

**Open Method of Co-ordination (OMC)
3% Action Plan**

Report of the CREST Expert Group on

**The Public Research Base
and its Links with Industry**

Final Report – First Cycle
June 2004

Final Report submitted to CREST

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Executive Summary

- 1) This is a report by the 'Public Research Base and its Links with Industry' Expert Group for CREST. The Expert Group decided for the first phase of its work to focus on two themes: Action 1) pursue and initiate necessary regulatory and administrative reforms, and support measures, to enable public research institutions to develop more effective links with industry; and, Action 2) increase the participation of industry and other stakeholders in the determination of priorities for public research. Action 1 was further subdivided into two closely inter-related strands, namely issues about a) creating a better public research base in order to provide a better *framework* for establishing links with the private sector; and, b) more specifically, in terms of creating more effective *links* between the public and private research sectors.
- 2) These two action areas were selected for consideration because creating a more dynamic public research base that is better aligned to the needs of private sector R&D is an important element in stimulating the overall growth of R&D activity and in supporting more effective R&D links with the private sector. The public sector is also a major source of R&D in its own right in Europe. There was concern that more could be done: to make the public sector more 'fit for purpose' in terms of its various remits; to enable the public sector to become a more efficient operator of R&D in its own right; to provide a better resource base for the private sector; and, for the public sector to be a better generator of private sector research activities (via licensing, spin-offs and commercialisation activities).
- 3) The Expert Group also felt that links between the public and private research sectors could be expanded and improved. At present only a small proportion of private sector firms have contact with public research establishments and universities within Europe. There may be good reasons for this (different time horizons, problems of scanning for contacts, different objectives and so on) but more consideration should be made in seeking to overcome some of the barriers in public-private research links.
- 4) The Group explored how the private sector can more actively be involved in deciding public research priorities. However, it was emphasised that for private sector firms to more actively participating in shaping public research activities, belies a more fundamental prerequisite, namely that firms need to recognise the value of R&D more generally for them to then feel it worthwhile to participate in influencing the nature and extent of public R&D activity. Thus, active participation requires, in addition, awareness of the value and benefits of R&D more generally. Large sections of the private sector, particularly Small and Medium-sized Enterprises (SMEs) and service enterprises, do not recognise the value of undertaking R&D and therefore forego good opportunities for innovation. In relation to this, they are often overlooked as possible partners in public-private R&D partnerships, a key vehicle to reaching the Lisbon targets.
- 5) In generating the results for this report, it is important to note the framework, stages and organisation of the information and data collection that provide the basis for the generation of results. At the core of the analysis was the collection of the policy mechanism case studies, which sought to cover all aspects of policies relating to R&D and technology transfer relating to the public-private interface within the remit of the Group. The resulting database,

currently holds over a 100 cases. It should be emphasised the database is not meant to be comprehensive by covering all schemes, but is necessarily selective since it is based on schemes that are thought to be worthy of consideration by other member states and the European Commission because they: are novel or interesting within a policy context; transferable; and, are effective.

- 6) A 'good practice' policy mechanism is defined in this report as a relevant scheme that is effective and works well in its chosen field of application and is worthy of consideration in another country (or where relevant in another region or technology/sector) *and* has no foreseeable problems or barriers in its transfer and application in another country or situation (i.e. transferability).
- 7) There has been a growing realisation within Europe that the public research base needs to be better attuned to the needs of the new 'knowledge-based' economy. There has been substantial reorganisation, firstly, of Public Research Institutions (PRIs) and, secondly, Higher Education Institutions (HEIs). In particular, the remit, organisation, structure and financing of higher education has undergone considerable change within virtually every member state recently. This has been accompanied by policies to the scale and diversity of industry-academic links and the contribution of higher education to furthering links with the private sector has been prioritised for attention by the Expert Group for the second round of work.
- 8) One indication of the emphasis placed on the higher education system within the public research base is reflected by the fact that nearly three quarters of the schemes recorded by the Expert Group were associated in some way with changes in the higher education system in terms of its organisation, finance or in terms of furthering linkages with the private sector. Not surprisingly, therefore, many of the schemes selected as good practice involve the higher education sector, or tripartite schemes combining industry-government-academia research activity together. In turn, many of the schemes have focused on the valorisation of university and higher education research. The report lists reforms which have been carried out in higher education, but there has, as yet, been very little discussion and transfer of ideas at a pan-European level on commercialisation, incentive and other strategies linked to industry and research. From this analysis arises the first recommendation of the Expert Group.

Recommendation 1: Commercialisation, Incentives and Behaviour in Higher Education Research - The Group noted that there has been very little exchange and transfer of ideas at a pan-European level on commercialisation, incentive and other strategies linked to industry and research. The Group recommends the development of guidelines on a European level on commercialisation and incentive strategies in European universities as a basis for developing specific policy mechanisms and the transfer of good practices between member states in this policy area. These guidelines should be developed under the next phase of the OMC process.

- 9) As well as reforming the public research base to aid the *valorisation* process, often involving the formation of new enterprises, there has also been a recognition that *more and better links* need to be created between existing organisations in the public and private sectors. This echoes a recent criticism by an OECD panel on the inadequacies of the European research system,

namely insufficient links between the public and private research realms. This appears to be coming more clearly understood by European policymakers. In the context of this Group, over fifty schemes were submitted under this heading, representing over half of the total mechanisms submitted by Panel Members.

- 10) The number and range of public-private research linkage types and mechanisms was expanding over time. However the group felt that more consideration should be made towards developing and considering new types of linkage mechanism that specifically grew out of and were suited to the European research system. The Expert Group felt that more effort should be made to develop new linkage structures and to establish a European forum to specifically discuss this involving both PRIs and HEIs. In part, this may involve a better dissemination process of current practices within Europe, but there was still felt the necessity for more active consideration of the development of new linkage mechanisms. This leads to the second recommendation of the Group.

Recommendation 2: Role of Knowledge Intermediaries in the Public-Private Interface - The Expert Group liked the role that Garching Innovation plays within Max-Planck-Institutes as a mediator and adviser between such public or quasi-public research institutes and industry. This type of scheme should be considered and adopted more widely in Europe. The Group recommends CREST to promote setting up of a network of actors in this field with a view to develop specific guidelines and the transfer of good practices between member states in this policy area.

- 11) There are few explicit initiatives that specifically encourage private sector participation in to how they can become more involved in R&D and in the formation of national research and innovation policy. In the former context, there are few specific schemes to get private sector firms more interested in the possibilities of the benefits of undertaking R&D. This remains a significant barrier and is fundamental to *all* the other schemes and initiatives mentioned in this report. For example, firms will not get themselves involved participating in public-private partnerships, if they do not see any benefit in undertaking or being involved in research and innovation themselves. Nor will they take active part in shaping R&D and innovation policies. On one level, it could be argued that R&D tax incentives may encourage R&D participation, but even here there are considerable barriers for companies, especially SMEs that have never undertaken R&D before. More specific schemes, as yet, remain sparse, but this is likely to change. In the latter context, an important exception to lack of initiatives in relation to private sector involvement in policy formation (but on a broad level) are the national, regional and sectoral foresight programmes that have formally sought to include industry participation within these policy shaping programmes. This leads to the next two recommendations of the Group.

Recommendation 3: R&D Awareness Scheme - The Expert Group liked the Irish R&D Awareness Scheme seeking to encourage firms to consider undertaking or accessing R&D for the first time. The Group proposes CREST to recommend that on the basis of this scheme a code of 'good practice' be developed and rolled out across Europe.

Recommendation 4: Private Sector Involvement in R&D Programmes - The Group recommends, on a general level, the identification of good practice procedures for including firms in national and other foresight programmes. The Expert Group felt it was necessary to consider novel ways in which a wider set of firms could be involved in areas such as foresight and other policy formation processes. In putting forward such a recommendation it should be noted, however, that the public sector continues to have an important 'educative' role for the private sector, and that care should be taken that certain narrow interest groups should not hijack such foresight and policy shaping initiatives. On an implementation level, the Group recommends that the mechanism of the TEKES technology programme should be further evaluated with a view to identify it as a good practice mechanism for other EU countries and that member state policy makers should consider how firms could participate more fully in the policy formation process.

