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# CREST report

on the application of the open  
method of coordination in favour  
of the Barcelona research  
investment objective

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European Union  
Scientific and Technical Research Committee

**CREST**

CREST is an advisory body whose function is to assist the Council and the Commission in performing the tasks incumbent on them in the sphere of RTD.

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# Executive summary

Following the Commission's action plan concerning the Barcelona objective of increasing R&D investment in the EU with the aim of approaching 3 % of GDP by 2010 and subsequent conclusions by the European Council and the Competitiveness Council, CREST was asked to act as an operational interface to define and oversee the implementation of the open method of co-ordination (OMC) in respect of the 3% objective

The CREST report on the first cycle of the implementation of the OMC to the 3% objective contains the following 30 recommendations grouped in five areas:

## 1\_ Public research spending and policy mixes

- R 1 Establish a common understanding on the design and implementation of national policy mixes in order to improve their monitoring, assessment and governance;
- R 2 Share information on novel ways of raising funds for R&D-purposes; adopt a commonly accepted definition of "knowledge-related activities" (KRA);
- R 3 Improve the coherence of the processes and techniques used by Member States to estimate public budget R&D needs, ensuring complementarity of national and EU funds;
- R 4 Set out and document how State aid has been successfully redirected towards R&D programmes in some Member States

## 2\_ Public research base and its links to industry

- R 5 Encourage the reform of public research centres and universities, in particular for promoting transfer of knowledge to society and industry
- R 6 Involve the private sector in shaping public research programmes

## 3\_ Fiscal measures and research

- R 7 Consider the needs of new and early-growth research-intensive firms when designing fiscal incentives;
- R 8 Achieve clearer and more verifiable objectives for fiscal measures to support R&D, to support the evaluation process. Evaluation methods, policy design and implementation can be improved by sharing lessons, data and experiences
- R 9 Review fiscal measures on territorial restrictions in the light of the clarifications provided by the Workshop on Territoriality;
- R 10 Intensify efforts to track the budgetary cost of fiscal measures and share the information as part of the OMC process.

## 4\_ Intellectual property and research

- R 11 Improve the coherence and effectiveness of IPR ownership regimes applicable in publicly funded research;
- R 12 Member States should earmark funding for the management of knowledge and IPR;
- R 13 Collect data in a coordinated way and develop IPR performance indicators;
- R 14 Establish mechanisms for promoting management of IPR in public research organisations (PROs);
- R 15 Promote the validation of European guidelines for management and exploitation of IPR in PROs and public-private partnerships by stakeholders;
- R 16 Basic awareness-training on IPR and technology transfer for every student;
- R 17 Recognise IPR and technology transfer activities in appraising the performance of researchers;
- R 18 Promote the accreditation of technology transfer professionals on a Europe-wide basis.

## 5\_ SMEs and research

- R 19 Tailor policies better to suit the diversity of SMEs;
- R 20 Encourage all types of SME to be involved with R&D activities. Special attention to SMEs with high growth potential. Use dedicated schemes to address specific needs of start-ups, new technology-based firms, and spin-offs;
- R 21 Programme stability, where justified should be kept, by avoiding radical and frequent changes in SME-supporting schemes;
- R 22 Specific measures for encouraging participation by SMEs, user-friendliness, and two-step evaluation procedures;
- R 23 Facilitate the insertion of skilled R&D personnel into SMEs;
- R 24 Demonstration projects and prototype construction by SMEs;
- R 25 Support technological support services in SMEs;
- R 26 Prioritise R&D and innovation performed by SMEs through the new structural funds regulation (2007-2013);
- R 27 Improve access for SMEs to capital, in particular to venture capital. SMEs with high/rapid growth should be targeted;
- R 28 Non-distorting measures to dynamise early-stage investment in new technology based firms (NTBFs);
- R 29 Make extended and systemic use of loan-guarantees and counter-guarantees for venture capital funds;
- R 30 Launch awareness initiatives in public-private partnership for promoting venture capital financing.

# Background

## 1\_

Research and technological innovation are key drivers of economic growth and central to the goal set at the Lisbon Summit of becoming the “most competitive and dynamic knowledge-based economy in the world”<sup>1</sup>. The Barcelona European Council in March 2002, recognising the relatively low levels of investment in R&D by Europe compared with major global competitors, set an ambitious and challenging objective for the Union to increase its investment in research and development towards 3% of GDP by 2010<sup>2</sup>.

## 2\_

In the context of the Commission’s Action Plan for reaching the Barcelona objective<sup>3</sup>, and recognising that primary competence for policy in this area lies with Member States, the Spring European Council of 2003 called for the Open Method of Coordination (OMC) to be used in support of research and development policy-making<sup>4</sup>.

