-2001* - incorporated in UK 38)	1998		1								1		1
UK	UK 29 Joint Research Equipment Initiative (1996- )	1996									1	1		
UK	UK 34 Regional Competitiveness Development Fund (2000- )	2000		1			1							
UK	UK 37 Biotechnology Exploitation Platform Challenge (1999- )	1999		1			1				1		1	1
UK	UK 38 Higher Education Innovation Fund	2001		1							1			
UK	UK 39 Science Research Investment Fund	2001		1			1				1			
UK	UK 44 Regional Innovation Funds	2000					1		1		1	1	1	1
UK	UK 48 Database of Technology Offers	2001			1				1	1	1	1	1	1
UK	UK 51 Business Fellowship scheme	2001		1	1		1							
UK	UK 57 Manufacturing Molecules Initiative (MMI)	2001	1		1		1				1	1	1	1
UK	UK 58 CASE - Co-operative Awards in Science and Engineering	1980							1	1	1	1	1	1
United Kingdom			3	8	4	2	7		4	2	11	8	8	7
Slovenia	SL 4 Research Group Program financing scheme	2000											1	
Slovenia	SL 5 Subsidies for fostering of R&D units in enterprises	2000	1									1	1	1
Slovenia	SL 7 Subsidies for fostering linkage of companies.	2000		1								1	1	1
Slovenia			1	1	0	0	0		0	0	0	2	3	2
Hungary	HU 1 Tender for Applied Research and Development	2000		1										1
Hungary	HU 4 EUREKA	1992	1		1		1					1		1
Hungary	HU 8 Information and Communication Technologies and Applications (IKTA-2000)	1997			1	1						1	1	1

# European Trend Chart on Innovation



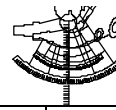
Hungary	HU 10 IKTA-NI (High-Speed Internet Programme)	?			1						1	1	1	
Hungary	HU 11 Call for proposals to support the establishment of Co-operative Research Centres	2000		1						1			1	
Hungary	HU 13 Call for proposals to support the social facilities of R&D	1991	1						1			1		
Hungary	HU 19 COST	1991	1								1	1	1	
Hungary	HU 23 Application for establishing innovative enterprises	2001			1		1							
Hungary	HU 43 OTKA-Application of conference organising	2000	1						1	1		1		
Hungary			4	2	4	1	2		0	2	2	4	5	6
Czech Rep	CZ 6 Park Programme	1995					1			1			1	
Czech Rep			0	0	0	0	1		0	1	0	0	1	0
Estonia	EE 3 Estonian Genome Project (EGP)	2001			1				1		1		1	
Estonia	EE 4 IT College	2000					1		1		1	1	1	1
Estonia	EE 15 CARIN	2001			1		1		1		1	1	1	1
Estonia	EE 16	1999					1		1		1	1	1	1
Estonia			0	0	2	0	3		4	0	4	3	4	3
Latvia	LV 6 The Latvian Technology Park at Riga Technical University	1996		1	1		1			1		1	1	
Latvia	LV 8 Electronic Industry Business Innovation Centre of Latvia	1997			1		1					1		
Latvia	LV 14 Latvian Academy Of Sciences (LZA) Web-site	?			1						1		1	
Latvia	LV 15 Innovation Relay Centre - Latvia	2000					1					1		
Latvia	LV 17 SME involvement and innovation development in the Republic of Latvia	1998												
Latvia	LV 24 Regulation on professional higher education standard on level I	2001									1			
Latvia	LV 26 Scheme on governmental financing of private general, intermediate and higher education establishments	2000									1			

# European Trend Chart on Innovation



Latvia	LV 28 Agreement between the Government of the Republic of Latvia, the Government of the Republic of Estonia and the Government of the Republic of Lithuania on the creation of a common educational space in higher education within the Baltic States	?									1		1	
Latvia	LV 34 On Higher Education Establishments and financing from the State Budget	2001									1			
Latvia	LV 35 Law on regulated professions and acknowledgement of professional qualifications	2001												
Latvia	LV 50 Regulation on Council for Sustainable Development	?												
Latvia			4	1	3	0	3		0	1	5	3	3	0
Lithuania	LT 7 Governmental decree 'On participation of Republic of Lithuania in EU training and education programmes 'Leonardo da Vinci II' and 'Socrates II'.	2000	1								1		1	
Lithuania	LT 8 Programme on innovations in business	2000										1		1
Lithuania	LT 12 Governmental decree 'On participation of Republic of Lithuania in EU training and education programmes 'Leonardo da Vinci II' and 'Socrates II' (change of LT 7)	2000	1								1			
Lithuania			2	0	0	0	0		0	0	2	1	1	1
Poland	PL 9 Bank of Technologies and Designs	1999		1							1		1	
Poland			0	1	0	0	0		0	0	1	0	1	0
Romania	RO 1 RELANSIN Program	1999		1	1		1					1		
Romania	RO 3 PHARE Partnership Program	1999			1								1	
Romania	RO 5 Technology Transfer, Stimulation and Dissemination of Innovation 1998 – 2010 (TTSDI'98)	1998		1								1		
Romania	RO 8 Programul 'Cooperare si parteneriat international' - CORINT	2001	1				1					1		
Romania	RO 13 INVENT Program – Stimulation of invention application	2001		1		1					1		1	
Romania			1	3	2	1	2		0	0	1	3	2	0
<b>TOTAL</b>			<b>79</b>	<b>129</b>	<b>59</b>	<b>21</b>	<b>72</b>		<b>37</b>	<b>23</b>	<b>136</b>	<b>172</b>	<b>147</b>	<b>119</b>

# European Trend Chart on Innovation



Austria			2	10	4	2	3		1	2	9	10	10	5
Belgium			6	10	3	0	2		0	0	7	11	7	4
Cyprus			1	1	1	0	1		0	1	0	1	1	1
Germany			11	12	12	2	15		5	2	18	17	19	11
Denmark			4	2	0	0	2		1	2	4	6	7	3
Spain			4	14	4	5	1		1	0	9	14	9	13
Finland			0	3	2	1	1		3	0	4	3	2	3
France			6	18	3	0	18		0	1	16	22	21	16
Greece			11	5	4	1	4		3	2	12	5	14	7
Iceland			0	0	0	0	0		1	1	1	1	1	0
Ireland			5	2	1	0	0		3	2	3	6	0	2
Israel			0	1	0	0	0		0	0	1	1	1	1
Italy			4	11	1	3	0		3	1	4	23	7	11
Luxembourg			1	0	0	0	0		0	0	0	0	1	0
Netherlands			2	7	1	2	0		1	0	3	5	4	8
Norway			3	6	3	0	4		2	2	7	8	6	2
Portugal			2	4	4	1	0		3	0	7	9	7	10
Sweden			2	7	1	0	3		2	1	5	6	2	3
United Kingdom			3	8	4	2	7		4	2	11	8	8	7
Slovenia			1	1	0	0	0		0	0	0	2	3	2
Hungary			4	2	4	1	2		0	2	2	4	5	6
Czech Rep			0	0	0	0	1		0	1	0	0	1	0
Estonia			0	0	2	0	3		4	0	4	3	4	3
Latvia			4	1	3	0	3		0	1	5	3	3	0
Lithuania			2	0	0	0	0		0	0	2	1	1	1
Poland			0	1	0	0	0		0	0	1	0	1	0
Romania			1	3	2	1	2		0	0	1	3	2	0