- 12) The Group in its selection of good practice mechanisms and in the presentation recommendations has inferred that such schemes can be transferred successfully. However, it is important to note the concerns expressed on the issue of transferability. Although good practice schemes may be flexible enough to be used successfully in other countries, regions, sectors or technologies, policymakers should be aware of the institutional context and legal and regulatory frameworks of the adopting country or region in absorbing such a scheme. The Group also felt more support should be made in encouraging the development of new schemes by supporting the formation, experimentation and testing of new schemes. In addition, this involves the recognition that some novel schemes may fail, but a supportive environment should be created so that policymakers can learn from such failures. This leads to the final recommendation of the Expert Group.

Recommendation 5: Evaluation of, and Support for, the Transferability of Good Practice Schemes and the Testing of New Schemes - Predicting the successful transfer of a good practice scheme *before* it is transferred is a difficult process. There should, therefore, be new procedures set up to help test schemes for their transferability elsewhere. This may involve having 1-2 experts from the 'mother' nation that generated the scheme, helping aid and advise the transfer of the scheme elsewhere in the European Union. Associated with this, the Group recommends CREST to discuss the idea of setting up an incubator and test bed for the opening up of national policy mechanisms and the creation of novel research and innovation policy mechanisms within Europe and their potential for transferability, as a possible action line within the FP7.

- 13) The report concludes by providing an outline of the key themes and recommendations of the Expert Group and issues to be addressed under the second round of investigations by the Group.

1. Introduction

1.1 Background

This is a Final Report by the 'Public Research Base and its Links with Industry' Expert Group for CREST. The report is in three main parts. Chapter 1 outlines the mandate for the 'Public Research Base and its Links with Industry' Expert Group (Section 1.2) and the key priority action areas that the Group decided to focus upon in the first round of analysis up to June 2004 (Section 1.3). The chapter then concludes by outlining why these three action areas were considered important to meeting the objectives of the Group's mandate, i.e. why they were prioritised for consideration in this first round of work (Section 1.4).

Chapter 2 then outlines the results relating to each of the three action areas selected for this first round consideration. These three action areas cover: a dynamic and aligned public research base (Section 2.2); encouraging public-private research links (Section 2.3); and, stimulating private sector participation in the public research base (Section 2.4). Each of these sections in turn were divided into four sub-sections, namely: overview of analysis; key issues and matters of practice; key conclusions arising from the analysis; and, recommendations under the particular theme.

Chapter 3 concludes by providing a short summary and review to the analysis and discussion. This includes a summary of key issues (Section 3.1); summary of the recommendations outlined in Chapter 2 (Section 3.2); assessment of progress by the Expert Group Panel (Section 3.3); and, lastly, suggestions for the next phase of work by the Expert Group Panel (Section 3.4). The Annexes then provide additional information associated with the work of the Group. This includes a classification of policy mechanisms associated with public research base and its links with industry theme of the Expert Group Panel.

1.2 Group Mandate

The remit of Expert Group Panel outlined by CREST is centred on five main action areas, which were:

1. Regulatory Reform to Enable Public Research Institutions to Develop More Effective Links with Industry
2. Increase Industry Participation in Determination of Public Research Priorities
3. Eliminate Rules that Impede European Co-Operation and Technology Transfer
4. Gear More Research Programmes to Constitution of Poles and Networks of Excellence
5. Enhance Innovation Impact of R&D Programmes

1.3 Focus of the First Work Phase

The Group in the first phase of work, decided to focus on the first two action themes for further consideration and analysis. More specifically, they were associated with measures to:

1. Pursue and initiate necessary regulatory and administrative reforms, and support measures, to enable public research institutions to develop more effective links with industry.
2. Increase the participation of industry and other stakeholders in the determination of priorities for public research.

As such, the Group sought to explore these two main actions, with the first theme being subdivided into two closely inter-related strands, namely issues about a) creating a better public research base in order to provide a better *framework* for establishing links with the private sector; and, b) more specifically in the links themselves in terms of creating more effective *links* between the public and private research sectors. As such, the Group sought to interpret the CREST remit more specifically within these two key areas as:

Action 1: Public Research Base and Links with Industry

a) To Create a Better Public Research Base: through regulatory and administrative reforms and changes to the nature and operation of public research institutions can change to make them commercially minded in creating new private sector activities (for example, through spin-offs or licensing activities) or more responsive to private sector requirements in terms of linkages.

b) Establishing Better Links between Public and Private R&D: seeking to remove barriers and/or create incentives to establish new or deeper *links* between the public research base and industry.

Action 2: Encouraging More Private Sector Participation in Orientating Public Research Priorities and R&D in General

The focus here is in terms of how the private sector can more actively be involved in orientating public research priorities, but more fundamentally in how the private sector can become more involved in research activities overall.

1.4 Reasons for Selection: Why are These Action Areas Important?

1.4.1 A Dynamic and Aligned Public Research Base

Creating a more dynamic public research base that is better aligned to the needs of private sector R&D is an important element in stimulating the overall growth of R&D activity and also helps to create more effective R&D links with the private sector (Section 1.4.2). The public sector is also a major source of R&D in its own right in Europe. There was concern that more could be done:

- a) to make the public sector more 'fit for purpose' in terms of its various remits;
- b) to enable the public sector to become a more efficient operator of R&D in its own right;
- c) to provide a better resource base for the private sector; and,

- d) for the public sector to be a better generator of private sector research activities (via licensing, spin-offs and commercialisation activities).

On the basis of improvements in the above, therefore, this would then provide an important foundation for creating more effective research links with the private sector.

1.4.2 Encouraging More and Better Public-Private Research Links

The Expert Group also considered ways in which links between the public and private research sectors could be expanded and improved. At present only a small proportion of private sector firms have contact with public research establishments and universities within Europe. There may be good reasons for this (different time horizons, problems of scanning for contacts, different objectives and so on) but more consideration should be made in seeking to overcome some of the barriers in public-private research links.

1.4.3 Stimulating Private Sector Participation

The Group explored how the private sector can more actively be involved in orientating public research priorities. However, it was emphasised that for private sector firms to more actively participating in shaping public research activities, belies a more fundamental prerequisite, namely that firms need to recognise the value of R&D more generally for them to then feel it worthwhile to participate in influencing the nature and extent of public R&D activity. Thus, active participation requires, in addition, awareness of the value and benefits of R&D more generally. Large sections of the private sector, particularly Small and Medium-sized Enterprises (SMEs) and service enterprises, do not recognise the value of undertaking R&D and therefore many good opportunities for research and innovation are ignored and lost. This group of firms is also very likely to be overlooked as possible participants in public-private partnerships.

2. Results

2.1 Background

In generating the results for this report, it is important to note the framework, stages and organisation of the information and data collection that provide the basis for the generation of results. At the core of the analysis was the collection of the policy mechanism case studies, which sought to cover all aspects of policies relating to R&D and technology transfer relating to the public-private interface within the remit of the Group.

The resulting database, which currently holds over a 100 cases, is based on a template that was found to be effective and not too onerous to complete by the panel members (Annex 1). The template sought not only to collect basic information about the scheme, but also reasons why the compiler thought the scheme was worthy of consideration and also policy relevant issues surrounding the potential transferability of the schemes to other countries and contexts .

Last, but not least, respondents were requested to outline any problems they had in implementing the scheme and any changes they may have made to the scheme to

improve it. It should be emphasised the database is not meant to be comprehensive by covering all schemes, but is necessarily selective since it is based on schemes that are thought to be worthy of consideration by other member states and the European Commission and are:

- a) novel or have interest within a policy context;
- b) transferable; and,
- c) are effective.

The construction of the database formed the first stage, or layer, of analysis to generate results and recommendations (Table 2.1). The next layer was the actual selection of policy mechanisms by the panel members, which were considered as being 'good practice' and applicable to other member states or circumstances. The last two stages, involve the identification of key conclusions from the analysis and then, lastly, review and amendment of the previous rounds of work and presentation of final recommendations to CREST.

Table 2.1 Selection and Work Sequence

Stages	Description
1.	Construction of database (including data cleaning and revisions)
2.	Selection of good practice mechanisms (on the basis of 1 above)
3.	Identification and synthesis of key conclusions (on the basis of 2 above)
4.	Final review and amendment of stages 2 and 3 and presentation of final recommendations to CREST

From the 100 or so cases collected so far, Panel Members 'voted'¹ for schemes they perceived as being 'good practice' (see below).