## 3\_

OMC is the soft governance tool, agreed between Member States in Lisbon, to ensure satisfactory progress in policy areas which are primarily of Member State competence. OMC involves:

- \_ “fixing guidelines for the Union combined with specific timetables for achieving the goals which they set in the short, medium and long terms;
- \_ establishing, where appropriate, quantitative and qualitative indicators and benchmarks against the best in the world and tailored to the needs of different Member States and sectors as a means of comparing best practice;
- \_ translating these European guidelines into national and regional policies by setting specific targets and adopting measures, taking into account national and regional differences;
- \_ periodic monitoring, evaluation and peer review organised as mutual learning processes”.

## 4\_

The Competitiveness Council<sup>5</sup> proposed that CREST, with its existing mandate to coordinate Member States policy-making, should act as the operational interface between Member States when applying the OMC to policies supporting the Barcelona objective.

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<sup>1</sup> Lisbon European Council Conclusions, March 2000

<sup>2</sup> Barcelona European Council Conclusions, March 2002

<sup>3</sup> COM (2003) 226 final. “Investing in research: an action plan for Europe”

<sup>4</sup> Presidency Conclusions of Brussels European Council of 22-23 March 2003

<sup>5</sup> Council Resolution of 22 September 2003. “Investment in Research in Europe”

# Application of OMC

## 5\_

No fixed model for the application of OMC to research policy has been established by the Union. However, the following outline can be envisaged in the context the Barcelona objective:

- \_ the agreed goal for the Union is the 3% target (2/3 private sector) and the Action Plan can be interpreted as guidelines for reaching this goal;
- \_ existing indicators for R&D investment (GERD, BERD etc) can be used to monitor progress towards this target;
- \_ Member States have translated the 3% goal and Action Plan into national and regional policies by setting targets and adopting measures, taking into account national and regional differences;
- \_ Member States, through CREST, have now established a process of reporting, monitoring and benchmarking of policies organised as mutual learning processes.

## 6\_

As the foundation of this first application of OMC to research policy, CREST organised a monitoring exercise with respect to Member States' progress toward the Barcelona objective (a "snapshot") and established a number of Expert Groups, comprising national policy-makers in five areas:

- \_ public research spending and policy mixes;
- \_ public research base and its links to industry;
- \_ fiscal measures and research;
- \_ intellectual property and research;
- \_ SMEs and research.

The Expert Groups discussed policy-making at national level that would underpin a number of the actions contained in Action Plan and engaged in a process of benchmarking and mutual learning.

## 7\_

Recognising the fundamental importance of human resources to the Barcelona objective, CREST has also considered the ongoing and parallel work of the Steering Group on Human Resources and Mobility, which has adopted the principles of OMC to guide its work-plan.

# Output of OMC

8\_

The “snapshot” of Member States’ progress in raising R&D investment provided a mixed picture – clearly showing that significant efforts are being made across Europe in support of the Barcelona objective (particularly in some of the new Member States) but suggesting that these efforts may not be sufficient to meet the objective in numerical terms<sup>6</sup>.

9\_

The work of the Expert Groups has led to the exchange of information between Member States and a mutual learning process. It has also led to the identification of good practice and the formulation of more detailed recommendations for action or further work that will underpin the 3% Action Plan. The output of the Expert Groups is detailed in their final reports to CREST.

10\_

The work of the Steering Group on Human Resources and Mobility has led to benchmarking of national policies and to a number of initiatives at the Community level. The output of the SGHRM is detailed in their report to CREST<sup>7</sup>.

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<sup>6</sup> R&D investments targets and current trends. Research Directorate-General. 24 September 2004.

<sup>7</sup> Report of the Steering Group on Human Resources and Mobility in the ERA. Brussels, June 2004.

# CREST Recommendations

## 11\_

CREST has discussed the outputs described above and sets out a number of possible action-oriented recommendations at the end of this report that may be appropriate for a number of Member States to implement on a voluntary basis, taking into account their own national and regional contexts. These recommendations are grouped by both policy area and by the actions set out in the “3% Action Plan”.

# CREST Conclusions

## 12\_

CREST finds that the application of the OMC in this instance (“the first cycle”) has resulted in a number of concrete benefits to many Member States as they strive to increase investment in research. These include:

- \_ the establishment of networks of national policy-makers - who may now work together on a multilateral basis through OMC or in other formations;
- \_ the collection, collation and exchange of information on national policies – providing an evidence base for future policy-making;
- \_ the identification, through informal peer review, of good practices – adding value to that evidence base; and finally,
- \_ the identification of key issues and, in some instances, specific recommendations for the future.

## 13\_

CREST finds that the collection and analysis of data on the broad sweep of policy included in the first cycle, while useful as a range-finding exercise this time round, has resulted in a heavy workload (in some cases too heavy for smaller Member States to become involved) and prevented the detailed review of policies that may be necessary for optimal progress to be made.