Good Practice: A 'good practice' policy mechanism is defined as a relevant scheme that is effective and works well ('tried and tested') in its chosen field of application and is worthy of consideration in another country (or where relevant in another region or technology/sector) *and* has no foreseeable problems or barriers in its transfer and application in another country or situation (i.e. transferability). This is not to suggest that the selected schemes could be transferred 'wholesale' without further modification, nor that such schemes may contain certain difficulties or problems with their application. However, overriding these potential difficulties, the selected schemes suggest overall of merit and deserves consideration in other parts of the European Union. Lastly, for this exercise, the schemes also had to be novel, or contain aspects of novelty, in their nature and operation (although given the need for being tried and tested, the schemes were usually a few years old).

The fourteen schemes selected are listed in Table 2.2 and abbreviated details of the schemes are provided in boxes in the relevant sections where they are discussed.

2.2 A Dynamic and Aligned Public Research Base

2.2.1 Overview of Analysis

There has been a growing realisation within Europe that the public research needs to be better attuned to the needs of the new 'knowledge-based' economy. There has been substantial reorganisation, firstly, of Public Research Institutions (PRIs) and, secondly, Higher Education Institutions (HEIs). Potentially, perhaps the most far reaching, in terms of the former, has been in Italy where, under the overall National Research Plan, there have been with schemes to revitalise the industrial research centres. This has involved the creation, restructuring, reorganisation or renovation of industrial research centres, but also the recruitment of new research personnel.

In terms of the latter, the remit, organisation, structure and financing of higher education has undergone considerable change within virtually every member state recently (Table A3.1). This has been accompanied by policies to the scale and diversity of industry-academic links (Section 2.3) and the contribution of higher education to furthering links with the private sector has been prioritised for attention by the Expert Group for the second round of work.

2.2.2 Key Issues and Matters of Practice

One indication of the emphasis placed on the higher education system within the public research base is reflected by the fact that nearly three quarters of the schemes recorded by the Expert Group were associated in some way with changes in the higher education system in terms of its organisation, finance or in terms of furthering linkages with the private sector. Not surprisingly, therefore, many of the schemes selected as good practice involve the higher education sector, or tripartite schemes combining industry-government-academia research activity together. In turn, many of the schemes have focused on the valorisation of university and higher education research.

Under the first heading of creating a more dynamic and better aligned public research base, six schemes have been selected here as representing good practice. These are:

- 1) National Incubator Program (NIP; Box 2.1)
- 2) MOBI, Industry-College Collaboration (Box 2.2)
- 3) Kplus Competence Centers (Box 2.3)
- 4) Science Enterprise Challenge (SEC; Box 2.4)
- 5) National Genomics Initiative (NGI; Box 2.5)
- 6) Fund for Investment in Basic Research (FIRB, Box 2.6)

Table 2.2 Identification of Good Practice Schemes

Name of Scheme	Country	Classification of Scheme	Section in Report
		1. Organisational Initiatives	
NIP	Sweden	1.1 Public to Private (1.1.1)	Box 2.1, Section 2.2
MOBI	Norway	1.2 Private to Public	Box 2.2, Section 2.2
K plus	Austria	1.3 Centres of Excellence	Box 2.3, Section 2.2
SEC	UK	1.4 Public Research Realignment	Box 2.4, Section 2.2
NGI	Netherlands	1.5 Sector Specific	Box 2.5, Section 2.2
FIRB	Italy	(1.1.3)	Box 2.6, Section 2.2
		2. Fostering Linkages	
Enter	Greece	2.1 Personal Mobility (2.1.3)	Box 2.7, Section 2.3
TRIN	France	2.2 Networks and Partnerships	Box 2.8, Section 2.3
SurfMat	Luxembourg	2.3 Clusters	Box 2.9, Section 2.3
Garching Innovation	Germany	2.4 Knowledge Transfer	Box 2.10, Section 2.3
YRP	Slovenia	2.5 Others	Box 2.11, Section 2.3
Industrial PhD Programme	Denmark	(2.1.1)	Box 2.12, Section 2.3
		3. Increasing Private Participation	
R&D Awareness	Ireland	3.1 Benefits of R&D	Box 2.13, Section 2.4
Tekes	Finland	3.2 Involvement in Policy Formation	Box 2.14, Section 2.4

Shortened summaries of the schemes are listed in the relevant boxes. What do these selected schemes denote? They reflect member state governments desire to create specific, integrated policy mechanisms which reflect, and are part of, wider legislation seeking to reform the higher education and public research system (Tables A3.1 and A3.2). Relating to the point above, all six involve universities and colleges, three on a bilateral basis with industry (NIP, MOBI and SEC) and the other three involving them on a tripartite basis with public research establishments (Kplus, NGI and FIRB).

Box 2.1 National Incubator Program

Sweden: VINNOVA's National Incubator Program

- Commenced in 2003 and is ongoing. Operated by VINNOVA (Swedish Agency for Innovation Systems). Level of funding is approximately €4.6 million per annum.
- Fourteen incubators were selected from a total number of thirty applying for funding based on a call during spring 2003.
- The major goal of the program is to improve national growth by strengthening the supporting infrastructure and key-personnel developing scientifically based business ideas, start-ups and spin-offs into companies so that a significant measurable improvement of SMEs, in number and quality is achieved. A central action in the program has been that the VINNOVA management has worked very closely with the incubator managers to develop and implement best practise in experience, tools and processes between the best national and international incubators thereby increasing the available pre-seed and seed-capital as well as available key-competences for incubator companies.
- The main objectives were to drastically strengthen the national incubator network thereby increasing the efficiency, accuracy, volume and quality of commercialised results into SMEs and in the end cause significant growth in the Swedish economy. The program has also aimed to strengthen the incubator's surrounding environment, seed-capital systems and engagement from universities and local regions in the commercialisation process.
- The *target participants* of the scheme are incubators, universities, researchers, large firms, SMEs and science parks.
- Main *mechanisms* of the scheme include combining of financial support with close coaching and team-building activities to the incubator managers.
- The scheme is very *successful*. As a result the entire Swedish incubator system has a common vision and objectives for future development. The working methods are new and have generated very good feedback not only from the participants, but also from national and international expertise. This program has now enabled a major shift in the interaction processes between universities, industry and financial actors. Also the program works with using hands-on indicators, and in close interaction with the INDICOM project, whereby the results become very usable and visible.

Box 2.2 MOBI**Norway: 'MOBI' (Industry-College Collaboration)**

- Period of scheme is 2003-2009 and MOBI is managed by 'The Research Council of Norway. Level of funding is approximately €4.5 million per annum.
- MOBI is an 'umbrella' programme covering several smaller programmes. The main aims are to encourage training, innovation and value adding in companies with little experience of R&D, via co-operation with R&D groups and other relevant public- and private-sector development agencies. One of the main aspects of this scheme is MOBI's experimental nature, which should test different ways of bridging R&D institutions and companies with little or no R&D experience.
- One of the *main mechanisms* of this scheme is '*The Industry-College Collaboration Scheme*'. This scheme aims to strengthen the ties and mutual change of competence between SMEs and the public colleges in Norway and to stimulate the regional capacity of innovation both in colleges and industry. The scheme's activities are concentrated around three strategies. The SME Competence strategy's main objectives are to help ensure that the latest knowledge reaches companies through a fresh graduate who is familiar with emerging technologies and to encourage the establishment of more lasting, formalised and mutual collaboration between SMEs and the educational institutions involved. In order to promote innovation processes in enterprises and collaboration between regional colleges and the enterprises, the participating companies get professional support from academic supervisors located at the regional college. The second strategy focuses on institutional change aimed at increasing industrial contact with state-financed colleges and making colleges more accessible to companies. The third strategy searches to improve the colleges' institutional role in the regional innovation system.
- An important factor of *success* is the constant focus on change at an institution level. R&D institutions involved in the sub-programmes must commit to and implement actions to change towards a more industry-friendly and adapted institution to meet the R&D needs of the industry. In addition, MOBI has a systematically focus on learning both at programme management level and at the level of the regional projects. All project leaders and brokers are invited to national network meetings 4-5 times a year.

Box 2.3 Kplus Competence Centers**Austria: K plus – Competence Centers**

- Commenced 1998 and is ongoing. Operated by TIG agency and funded through Federal Ministry of Transport, Innovation and Technology. Level of funding is approximately €104 million (period 1998-2004).
- The *Kplus* program improves cooperation between the business and research sectors through the establishment of competence centres. Competence centres go through a competitive selection procedure based on established quality criteria and are funded for a period of seven years. Currently some 270 enterprises of all different sizes are working in *Kplus* centres, generally in the form of multi-company projects with several enterprises working together with various researchers on solving problems.
- One of the main reasons for launching this scheme is because an insufficient science-industry co-operation is perceived as one of the major weaknesses of the Austrian innovation system.
- *Kplus* centres undergo a two-step selection procedure. The first task is to form a consortium, which consists of one or more universities and/or non-university research institutes as well as at least five partners from the business sector. The first step in lodging a tender involves a pre-proposal containing information on the basic intentions of the centre. This pre-proposal is evaluated with regard to its financial and organisational quality and for its scientific and technical quality by auditors from the Austrian Science Fund, FWF. Tenders that are judged positively are invited to submit a full proposal, which in turn is also evaluated by the ERP and the FWF as well as by six international auditors and then discussed in situ with a visiting committee. On the basis of the results an independent jury submits a recommendation for funding for the best centres.
- The scheme has been *successful* because of following main reasons: a strict set of rules and multi-annual funding that guarantees stable framework conditions; the funding offered is of a dimension such that there is a substantial incentive to overcome barriers to co-operation among university institutes as well as between science and industry in order to be eligible for *Kplus* funding; creation of many new career opportunities for young researchers; increased awareness of industry of the mostly intangible benefits of long-term commitment; and most stakeholders now want to keep the centres beyond the 7 year funding period.

Box 2.4 Science Enterprise Challenge

UK: Science Enterprise Challenge

- SEC has received two rounds of funding of €43 million in 1999 and €22 million in 2001. This scheme is operated by the Office of Science and Technology (OST).
- This is a network of 13 enterprise centres covering 60 Universities across the UK. They specialise in the teaching and practice of commercialisation and Entrepreneurship in the field of science and technology.
- Centres are encouraging strategic changes in Institutional structures and processes by supporting the teaching and practice of entrepreneurship among science faculty and students, and promoting links between universities and business. SECs are helping to build a new generation of scientists and engineers, trained in enterprise who are able to lead and inspire future businesses and are better prepared to start their own businesses.
- As this is still relatively early in the programme (most research suggests a lead time of about a decade before the major results start to become apparent), it is difficult to establish how successful the scheme has been up to now, but the early signs are encouraging, (as per the Higher Education & Business Interaction survey) and the recent Lambert Review is strongly supportive of further activity and funding in this area.

Box 2.5 National Genomics Initiative

Netherlands: National Regieorgaan Genomics (NGI)

- Period of scheme is 2001-2008 and it is operated/funded by Ministry of Education, Culture and Science (in charge of administering the programme), Ministry of Economic Affairs, Ministry of Agriculture, Nature Management and Food Quality, Ministry of Health, Welfare and Sports, Ministry of Public Housing, Spatial Planning and Environment, through Netherlands Organisation for Scientific Research (NWO). The NGI office is part of the NWO organisation. The overall funding is approximately €40 million per annum.
- The scheme is aiming at improvement, strengthening and extension of the public knowledge infrastructure in genomics in the Netherlands; at coherent steering of the integral 'innovation chain', including fundamental research, applied research and 'valorisation' of research results; at improving the relations between public research and application sectors (industry, clinical health care and agriculture).
- The scheme was launched because of the need to update the genomics research infrastructure in the Netherlands, genomics being a very promising area for innovation in industry, agriculture and health care.
- The target participants of this scheme include universities, fundamental and applied research institutes, large firms and SMEs and university hospitals.
- The scheme is considered as successful although it is still in an early stage of development. There is much trust in the mechanisms developed and in general the atmosphere in the field is very enthusiastic. However, the scale of funding is an important asset. The centres of excellence each receive sizeable funding for a reasonably long period, so diminishing red tape.

Box 2.6 Fund for Investment in Basic Research (FIRB)

Italy: 'FIRB' – Law 388-2000

- This scheme is operated through the Ministry of Education, University and Research (MIUR) and it provides a fund for investment in basic research. Research projects are directed to set-up the basic knowledge for scientific funding enabling technologies in priority areas identified by the Italian National Research Program (PNR).
- The scheme was launched to push universities and public research institutions towards basic research focused to set up the knowledge required for development of enabling technologies and industrial innovations in order to guarantee sustainable growth and with particular regard for areas like health, safety, quality of life, environment and the climate.
- The projects are selected by an international panel of referees and the scheme has been successful in pushing universities and public research institutions towards basic research cooperation with enterprises.

2.2.3 Conclusions

This section presents a number of key conclusions arising from this part of the study, before specific recommendations arising from this stage are presented in the following section (Section 2.2.4).

1) *Enterprise and Valorisation in Public Research Institutions*

There are good reasons why there are public research organisations doing public research. However, it has become increasingly recognised that many of these organisations have potential to valorise some of their research outputs through, for example, licensing and joint venture activity or by combining some aspects of their research activity with industry. The Expert Group has identified certain schemes that are exemplars of good practice methods to help these commercialisation activities (NIP) and combinatorial activities with industry (Kplus, NGI, and FIRB), together with such initiatives as the creation of Defence technology Centres (DTCs) in the UK (Table A3.2) and is putting forward these schemes for wider consideration within the EU.

2) *Changing Nature of Higher Education Research*

This report has highlighted that the higher education system is a key policy area in relation to R&D. The higher education system is a crucial part of the Research and Innovation System and should be able and be stimulated to interact intensively with business enterprise to tackle the European Paradox. The report has listed where reforms have been carried out in higher education (Table A3.1), but there has, as yet, been very little discussion and transfer of ideas at a pan-European level on commercialisation, incentive and other strategies linked to industry and research. This conclusion forms a specific recommendation by the group (Section 2.2.4).

3) Getting the Commercial Strategy Right in Public Sector Research

Despite the broad development in public research institutions and HEIs it was felt that further consideration should be made towards considering what types of commercially-oriented units were best embedded in public research establishments and organisations. Have we found the right formula for these types of organisations? The Expert Group felt that there should be a forum to actively discuss existing and new types of entrepreneurial units within PRIs. What are the best types of organisations to achieve this? What are the best size, right incentive structures and commercialisation strategies for these units? What should its basic modus operandi be? Could a genuinely new form of embedded commercialisation unit be created to fill a gap in this area?

2.2.4 Specific Recommendations

Recommendation 1: Commercialisation, Incentives and Behaviour in Higher Education Research

The Group noted that there has been very little exchange and transfer of ideas at a pan-European level on commercialisation, incentive and other strategies linked to industry and research. The Group recommends the development of guidelines on a European level on commercialisation and incentive strategies in European universities as a basis for developing specific policy mechanisms and the transfer of good practices between member states in this policy area. These guidelines should be developed under the next phase of the OMC process.

2.3 Encouraging Public-Private Research Links

2.3.1 Overview of Analysis

As well as reforming the public research base to aid the valorisation process, often involving the formation of new enterprises, it has also been recognised that simply more and better links be created between existing organisations in the public and private sectors. This echoes a recent criticism by an OECD panel on the inadequacies of the European research system, namely insufficient links between the public and private research realms. This appears to becoming more clearly understood by European policymakers. In the context of this Group, over fifty schemes were submitted under this heading, representing over half of the total mechanisms submitted by Panel Members.

2.3.2 Key Issues and Matters of Practice

Under the second heading of encouraging links between the public and private research sectors, six schemes have been selected by the Group as representing good practice. These are:

- 6) ENTER program (Box 2.7)
- 7) Technological Research and Innovation Networks (TRINs; Box 2.8)
- 8) SurfMat (Box 2.9)
- 9) Garching Innovation (Box 2.10)
- 10) Young Researcher Program (Box 2.11)
- 11) Industrial PhD Programme (Box 2.12)

Shortened summaries of the schemes are listed in the relevant boxes. One of the schemes, ENTER (Box 2.7), involves transnational personal mobility (please note this overlaps with the remit of the Mobility Group; Section 3.1). There are a number of similar schemes to attract back talented workers to their 'home' countries (for example, in Denmark there is a similar initiative see the internet portal: <http://www.workindenmark.dk/>). The second initiative, Technological Research and Innovation Networks (Box 2.8), established by ANVAR operates 16 successful public-private networks, which seeks to develop cooperation between industry, especially SMEs (Section 3.1) and the public research base. In 2000-1 the SurfMat cluster was launched in Luxembourg to help companies to cooperate within the field of surface finishing and coating which has been successful in creating a network of firms and organisations working this field within the Grand Duchy (Box 2.9).