## 14\_

CREST finds that the lack of clarity with respect to the RTD “model” for OMC has led to a certain degree of confusion among participants and some tension between the well-intentioned goal of CREST to produce clear recommendations for action, and the competence of Member States to make policy in their own national context.

## 15\_

CREST proposes that the future use of OMC in the above contexts be directed by a clear “model” and to that end will establish a sub-group to define such a model, bearing in mind the agreed principles of OMC “lite” (with respect to its voluntary nature and the administrative burden on Member States). This model should be developed before launching a second cycle and should:

- \_ focus on the priorities for evidence-based policy making in Member States;
- \_ enable more detailed examination of those Member States policies which are likely to have the greatest impact on increasing R&D levels;
- \_ facilitate greater use of the expertise of Member States policy-makers when assessing policies or policy mixes;
- \_ optimise the engagement and commitment of senior Member States policy-makers by balancing their involvement with appropriate external support;
- \_ provide clarity with regard to the requirement for and expected output of any groups established;
- \_ distinguish between the types of output that may be desirable for different policy areas (mutual learning only, convergence of national policies, mutually reinforcing Community and Member States action etc);
- \_ ensure optimal linkage to other related activity of the EU (e.g. Innovation Trendchart, scoreboards and policy forums) and other international bodies (e.g. OECD).



# CREST recommendations in the area of public research spending and policy mixes

## Actions 1 and 2

- Design policy mixes using, in a coherent way, various policy instruments, and develop interactions with policies put in place by other countries and at European level, notably through the OMC.
- Optimise the mix of financing instruments, taking into account the needs for different industry segments and developments in other countries and at European level.

## Recommendation 1

Establish a common understanding among MS on the design and implementation of national policy mixes in order to improve their monitoring, assessment and governance, through:

- Development of a ‘best practice’ template for National Reports to provide guidance on improving comparability, and rationalizing the collection and analysis of data. MS may wish to send their National Reports on R&D and Innovation policies related to the 3% objective, drawing on this guidance where useful, to CREST for discussion and advice;
- Development of appropriate methodologies, adapted to different scenarios and national contexts, for the monitoring and evaluation of national policy mixes with a view to their subsequent trial use in volunteer countries;
- Assessment by MS on a voluntary basis of the effectiveness of national governance structures and processes for the design, monitoring and evaluation of MS policy mixes, based on a commonly agreed methodology (e.g. peer review).

## Rationale

The need to improve the mix of policy instruments to support R&D goes hand in hand with the need to increase the public spending in research. Policy mix in most Member States is more often an outcome of autonomous policy developments than the result of a coherent and comprehensive design process. The effectiveness of public actions to promote R&D must be increased through the adequate combination of direct financial measures (either supply side e.g. R&D grants, conditioned loans; or demand side e.g. Public Technology Procurement), fiscal incentives, access to private financial market and other direct support (networking, information, awareness, advice).

Direct financial measures (collaborative R&D and Public Technology Procurement), combined with fiscal measures and State Aid rules that address market failures inhibiting innovation, can be used to increase existing R&D investment. Framework conditions (standards and regulations), support to public research (centres of excellence, human resources) and demand side direct financial measures (Public Technology Procurement) can all be used to attract international R&D intensive firms. To boost R&D in moderately R&D intensive firms and to bring new R&D performers, catalytic risk capital and guarantee instruments and other direct measures (information, networking, awareness) are well suited, together with measures to stimulate demand of innovative goods and the absorptive capacity of the R&D system.

Though there is a wide perception of the need to improve national innovation systems to make progress towards a knowledge-based society and the 3% target, the exploratory work carried out shows that, due to the complexity of the matter, the suggestions mainly deal with the process itself rather than with developing guidelines or identifying good practices. In this context, more strategic intelligence, mutual learning and common assessment procedures are needed in almost all actions. Therefore mutual learning within the OMC should continue to be the dominant activity in these policy areas, accompanied by more focused efforts to develop specific guidelines for implementation, identify and transfer good practices between Member States, and develop of suitable indicators of progress.

Obstacles may arise from a lack of appreciation and familiarity with the concept, process and techniques of the design, monitoring, evaluation and assessment of policy mixes, together with poor coordination and governance in the design and implementation of appropriate, effective and efficient policy mixes in some Member States.

## Examples

There are a number of reporting mechanisms, governance structures and assessment processes that can be considered within the design and fine-tuning of national policy mixes. These include:

- \_ National Reports on R&D and Innovation activities and policy mix portfolio evaluations (DE, UK, NL);
- \_ Horizontal coordination of different Ministries entrusted with different parts of the policy mix (Science & Technology Policy Council FI, Inter-ministerial Commission in many countries);
- \_ Peer review on the impact of holistic policy mixes on innovation system performance (OECD).

While it is true that policy mixes that work in one setting cannot be directly transferred to different settings, this does not mean that useful lessons concerning the appropriateness of specific policy mixes cannot be derived from analysis of their efficacy in specific settings.

## Action 3

Encourage and monitor the refocusing of public spending towards knowledge, notably research and innovation.

## Recommendation 2

The sharing of information on novel ways of raising funds for R&D and the adoption of a commonly accepted definition of knowledge-related activities (KRA) including higher education, research and innovation and associated set of indicators, in order to:

- Track and compare efforts of MS to refocus public spend towards KRA as productive investment for future economic growth and employment, as compared with other policy areas, catalyzing the adoption of innovative ways to raise R&D funds;
- Guide the redesign of National Plans for R&D and Innovation in the light of the Lisbon process and Barcelona target. Inclusion of the National Development Plans produced to use structural funds within the national policy mixes for R&D and Innovation.

## Rationale

The refocusing of public spend towards KRA is hindered by a lack of consensus on their definition. In several Member States, the governance of funds allocated to KRA is fragmented among different major components: education, R&D, innovation and ICT, while others include additional activities such as public procurement, research infrastructures, etc. As a result there is a lack of the coordination needed to ensure the adequate monitoring and comparison of the efficiency and throughput of the allocated public spend to each aspect. This fragmentation in the governance of funds allocated to KRA makes it difficult to compete with other policy priorities to refocus public spend towards KRA.

The setting up of KRA composite, synthetic indicators, considering both tangible and intangible goods, to benchmark EU and national knowledge related policies, should be used to monitor the Member States commitment in the process. Given the complexity of the subject, the elaboration of definitions and indicators is a matter for specialists in the field and is likely to require the involvement of the Commission (incl. Eurostat), the OECD and national statistical offices.

Obstacles may arise from the lack of an internationally acceptable accounting framework for KRA, allowing the refocusing of public spend from non-KRA activities and within KRA main components to be assessed.

## Examples

There are a number of attempts aimed to refocus public spend and indicators to monitor the refocusing of funds to KRA, including:

- \_ Innovation Scoreboard and Trend Chart (DG Enterprise Commission);
- \_ Knowledge Indicators (OECD “Investment in knowledge”, DG Research Composite indicators on KRA);
- \_ National R&D and Innovation Plans (many countries, ES);
- \_ Dedicated funds for KRA (many countries, DK, NO);
- \_ Transfer from other budgets (PT, LI, HU, UK);
- \_ Increase tax yields (R&D tax on fish and agricultural products, NO).

## Action 4

Analyse and discuss with Member States the public budget requirements for attaining the 3% objective and the repartition of roles and efforts between national and Community levels until 2010.

## Recommendation 3

Improve the coherence of the processes and techniques used by MS to estimate public budget R&D needs in the light of potential increases in EU R&D and Innovation budgets and Structural Funds, ensuring additionality and complementarity of national and EU funds:

- Elaborate simulation analysis of the contribution of the expected EU funding for R&D and Innovation to the overall public R&D effort needed to reach the Barcelona target, including the leverage effect in private investment and the right balance between national and EU funding;
- Benchmark the tools and processes used in MS to estimate public R&D budget needs.

## Rationale

Budgetary priority settings among Member States for R&D do not always estimate the implications of expected changes in EU R&D and Innovation budgets and Structural Funds or the leverage effect of public spending in private investment.

The need to co-finance EU R&D&I budgets makes EU funding important to fulfil national R&D expenditure targets, especially in new Member States. Therefore, the National Development Plans (R&D&I parts) produced for the use of Structural Funds should be integrated within national R&D&I strategies.

Obstacles may arise from public budget constraints during a period of slow economic growth.

## Examples

Some existing practices can be considered to analyse the public budget needs towards the 3% target:

- Attempts to leverage private funding by charities and sectoral associations (ES, FR);
- Stakeholders consultation (SE, NL);
- Foresight exercises in priority setting and public budget needs (IE, PL);
- Surveys on the absorptive capacity of the R&D community (SI, ES, PT).

## Action 5

Redirect State aid towards R&D as part of the more general redirection of State aid towards horizontal objectives.

## Recommendation 4

Elaborate a track record of success on how State aid has been redirected towards R&D programmes in some MS, with a view to preparing a guide for other Member States.

## Rationale

Within a general shift from sectoral to horizontal support, redirection of State aid towards R&D&I has to compete with other horizontal activities (environment, energy saving, employment, training, regional development,..).

Redirection of State aid towards horizontal objectives to deal with specific features of R&D&I, addressing programmes rather than individual enterprises (i.e. start-ups, SMEs innovation,..) should be enhanced as they can constitute an effective support to business research.