Another interesting initiative has been the creation of scheme is Garching Innovation as the technology transfer organisation of the Max-Planck Institutes in Germany (Box 2.10). Garching Innovation actively seeks out inventions and know-how in the Max Planck Institutes, taking care of the procedure of patenting industrially relevant inventions and in the conclusion of sale, licence or option agreements. The last initiative is more general mechanism seeking to rejuvenate the overall research base of the member state, Slovenia (Box 2.11). Another scheme identified as being of 'good practice' was the long established scheme in Denmark, Industrial PhD programme, which seeks to educate PhD researchers with knowledge of business aspects of R&D and help establish personal networks for knowledge transfer between the public and private sectors (Box 2.12). The Dutch STW-scheme and the virtual Leading Technology Institutes are also proven examples of public-private research links, although primarily listed under the category heading 1) Organisational Initiatives in the typology of schemes. In Italy there is also a an interesting scheme to train research personnel in private enterprises, as part of their wider restructuring of the public research sector (see Table A3.2).

Box 2.7 ENTER Program**Greece: 'ENTER' Program**

- ENTER program involves the integration of PhD researchers from abroad in Greece's research and technology system.
- Total funding is €7.5 million, 90% public funding and 10% private funding
- Period of scheme is 2001-2006 and it is operated/ funded by the Ministry of Development/ General Secretariat of Research and Technology (GSRT). [No available information on levels of funding received to date]
- ENTER aims to attract experienced researchers from abroad in order to incorporate them to the national research system for a time period of 3 to 24 months, which may be extended up to 48 months. The purpose is: (a) to contribute to technology and know-how transfer from the international research community to Greek research entities and vice versa; and (b) to enhance international research networks.
- The main objectives for launching this scheme were:
 - the transfer R&T information and know-how from abroad to Greece and vice versa
 - to improve Greek research units networking with their counterparts abroad.
 - the promotion of researchers mobility; and
 - combating the brain drain.
- The main target participants include universities, technological institutes, research centres and foundations supervised by the GSRT or other public entities. These entities submit research proposals, including employment of researchers from abroad, to the GSRT within the framework of the relevant call for tender, having first ensured co-operation with a co-funding body of the research proposal (at least 10% of the budget).
- The scheme is considered successful because it enables technology transfer to research bodies and to industry as well.

Box 2.8 Technological Research and Innovation Networks

France: Technological Research and Innovation Networks

- Commenced 1998 and is ongoing. Operated by Ministries in charge of Research and Industry as well as ANVAR (French National Innovation Agency). Overall funding received since 1998 is €600 million from the government and €1000 million from private sector businesses.
- This scheme supports public-private partnerships in technological research and helps to bring together research teams from both private and public sectors.
- The scheme was launched because previously there was a lack of funding for SMEs, as well as a lack of public/private funding for well balanced partnerships.
- Main target participants include SMEs, large firms, research institutes, universities and researchers.
- The scheme is operationalised via the setting up of about 16 networks, incorporating a President, Advisory Committee, Executive Office, Experts (peer evaluation) and research/ industry cooperation.
- The scheme has been successful mainly due to the following reasons:
 - the bottom-up process of decision making within each of the 16 networks;
 - the involvement of scientists from public labs as well as from private companies;
 - the significant level of funding;
 - the funding system based on leverage.

Box 2.9 SurfMat Cluster

Luxembourg: 'SurfMat Cluster'

- The Luxembourg Ministry for Economy, in dialogue with the FEDIL (Federation of the Luxembourg Industrialists) and Luxinnovation (National Agency for the Promotion of Innovation and Research), launched a consultation in 2000-1 of companies for better establishing their needs and defining with them the priorities of actions. To foster synergies in the field of surface finishing and coating, several Luxembourg-based companies launched the "new materials - surface finishing and coating" (SurfMat) cluster.
- The activities of the SurfMat cluster include:
 1. mapping the needs and expertise of companies in the field of new materials;
 2. surface finishing and coating; and,
 3. capitalising on this information to create the synergies required.
- The companies forming the cluster are divided into various working groups seeking above all to exchange information and find ways to enhance technologies through collaboration.
- Luxinnovation runs the SurfMat cluster and Luxinnovation is the first-stop shop for information and advice on innovation, research and development in Luxembourg.
- The SurfMat cluster covers 4 industrial sectors (2002-3) and has resulted in significant technology transfer activities. The cluster has led to new collaborative products, research projects and links with public research organisations.

Box 2.10 Garching Innovation**Germany: Garching Innovation (GI)**

- Garching Innovation GmbH (GI) is the technology transfer organisation of the Max-Planck Gesellschaft (MPG), Germany's largest private organisation for fundamental research and GI is fully funded by MPG. Scheme commenced in 1970 is still ongoing.
- GI seeks out inventions and know-how in the Max Planck Institutes, taking care of the procedure of patenting industrially relevant inventions and in the conclusion of sale, licence or option agreements. In the last five years support of scientists interested in starting their own business has become a further activity of increasing significance at GI.
- By offering technology of the research institutes to industry new products are generated from this scheme; whilst, in many cases, cooperation between industry and research is initiated.
- The successful features of this scheme have been a concentration on technology transfer in a separate unit with highly specialised personnel. The support of spin-offs became very successful. Also the continuous contact to many industry decision makers, new products, new labour have been beneficial through this scheme.

Box 2.11 Young Researchers Program**Slovenia: Young Researchers Program**

- This scheme commenced in 1985 and is ongoing, managed and financed by the Ministry of Education, Science and Sport.
- The government has stimulated postgraduate studies by financing personal costs and research costs for young researchers.
- The main goals of this scheme are:
 - to renew and rejuvenate the research personnel in research institutes and research and teaching personnel in universities;
 - to educate highly skilled personnel for employment in business sector;
 - general promotion of postgraduate education and training in Slovenia.
- The target participants are universities, companies and research institutions.
- The scheme includes governmental financing of personal costs and research costs for postgraduate students working at research institutes or universities as young researchers. Each year 200-300 newcomers enter in this MR-program (10% of them from enterprises – junior researchers for the economy).
- “Young Researchers” is a key program aimed at improving human research potential by financing the doctoral study and postdoctoral projects of young researchers. With regard to increasing the level of quality of research and increasing the number of young researchers in the research groups in academic or industrial organizations, the programme is considered to be very successful. It has also contributed to lowering the average age of researchers by 5 years.

Box 2.12 Industrial PhD Programme

Denmark: 'Industrial PhD Programme'

- This is a Ministry of Science, Technology and Innovation funded scheme that is long established since 1970. The current total budget (including participating company expenditures) is approximately €17 million per annum.
- The Industrial PhD Program involves the cooperation of a university, an industrial PhD fellow and an enterprise working on a defined R&D project. Two supervisors guide the PhD fellow, one from the university and the other one from a enterprise. The Fellow is employed by the company on a full-time basis and paid for the entire period and the work schedule should involve alternate presence at the university and at the enterprise.
- The main objectives for this scheme are to educate PhD researchers with knowledge of business aspects of R&D, establish personal networks for knowledge transfer between the partner organizations and to enhance the development and innovation of Danish trade and industry.
- The main advantages of this scheme have been the private sponsorship of PhD studies, companies receiving cutting edge knowledge, universities receiving some knowledge about commercial oriented research and the networking between universities and private companies.

2.3.3 Conclusions

4) *Furthering Public-Private Research Links*

Over the past two decades member states have been exploring various policy mechanisms to improve, and make more effective, links between public and private research. A number of schemes have been identified by the Expert Group that are seen as being examples of good practice that could be more widely adopted by EU member states (such as TRINs and SurfMat). It should be noted here that such schemes form a very important set of measures in the combat against the European Paradox, especially once the incentive system is set right, and it is intended that the Expert Group will return to this issue in the next round to suggest specific policy options.

5) *Public Research Units, Technology Transfer and Intermediation*

It was recognised that public research institutions should play a more proactive role in transferring knowledge, i.e. organising their knowledge "reservoir" in such a way to make it easily available to SMEs and other enterprises. This could be a powerful tool also to increase the awareness of the benefits of R&D, especially for SMEs (Section 2.4.3, Recommendation 3). It was felt more could be done to make the public sector more proactive in:

- a) identifying the current and future needs of the private sector in terms of research; and,

- b) in more actively seeking private sector customers or collaborators for their work.

This conclusion forms a specific recommendation by the group (Section 2.3.4).