Obstacles may arise from a reluctance in some Member States to State aid and from the absence of specific efforts for redirection of State aid towards R&D&I in most Member States.

## Examples

There are some examples of redirection of State aid to R&D as a priority in competence with other forms of horizontal support (FI, AT, NL).

# CREST recommendations in the area of public research base and its links to industry

## Action 6

Pursue or initiate necessary regulatory and administrative reforms, and support measures to enable public research institutions to develop more effective links with industry, in particular SMEs, while safeguarding their public mission in education and fundamental research.

## Recommendation 5

Encourage the reform of public research centres and universities, in particular to promote the transfer of knowledge to society facilitating the possible exploitation of their research by industry, through:

- Develop guidelines at EU level on commercialization and incentive strategies in public research centres and universities as a basis for the definition of specific policy mechanisms and facilitating the transfer of good practices between Member States.
- Special attention should be given to establish mechanisms to promote IPR management in public research centres and universities (see recommendation 11) and to the validation of EU guidelines for the management and exploitation of IPR in public research organizations and public-private partnerships (see recommendation 15).
- Reinforce the role and transnational networking of Knowledge Intermediaries in the Public-Private Interface. The model of the role played by Garching Innovation within the Max-Planck-Institutes - as both a mediator and advisor between public research institutes and industry - can provide a basis for developing specific guidelines and facilitating transfer of good practices between Member States.
- Transnational networking should be achieved through increased collaboration of existing Technology Transfer Associations at EU level (see recommendation 15). To reinforce the role of Knowledge Intermediaries in the Public-Private Interface, there is a need to improve the professional skills on IPR and Technology Transfer of their people (see recommendation 18).
- Reinforce the valorization of public research promoting the creation of new, fast growing R&D intensive firms from the public R&D sector, i.e. high tech start-ups and spin-offs.
- The valorization of public research should be based on the collection of data measuring the activities of technology transfer organizations (see recommendation 13) and on considerations of the economic impact of these activities (see recommendation 14).
- Launch a voluntary peer review process in relation to public research reform. Its objective should be to identify the most effective elements of the various reform approaches undertaken by Member States.

## Rationale

The public research base is a major source of knowledge and resources in Europe. While there is little difference between US and the EU in the funding level as % of GDP of public research, the issue is how to convert European excellence in science into technologically driven innovation. There is a need to capitalize fundamental research, normally performed by the public sector, through reform of steering and funding of public research centres and universities. The supply of new knowledge and its adaptation to business needs should be pursued by public research centres and universities as major creators and suppliers of scientific knowledge.

Though reform of public research organizations (PROs) is under way in many countries (Sweden, Finland, Austria, UK,...), it seems that there is insufficient exchange of ideas on commercialization and valorization of public research, leading to a need for guidelines to be developed at European level on commercialization and incentives strategies in public research centres and universities. These could be used as a basis for developing specific policy mechanisms to create a public research base better tuned to the knowledge-based economy with improved links with industry.

The public R&D sector must be more efficient in its various remits: i) as an operator of R&D; ii) in providing knowledge and resources to the industry and iii) as a generator of private sector research activities (licensing, spin-offs, commercialization,...). The so called "third role" of universities (i.e. transferring knowledge to society, as well as teaching and performing research) needs to be promoted. This will involve, amongst other things, improving incentive structures for public researchers to consider the exploitation potential of their work in collaboration with industry, and the removal of administrative and legal barriers impeding the development of effective partnerships with industry.

Obstacles may arise from the perceived gap between knowledge- or curiosity-driven public research and innovation as a business process. This is largely due to the mutual lack of understanding of common interests between academia and industry. In academia R&D is often viewed as a freely available public good, arising from diffusion in open publications. Industry, however, are concerned by the uncertain commercial success of any research they may purchase.

## Examples

There are a number of schemes aimed at increasing the level and efficiency of university and public research centres cooperation with industry in many countries, which use the same type of instruments adapted to local contexts. These include:

- Responsibility of universities for the exploitation of their research and assessment of performance of public research centres not only based on scientific achievement but for their exploitation (IE);
- Establish goals for public-private collaboration for Research Councils funding allocation (UK, NO);
- Schemes targeted to bring new R&D performers (MOBI NO) involving contract research organizations as service providers, can be well fitted for SMEs in low to medium tech sectors in all EU countries;

- Schemes aimed at reinforcing the role of Knowledge Intermediaries, such as Garching Innovation - Max Planck's technology transfer organization - to strengthen transfer of research results to industry through spin-offs, taking care of patenting and commercialization agreements between Max Planck Institutes and the industry;
- National Incubator schemes as VINNOVA, the Swedish Incubator Programme, targeting universities, researches, large firms, SMEs and science parks. Development of scientifically-based business ideas, start-ups and spin-offs into companies implementing international best practices to increase key competences for incubator companies;
- Schemes to strengthen and create new public-private partnerships (science parks in many countries, K plus Competence Centres AT, Science Enterprise Challenge UK, Technological Research and Innovation Networks FR) involving service providers and encouraging entrepreneurship among scientists.