6) Development of New Types of Linkage Mechanisms

The number and range of public-private research linkage types and mechanisms was expanding over time. However the group felt that more consideration should be made towards developing and considering new types of linkage mechanism that specifically grew out of and were suited to the European research system. The Expert Group felt that more effort should be made to develop new linkage structures and to establish a European forum to specifically discuss this involving both PRIs and HEIs. In part, this may involve a better dissemination process of current practices within Europe, but these was still felt the necessity for more active consideration of the development of new linkage mechanisms.

2.3.4 Specific Recommendations

Recommendation 2: Role of Knowledge Intermediaries in the Public-Private Interface

The Expert Group liked the role that Garching Innovation plays within Max-Planck-Institutes as a mediator and adviser between such public or quasi-public research institutes and industry. This type of scheme should be considered and adopted more widely in Europe. The Group recommends CREST to promote setting up of a network of actors in this field with a view to develop specific guidelines and the transfer of good practices between member states in this policy area.

2.4 Stimulating Private Sector Participation in the Public Research Base

2.4.1 Overview of Analysis

There are few explicit initiatives that specifically encourage private sector participation in to:

- a) how they can become more involved in R&D; and,
- b) participate in the formation of national research and innovation policy.

In the former context, there are few specific schemes to get private sector firms more interested in the possibilities of the benefits of undertaking R&D. This remains a significant barrier and is fundamental to *all* the other schemes and initiatives mentioned in this report. For example, firms will not get themselves in shaping national (and EU, regional and sectoral) R&D and innovation policies if they do not see any benefit in undertaking or being involved in research and innovation themselves. On one level, it could be argued that R&D tax incentives may encourage R&D participation, but even here there are considerable barriers for companies, especially SMEs that have never undertaken R&D before. More specific schemes, as yet, remain sparse, but this is likely to change. The R&D Awareness

scheme in Ireland, therefore, remains a novel and unique policy initiative that deserves wider attention.

In the latter context, an important exception to lack of initiatives in relation to private sector involvement in policy formation (but on a broad level) are the national, regional and sectoral foresight programmes that have formally sought to include industry participation within these policy shaping programmes. There have been a number of criticisms of these schemes, in particular domination by large firms (some as 'national champions') and by special interest groups to the exclusion of other groups, most notably SMEs and service firms (Molas-Gallart et al. 2002). In this sense, most countries that now have foresight programmes do have their research and innovation policies to some extent influenced by industry. More specific examples of programmes influenced by industry participation are harder to come by, a possible exception to this is the TEKES technology programme in Finland (Box 2.14, Section 2.4.2).

2.4.2 Key Issues and Matters of Practice

Two schemes were selected for this third main policy segment considered in this round. The first is the R&D Awareness Campaign that was set up by Enterprise Ireland in 2000 and is set to run initially for four years (Box 2.13). The targets are firms that currently do not undertake R&D or are low R&D spenders. This is a notoriously difficult group to target and the programme has done extremely well to achieve such a good take up of the scheme. In many ways the types of companies being targeted do not usually appear on the 'radar screen' of R&D and innovation policy programmes, but these are crucially the type (the majority) of enterprises in the European Union that have no involvement in R&D and have no attention to be involved in R&D. However, this is exactly the group that needs to be targeted if the Union is to achieve the Lisbon objective. It should be noted, though, that for such schemes there still needs to be some targeting, aimed at the more research and innovation 'sensitive' amongst them. Marginal, but long term, changes in the behaviour and attitude of firms – the majority – will have the most significant impact on R&D activity, but more importantly gaining the long term competitive advantages of growth and development of such change.

To these two schemes, included here, must be added a 'horizontal' theme that covers all the good practice schemes listed in this report, namely that of transferability of schemes (Section 2.1) and, associated with this, the need for a nurturing environment for the creation and experimentation of novel schemes and their testing. This issue forms the final recommendation in this report (Section 2.4.4; see also Section 3.1).

Box 2.13 R&D Awareness Campaign**Ireland: 'R&D Awareness Campaign'**

- Period of scheme is 2000-2004 and it is operated/funded by 'Enterprise Ireland'. The level of funding is €500,000 per annum.
- Under this scheme a series of regional briefings are held. The objective of the briefings (attendance limited to local companies by invitation from the Enterprise Ireland Regional Offices) is to demonstrate to target companies the importance of R&D as a business function and the realities of undertaking R&D. Experienced industrial R&D practitioners are selected to make case-study presentations. A key element of each seminar is an opportunity for participating firms to apply for technical consulting support for their R&D activities.
- This campaign was launched as part of a National Development Plan, which shows a major commitment by the Government to support both R&D infrastructure in firms and R&D project funding.
- The target market for the Initiative are the client companies of the four development agencies provided they can satisfy the following criteria:
 - they currently do not undertake R&D, defined as spending less than €65,000 a year.
 - they are low to medium R&D performers, defined as spending between €65,000-€130,000 per year on R & D for the past three years.

The TEKES technology programme operated in Finland (Box 2.14) is an example of a specific programme that has been demand-oriented in its origin by being planned specifically with the needs of firms in mind, and having been implemented in collaboration with companies. At the beginning of 2004, there were 24 ongoing programmes with a total cost of 1.3 billion euros and involving 2,000 companies and 800 research unit participation annually. Each programme lasts typically three to four years. Planning of the programmes takes place in workshops and seminars in cooperation by the firms, universities, research institutes and Tekes.

Box 2.14 The TEKES Programme

Finland: 'Tekes - National Technology Programmes'

- Tekes, the National Technology Agency is the main public financing and expert organisation for research and technological development in Finland. Tekes finances industrial R&D projects as well as projects in research institutes. Tekes especially promotes innovative, risk-intensive projects.
- Tekes funds come from the state budget via the Ministry of Trade and Industry. Tekes has a budget of €400 million, a source of funding for circa 2000 projects annually.
- Tekes offers companies grants, capital loans and industrial loans. Research grants are directed to the research work done at research institutes and universities. Usually projects are conducted in cooperation with companies.
- Close co-operation between companies, research organizations and universities is considered a specific strength of the Finnish system of innovation.
- Technology programmes are multi-project programmes initiated, managed and part-financed by Tekes. They are demand-oriented in the sense that they have been planned and implemented in collaboration with companies, research institutes, universities and Tekes.
- Technology programmes have proved to be an effective form of cooperation and networking for the companies and the research sector. They also pass the results of the research work to business in an efficient way. They have also strengthened cooperation between the different Ministries and funding agencies at the national level.
- All technology programmes are evaluated at the end. The main benefits lay in the close cooperation between research institutes and industry and the widespread involvement of small and medium sized companies. In addition, they have found to be effective because they are focused.
- Technology programmes are also utilised as a tool for deepening international cooperation and implementing the Tekes strategy for internationalisation.
- Tekes actively seeks for open international cooperation on programme level. Tekes is involved in the preparation of joint technology programmes and ERA-NET programmes in cooperation with other funding agencies in other countries.

2.4.3 Conclusions

7) Awareness of the Benefits of R&D

There is a large swath of European business that undertakes little or no R&D and does not realise of the potential benefits from undertaking R&D or in influencing public research activities. This conclusion forms a specific recommendation by the Group (Section 2.4.4).

8) Improving Accessibility to R&D

Realising there may be benefits from undertaking R&D, does not detract from some of the real barriers from undertaking R&D in-house and accessing R&D resources externally. This is particularly true for many: SMEs, new firms, low-technology firms and those businesses within the service sector. The Expert Group is considering

schemes, which on a case-by-case basis provided individual, bespoke advice to firms in terms of how they might become involved in R&D, either through their own efforts or via externally sourcing R&D from other firms or public sector organisations. Again it was hoped a 'good practice' mechanism could be identified (or a composite of various schemes) which could then be rolled out across Europe

9) More Active Private Sector Involvement in Setting Up R&D Programmes

There was a feeling by firms that they could be better engaged in helping to formulate national and R&D programmes. This was particularly true of firms outside the typical cadre of large, high technology spenders, such as small firms or in sectors such as services. This conclusion forms a specific recommendation by the Group (Section 2.4.4).

10) Supporting the Transferability and Testing of Good Practice Schemes

The Group in its selection of good practice mechanisms and in the presentation recommendations has inferred that such schemes can be transferred successfully. However, it is important to reiterate the concerns expressed in Section 2.1 on the issue of transferability. Although good practice schemes may be flexible enough to be used successfully in other countries, regions, sectors or technologies, policymakers should be aware of the institutional context and legal and regulatory frameworks of the adopting country or region in absorbing such a scheme. The Group also felt more support should be provided in encouraging the development of new schemes by helping the formation, experimentation and testing of new schemes. This conclusion forms the last recommendation made by the Group (Section 2.4.4).

2.4.4 Specific Recommendations

Recommendation 3: Awareness of the Benefits of R&D

The Expert Group liked the Irish R&D Awareness Scheme seeking to encourage firms to consider undertaking or accessing R&D for the first time. The Group proposes CREST to recommend that on the basis of this scheme a code of 'good practice' be developed and rolled out across Europe.

Recommendation 4: Private Sector Involvement in R&D Programmes

The Group recommends, on a general level, the identification of good practice procedures for including firms in national and other foresight programmes. The Expert Group felt it was necessary to consider novel ways in which a wider set of firms could be involved in areas such as foresight and other policy formation processes. In putting forward such a recommendation it should be noted, however, that the public sector continues to have an important 'educative' role for the private sector, and that care should be taken that certain narrow interest groups should not hijack such foresight and policy shaping initiatives. On an implementation level, the Group recommends that the mechanism of the TEKES technology programme should be further evaluated with a view to identify it as a good practice mechanism for other EU countries and that member state policy makers should consider how firms could participate more fully in the policy formation process.

Recommendation 5: Evaluation of, and Support for, the Transferability of Good Practice Schemes and the Testing of New Schemes

Predicting the successful transfer of a good practice scheme *before* it is transferred is a difficult process. There should, therefore, be new procedures set up to help test schemes for their transferability elsewhere. This may involve having 1-2 experts from the ‘mother’ nation that generated the scheme, helping aid and advise the transfer of the scheme elsewhere in the European Union. Associated with this, the Group recommends CREST to discuss the idea of setting up an incubator and test bed for the opening up of national policy mechanisms and the creation of novel research and innovation policy mechanisms within Europe and their potential for transferability, as a possible action line within the FP7.

3. Conclusions

3.1 Summary of Key Issues

The Expert Group has identified three main areas in this first round of work for CREST. These centre on three action areas which relate to the issue of creating a dynamic and aligned public research base; encouraging more and better public-private research links; and, in stimulating private sector participation in the public research base. It is noticeable that the higher education sector plays a major role in this realignment of the public research and innovation base of member state countries (Section 2.2) and in fostering links with the private sector (Section 2.3). By contrast, few policy mechanisms have focused on creating awareness of the benefits of R&D, in stimulating more R&D expenditures from the private sector (Section 2.4). We believe this is a major ongoing issue, which remains central to achieving the 3% Lisbon objective and is a theme that will be considered for further second round work and consideration (Section 3.4).

On a more specific level, the Expert group also raised the ‘horizontal’ issue of how good practice schemes may be transferred between member states. It was felt that more work should be undertaken to ‘test’ the transferability of schemes and generate some means of how their likely success in the transference process could be gauged *before* they were transferred. In addition, some specific actions were proposed in providing the support of such schemes between ‘provider’ and ‘receiver’ country. Related to this, but also as a precursor to good practice schemes, was the view that more attention should be paid as to how novel schemes could be nurtured, experimented and tested within some supportive incubating environment (Section 3.4). Again the Expert Group felt that more work could be done by the Group to nuance and develop this process.

Turning to a more specific level, it should be noted that this Expert Group has been careful not to impinge on the remit of other Expert Groups under CREST. The focus of this Group overlaps, to some extent, with the Groups working on SMEs, Fiscal Measures and Mobility. We have sought guidance from CREST in this respect and we believe we have followed this guidance. It is important to stress that key issues should not ‘fall between the gaps’ and that indeed some of the most interesting measures are exactly where there are inter-sections of interest and supervision. In this respect we have sought to be inclusive, but highlight those areas where there is overlap, and in particular where the Group does not believe it has ‘lead’ responsibility. In identifying policy mechanisms where there may be overlap we have taken advice from the member state representative.

3.2 Summary of the Recommendations

This report has presented five specific recommendations to the CREST. These are:

- 1) Commercialisation, Incentives and Behaviour in Higher Education Research
- 2) Role of 'Knowledge Intermediaries' in the Public-Private Interface
- 3) Awareness of the Benefits of R&D
- 4) More Active Private Sector Involvement in Setting Up R&D Programmes
- 5) Evaluation of, and Support for, the Transferability of Good Practice Schemes and the Testing of New Schemes

It is not the intention to summarise again these proposals within this short report, but to highlight here that the Expert Group would like to take forward all five recommendations and to work them up more specifically in the second round of work by the Group. Given the success of the Group (Section 3.3), it was felt strongly that the 'Public Research Base and its Links with Industry' Expert Group should retain this function given its experience, but also to avoid the setting up of another duplicate group involved in such policy work within Europe.

3.3 Assessment of Progress

The Expert Group has made excellent progress with both good attendance and participation. The group has also established a unique and growing database of key policy mechanisms surrounding the public research base and its links with industry. It is intended that this database will be provided on a CD-rom and online after it has been further extended and revised in late 2004. The presentations of key policies, the provision of details of individual policies and the discussions associated with them has led to continued cooperation and mutual learning between the expert participants. The issue of identifying 'good practice' and barriers and problems associated with the devising and introduction of new policy schemes have proved particularly useful to members. Panel Members have continued to articulate new areas of work that the Group should consider and new ways in which they should cooperate together and in conjunction with the Commission.

3.4 Suggestions for Next Work Phase

The group has so far concentrated on the first two main action themes, namely: regulatory reform to enable public research institutions to develop more effective links with industry; and, ways to increase industry participation in the determination of public research priorities. There is further work to do on these themes, as noted in Section 3.1 in terms of developing the policy recommendations, as well in the area of university-industry links, an area only partially touched upon under the first phase of the research project.

However, attention will now naturally turn to last three action areas covering: action to eliminate rules that impede European co-operation and technology transfer; the need to gear more research programmes to the constitution of poles and networks of excellence; and, finding means to enhance innovation impact of R&D programmes.

Lastly, the Expert Panel Group felt strongly that they wanted to continue to develop the policy database and share experiences and lessons associated with initiating and implementing policies in the overall field of R&D and technology transfer relating to the public-private interface. As such, this will represent underlying work in the Group in relation to the main action areas listed above.

Notes

¹ The selection criteria used is a hybrid model and not exact. Panel members were allowed to vote using a Likert scale of 1 to 5 (1 being 'least favourable' scheme and 5 'most favourable' scheme). However this often proved difficult to operate for certain members and, in the case, members used a simpler voting system. This consisted of selecting the best scheme in each of the policy categories listed in Table A2.1. Each time a scheme was voted, by ticking, it was simply given a value of 1 as the score and these scores were added up. However, panel members were given two votes (i.e. a value of 2), for any scheme in their 'home' country which they thought of as being of merit, as it was felt they would be more familiar and knowledgeable about these schemes. On this basis, the schemes could be approximately ranked on an ordinal scale. Because of their size, the two largest main categories, 1) Organisational Initiatives and 2) Fostering Linkages, two highly rated schemes were also included in this report as being 'good practice' mechanisms, the FIRB scheme and the Industrial PhD Programme.

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**Open Method of Co-ordination (OMC)
3% Action Plan**

Report to the CREST Expert Group on

**The Public Research Base
and its Links with Industry**

Annexes

Final Report – First Cycle
June 2004

Annexes to Final Report submitted to CREST

Annex 1 Policy Mechanism Template

Public Research Base and its Links with Industry: Case Study Examples

As noted in the accompanying letter we would like to initially focus on three broad and inter-linked topic areas associated with fostering the public research base and its links with industry, namely:

- 1) those schemes or mechanisms which seek to remove barriers and/or create incentives to establish new or deeper *links* between the public research base and industry;
- 2) those schemes or mechanisms which more directly seek to encourage more *private sector research activity* within industry (excluding direct fiscal measures, a topic covered by another Panel group); and
- 3) examples of how the nature and operation of public research institutions have changed to make them commercially minded in creating new private sector activities (for example, through spin-offs or licensing activities) or more responsive to private sector requirements

The word 'scheme' has been used loosely in the template below; it can mean any policy, initiative or mechanism operated by governments, agencies or private firms which targets one or more of the topic areas listed above.

We appreciate you may not have all details available or may have to provide estimates; partial responses are better than no responses at all. If you feel the scheme is particularly worthy of study and report, we can try and obtain more details at a later day.

We thank you for time and cooperation.