It would be advisable when developing new schemes to assess the conditions for successful transfer of existing schemes, through concerted actions among Member States involving experts from both the country generating the scheme and the country where it is intended to be applied. The risk of not doing so is to imitate policies and measures adopted in other countries whilst neglecting local structural deficiencies.

## Action 7

Increase the participation of industry and other stakeholders in the determination of priorities for public research.

## Recommendation 6

To involve private sector in shaping public research programmes, through:

- Increase the awareness that public research centres and universities can be valuable sources of knowledge and resources to satisfy industry technology needs. In this regard, the Irish R&D Awareness campaign provides a useful starting point for drawing up a European code of practice in relation to R&D awareness among below average R&D intensity enterprises;
- Involve industry associations and other stakeholders in the design and priority setting of the national R&D programmes to get them more demand oriented and business-relevant. The TEKES National Technology Programmes model provides a useful basis for developing guidelines to encourage a wider set of enterprises to participate in public research priority-setting at national level.

## Rationale

To close the gap between the public research base and industry there is a need to bridge policies, thus strengthening the links between actors (public, private) and activities. This allows user needs to influence knowledge production and knowledge production capabilities to influence user expectations and demands.

On the business level there is a need for both better awareness and appreciation of public R&D. Very often firms find difficulties in incorporating technologies and accessing public sector knowledge. Public sector knowledge is sometimes considered by firms only as a source of basic knowledge which is not directly applicable, and of highly educated students. Therefore, besides trying to involve the private sector in shaping public research activities and priority setting, there is a need for firms to recognize the possible value of public R&D to satisfy their technology needs, so that they realize the value in participating in and influencing public R&D programmes.

Obstacles may arise from concerns over the possible domination of large firms or special interest groups in the shaping of national programmes.

## Examples

There are a number of schemes aimed at increasing the awareness of the value of public R&D. Among them, the Irish R&D Awareness Campaign is well suited for non R&D performing SMEs in the low to medium tech sectors. It is based on a series of regional briefings to demonstrate the benefits of undertaking R&D as a business function to local companies.

TEKES National Technology Programmes (Finland). Demand oriented multi-project programmes planned and implemented in collaboration with companies, public research centres, universities and TEKES. Grants are offered for research work at public research centres and universities, complemented with capital loans and industrial loans.

## Areas to be focused on in the second cycle:

The work of the Expert Group focused on the two actions above during the first phase of the OMC process, postponing the consideration of three actions of the Action Plan under the heading of “The public research base and its links with industry”, to the next phase. Preliminary discussions on these three actions are outlined below, for consideration by CREST in the second cycle.

## Action 8

Eliminate rules and practices in national programmes that impede European cooperation and technology transfer, and allow funding of organisations from other Member States where appropriate.

### Considerations on Action 8

The excessive fragmentation of the public research sector in the EU has to be addressed. The arguments of balance, critical mass and need of integrating research used to launch the concept of the European Research Area and the design of the Sixth Framework Programme (FP6), have to be considered also at national level. National R&D Programmes account for more than three quarters of the total R&D competitive expenditure in the EU and are largely constricted within national boundaries.

While there are some initiatives at EU level, e.g. CREST initiatives on opening up of national RTD programmes and ERA-NET Coordination Actions within FP6, there are very few national RTD programmes really addressing trans-national collaboration (Plant Genomics ES, FR, DE). Cross funding e.g. the upper level of cooperation of ERA-NET initiatives is not yet widely implemented.

Obstacles may arise from the present administrative and legal barriers to effectively open national RTD programmes to foreign research groups in most Member States.

Therefore CREST could consider promoting the mutual, voluntary and progressive opening-up of national R&D programmes to trans-national collaboration of public and private research groups. It is suggested that the following aspects be given priority in the second cycle:

- \_ Analysing the usefulness, problems and efficiency of the present ERA-NET schemes for the coordination of national RTD programmes with a view to develop guidance on the reform of national RTD programmes, and to remove barriers to transnational collaboration between public R&D institutions in different countries;
- \_ Launching of cross-border research and technology transfer initiatives between the public and private sector, either by means of the existing FP6 schemes (ERA-NET) or through concerted actions among interested countries;
- \_ This type of trans-national technology transfer initiatives should consider barriers such as the “professor’s privilege” / institutional ownership regimes (see recommendation 11 of the IPR and research section of this report).

## Action 9

Gear more research programmes towards the constitution of poles and networks of excellence by encouraging clustering or integration of resources at regional, national and European levels.