Name or title of scheme/mechanism:		(No.)
Period of scheme? (Start date – end date or ongoing)	Who operates and funds the scheme?	
	Level of funding? (Overall; per annum)	
Geographical coverage of scheme (Specify country; and where applicable, whether the scheme operates in parts of the country concerned)		
Brief description of scheme:		
What are (were) the reasons/objectives for launching the scheme?		
What are target participants of the scheme? (SMEs, large firms, research institutes, universities, researchers etc.)?		
What are the main mechanisms of the scheme?		

Explain why the scheme is (or has been) successful or unsuccessful?

What have been specific outcomes of the scheme?

Are there, or have there been, any follow-up or changes to the scheme?

Has there been an evaluation or report of the scheme? (Please provide details)

Transferability: Do you envisage there would be any problems transferring the scheme to other countries/contexts? (For successful schemes only)

<p>Other Comments:</p>
<p>Completed by: (Name, email address)</p>

Annex 2 Typology of Policy Programmes and Mechanisms

Table A2.1 Typology of Public Research Links with Industry

Public Research Links with Industry: A Typology and Classification		
1. Organisational Initiatives		
1.1	Public to Private	
1.1.1		Incubators
1.1.2		Spin-Offs
1.1.3		Others
1.2	Private to Public	
1.2.1		Embedded Units
1.2.2		Others
1.3	Centres of Excellence	
1.3.1		Physical
1.3.2		Virtual
1.4	Public Research Realignment	
1.5	Sector Specific Schemes	
2. Fostering Linkages		
2.1	Links I: Personnel Mobility	
2.1.1		Public to Private
2.1.2		Private to Public
2.1.3		Transnational Mobility
2.2	Links II: Networks and Partnerships	
2.3	Links III: Clusters	
2.4	Links IV: Knowledge Transfer	
2.5	Links V: Other	
3. Stimulating Private Sector Participation		
3.1	Benefits of R&D	
3.2	Involvement in Policy Formation	

Annex 3 Changes in the Institutional and Operational Structures of the Public Research Base

Table A3.1 Recent Changes in the Higher Education System in Europe

Country	Date/Title	Comments
Austria	2002, The University Act	Provides greater autonomy and freedom to universities. In 2004 they became independent legal entities free to run their own affairs, but with performance agreements between the university and the Ministry of Education, Science and Culture. New funding arrangements are also in place together with new organisational structures.
Belgium	2003, Decree 4 April	Flanders: Regrouping of universities from 4 to 2; shortening of degree length; new funding system in operation; harmonisation of the higher education system with co-operative formation of entities: hogescholen
Denmark	2003, University Act	Improve flexibility of universities; each university will have its own development contract
France	1999, Innovation Law	The law has allowed the creation of SAICs* to structure and manage the valorisation efforts of HEIs; establishment of long term research-industry Technological Research Teams (ERT)
Germany	1998, 4 th Amendment of the Framework Act for Higher Education, HRG	Broad scope for Lander to be involved in higher education management; reform of university budgets and decentralisation of control; performance related pay for professor; more support for younger academics; realignment of teaching to Bologna framework
Greece	2002-6	Supporting entrepreneurial ideas through tertiary education structures
Ireland	2002-6, National Development Plan (NDP)	Within NDP three new areas relating to higher education: PRTL I Funding of 3 rd Level Institutions; Science Foundation Ireland; Commercialisation Fund run by Enterprise Ireland
Italy	1999, Law 599	Confirms and enhances autonomy of the Universities. Three degree levels are introduced: i) Professors can be selected directly by each University. ii) Mechanisms for the University evaluation have been introduced and research funding is given on a national competitive basis (PRIN). iii) More support for links with industries (such as doctorates, PhD and Centres of Excellence).

Table A3.1 Recent Changes in the Higher Education System in Europe (Continued)

Country	Date/Title	Comments
Netherlands	2003, Science White Paper	Introduction of performance related funding of universities (also related to public-private R&D-cooperation) and the transfer of knowledge to society ("valorisation"). This latter role is now one of the three main tasks of universities, and will be clarified and also is explicitly taken up in the new formula for funding of universities.
Norway	2003, Quality Reform	Arising from 2002 the Bernt Commission: commercialisation should be an integrated part of a university's and college's remit; new funding formula; internationalisation of Norwegian universities
Spain	New Law of Universities	New law encourages: mobility of researchers; engagement of professors to undertake mainly R&D; hiring of technicians to support research; establishment of 'mixed' public-private centres in universities; and creation of new start-ups from universities
Sweden	1996, Higher Education Act	Formal acknowledgement that HEIs should 'co-operate with the surrounding society' confirming the 'third mission' role of universities and colleges
UK	1999-ongoing	Further changes in 'Third Leg' funding: HEIF - 89 universities been supported in a range of activities including improving intellectual property infrastructure and the creation of 5 University Innovation Centres; Science Enterprise Challenge created in 1999

Notes:

- * Services d'activités industrielles et commerciales

Table A3.2 Examples of Recent Changes in the Structure and Operation of Public Research Institutions in Europe*

Country	Date/Title	Comments
Denmark	2002, Danish Growth Strategy	Each Government research institute to be governed by an independent board of directors. Funds for public research made available above the basic grant are to be offered on a competitive basis between the public research institutions.
Greece	2001, Law 2919/2001; Presidential Decree 17/2001	The law seeks to promote better linkages between research and production. There also has been a reorganisation and concentration of independent research centres. Incentives for greater exploitation of new knowledge and research results provided together with development of high-technology incubator and technology parks and support for public research and university spin-off companies. The general Secretariat for Research and Technology (GRST) in addition to managing the above, also operates the Operational Competitiveness Programme (2002-6) which seeks to upgrade public research centres, develop centres of excellence and make them more competitive.
France	1999, Innovation and Research Law (Law no. 99-587)	One of the objectives of this Law is to increase collaboration between public research institutes and private companies. To increase and improve the dissemination of research results for economic prosperity.
Ireland	2003, National Code of Practice	The Irish Council for Science, Technology and Innovation recommended the introduction of a National Code of Practice for the management of Intellectual Property. Promoted by recognition that there was an absence of systems in place in Ireland to support the identification and exploitation of IP from publicly funded research. This new measure is aimed at public research institutes, universities and institutes of technology.
Italy	2003, Acts 127/2003, 128,2003, 257/2003 Review of Public Research Institutes	Reform and reorganisation of CNR, (the largest public research institute), the National Institute of Astronomy and Astrophysics and the Italian Space Agency to facilitate greater participation in major international research networks. The reforms are characterised by a more managerial approach allowing scientists to formulate projects.
Netherlands	2004, Evaluation Committee led by Mr. Wijffels	The recently conducted evaluation of the public research institutes for applied research will lead to a fundamental change from institutional to demand oriented programme funding.

Notes:

- * Excluding higher education (see Table A3.1)

Table A3.2 Examples of Recent Changes in the Structure and Operation of Public Research Institutions in Europe* (Continued)

Country	Date/Title	Comments
Slovenia	2001 onwards	Ongoing changes to the running of public research organisations under the following: The Strategy for the Economic Development of Slovenia (2001); The National Development Plan 2001-2006 (2001); Research and Development Activities Act (2002); Single Programming Document 2004-2006 (2003); National R&D Programme 2004-2008 (in preparation)
Spain	2002, Normative Amendment to the Science Law	The amendment to the Science Law broadens the scope for public research organisations to participate in or create firms. Previous restrictions meant that public research organisations could only take part in firms related to technical services or with research aims. Now the company's aims may include the transfer and exploitation of patents, innovations, scientific knowledge and industrial property rights.
Sweden	2001-2, R&D and Co-operation in the Innovation System	Reorganisation of the structure of public funding for RTD. This bill focuses on the role of the semi-public industrial research institutes and the Swedish Agency for Innovation Systems (VINNOVA). The research institutes were to be restructured to create a flexible and efficient structure with a few internationally competitive institutes that have strong industrial support.
UK	1998, Strategic Defence Review, MoD	Division of Defence Research Establishment into two organisations the Defence Science and Technology Laboratory and Qinetiq, a public private partnership. In 2003 the UK introduced a new initiative Defence Technology Centres to encourage collaboration across sectors to generate, develop and exploit innovative technology for UK Defence. The UK has a Continuing programme of privatisation of government research establishments and active support for commercialisation of IP in public sector research institutions.

Notes:

- * Excluding higher education (see Table A3.1)