### Considerations on Action 9

National R&D capacities are most often insufficient to create world-class poles of excellence with the critical mass to act as growth poles for university-industrial R&D agglomerates. Though “islands of excellence” do exist, there is a lack of economies of scale in equipment and resources needed for interdisciplinarity and interface with industry.

At EU and national levels, a tension should be recognised between the consolidation of pre-existing excellence and the development of new potential. Appropriate policies, both to promote the concentration of excellence and to allow new potential to flourish, should be developed, promoting the creation of a distributed research capacity also increasing the R&D average performance within the EU. There are some interesting initiatives at EU level, under the Research Infrastructures Programme and Networks of Excellence within FP6.

Obstacles may arise from the possible regional disparities linked to excessive concentration of resources in specific settings.

It is suggested that during the second cycle, CREST could consider focusing its efforts on promoting the creation of a public research infrastructure in the EU, with an appropriate balance between centres of excellence and dispersed research capabilities to facilitate technology and innovation diffusion, through:

- Concentration of resources in centres of excellence which can attract international business R&D;
- Promotion of distributed research capacities to facilitate technology transfer and generate a demand for more public and private R&D.

## Action 10

Enhance the innovation impact of R&D programmes by encouraging and supporting the integration of innovation-oriented activities in research projects (e.g. knowledge management and diffusion, training activities, take-up measures for SMEs).

### Considerations on Action 10

There is a need for specific measures to support public research directed to industry, i.e. with conditions attached to increase the benefit of the industry, increasing the impact of public research. The ability of businesses to innovate depends not only on their internal research capabilities but also on the existence of a dynamic market of knowledge. Finding or using new technologies and knowledge-sharing or networking are among the most difficult problems faced by European managers. European excellence existing in certain knowledge areas within the public sector must be identified, analyzed with a view to its possible application to innovation, and diffused to the business sector.

The creation of a dynamic market for knowledge, where knowledge flows are facilitated between science and industry and within industry, depends, among other aspects, on the increase of the innovation impact of research programmes at EU, national and regional levels.

There are some initiatives at EU level, under the Research and Innovation Programme with pan-European networks and take-up measures for SMEs in Integrated Projects, within FP6. There are also National Innovation Action Plans (NL, IE, FR, DE, UK). Regional Innovation schemes exist, aimed at technology transfer, networking and clustering with neither enough specialization nor emphasis in absorption of technologies by businesses. Targeted business-oriented research programmes are carried out by public research centres and universities (IE, UK, NL,...).

To stimulate the supply and share of new knowledge, its identification, adaptation to business needs, facilitation of knowledge transfer and absorption by industry, while designing and implementing national and EU R&D programmes, it is suggested that in the second cycle CREST could focus on:

- \_ Linking national and regional research and innovation programmes, through existing mechanisms (IRC, Technology platforms, IRE, clusters, networks...);
- \_ Enhance the “innovation and SME” aspect in research programmes at EU and national levels, including specific activities to foster innovation: management of IPR, technology mediation, take-up measures, innovation help-desk, training,...

# CREST recommendations in the area of fiscal measures and research

Fiscal measures are an increasingly important part of Member States' innovation policy mix. These measures can stimulate private sector investment in R&D and existing evidence clearly points to additional R&D spend in response to an effective reduction in the cost of R&D activity.

## Action 11

Encourage a concerted use of fiscal incentives to address research policy issues of common interest, notably to:

- \_ encourage the creation and early growth of research-intensive firms;
- \_ facilitate fund raising by new or existing foundations supporting R&D activities in Europe;
- \_ raise the attractiveness of research careers.

## Recommendation 7

**Member States should consider the needs and especially the financial situation of new and early-growth research-intensive firms in the design of any fiscal measures to support R&D.**

## Rationale

The creation and early growth of R&D-intensive firms is a key issue in the innovation policy of many Member States. Fiscal measures may be particularly suitable for this type of firm as such measures are generally easier to access than direct support and cost less to administer. However, careful design is required to ensure benefit to this category of firms for which profit is often a distant expectation. A wider use of such measures in Europe may facilitate the growth of such firms through creation of subsidiaries in other Member States.

## Examples

A number of existing schemes assist early-stage companies despite their lack of profitability – these include the UK payable tax credit (which allows SMEs to benefit “up front” and reduce the cash cost of their R&D) and the Netherlands WSBO scheme (which reduces the wage cost of R&D and is therefore not affected by the income of the company).

## Action 12

Improve fiscal measures for research on the basis of:

- \_ formal evaluations, whose results should be disclosed;
- \_ mutual learning;
- \_ the application of principles of good design such as simplicity, low administrative cost and stability.

## Recommendation 8

Where Member States implement fiscal measures to promote R&D, those measures should have clear policy objectives, targets and indicators to support the evaluation process, and should involve the collection of data required for this evaluation from the date of launch. Member States should share the lessons learned from policy evaluations in an open and voluntary way to ensure that experiences can lead to improvements in both evaluation methods and policy design and implementation.

## Rationale

As most Member States have fiscal measures and there is a degree of variation in the design of these measures, the scope for mutual learning (and therefore improvement in national policies) is great. However, the majority of existing measures are relatively new and few have been evaluated. This results in a lack of objective information on effectiveness and efficiency which, in turn, hinders the identification of “best practice” that could be extrapolated between countries.

## Examples

The Dutch WSBO scheme was evaluated using a combination of methods – econometric analyses, telephone surveys, desk research and interviews. One of the results of this evaluation was that around 1.02 of additional R&D is generated for every 1.00 of WSBO cost. The Norwegian Skattefunn scheme is currently being evaluated using a mix of before and after studies and “quasi experiments” based on discontinuities in the design of the scheme over time.

## Recommendation 9

Recognising the current uncertainty as to whether territorial restrictions infringe the fundamental freedoms established by the Treaty, the Workshop on Territoriality set up by the Commission work to clarify the situation by setting out the principles by which infringement of the Treaty may be caused by such territorial restriction. In the light of this clarification, Member States should review their existing fiscal measures' compliance in this respect.

### Rationale

Direct taxation remains within the competence of Member States provided that they respect Community law, namely the Treaty rules on state aid and on fundamental freedoms. It is possible that the territorial restriction of a fiscal measure may infringe the fundamental freedoms of providing services and of establishment. The European Court of Justice has recently been asked to rule on such a question.

## Action 13

Disclose data on the budgetary cost of fiscal measures.

## Recommendation 10

Member States should intensify efforts to track the budgetary cost of fiscal measures and share this information as part of the OMC process.

## Rationale

It has been difficult to implement this action in the first cycle of OMC. Information on both the actual cost and the trends in cost over the lifetime of a scheme is essential for Member States' mutual learning as, together with evaluation results, it will indicate the cost effectiveness of different measures.

# CREST recommendations in the area of intellectual property and research

## Action 14

Develop recommendations to help Member States review – and, where appropriate, adapt – their national regimes governing the ownership, licensing and exploitation of IPR resulting from publicly-funded research, with the aim of promoting technology transfer to industry and spin-off creation.

## Recommendation 11

Improve the coherence and effectiveness of IPR ownership regimes applicable in publicly funded research. This can be done:

- By the production of clear legislation or guidelines for all PROs<sup>8</sup> (universities and others) in each Member State;
- By the regular exchange of experience and good practices between those countries having a “professor’s privilege” regime. Although the same basic principle – professor’s privilege – exists in a number of countries (FI, IT, EL, SE, RO), each one has peculiarities, and convergences between them should be promoted;
- By those countries with “professor’s privilege” regime making disclosure (to TTOs) of inventions and patents mandatory. This would permit PROs in “professor’s privilege” countries to have a better overview of the inventions developed by their staff, and possibly to play a role in promoting their exploitation. In particular, it would make it easier (e.g. for industry) to identify the owner of any results generated by a PRO in these countries;
- By those countries having a “professor’s privilege” system encouraging PROs making arrangements with researchers/professors so that they systematically assign their IP to the PRO or to its TTO, under clearly de-fined conditions. While doing so, transition to the institutional ownership regime should be promoted as a long term objective to such countries. Without requiring new legislation to be adopted, such a measure – to be taken individually by PROs – would have the same consequence as the replacement of the professor’s privilege regime by the institutional ownership regime. It could also be promoted by Member States including provisions in their funding regimes, which allocate the rights to the institution rather than to the professor. Institutional ownership appears to be emerging as the common practice worldwide.

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<sup>8</sup> Public Research Organisations

## Rationale

Recommendations related to this Action intend to introduce more coherence in the legal regimes defining the ownership of publicly funded research results, an essential parameter with a view to their exploitation. While most European countries are now adopting the “institutional ownership” regime (according to which the institutions, e.g. universities, own their results), a small number of countries still have the “professor’s privilege” (according to which researchers can own their results) or leave it up to the institutions to choose their own regime (UK). In addition, within a given country, it may happen that the regimes applicable to universities and to other PROs are not the same. This lack of uniformity does not facilitate R&D collaborations or technology transfer activities between organisations subject to different regimes, in the same country or in different countries.

## Recommendation 12

**Member States may consider that an earmarked percentage of their global public R&D financing will be devoted to the management of knowledge and IPR (technology transfer organisations and associations, incubators, etc.).**

## Rationale

Only in a handful of countries are PROs required to actively manage their knowledge and intellectual property. This causes many PROs to focus on the research itself whilst technology transfer is often ignored. Even where PROs are required or willing to promote the exploitation of their results, they are sometimes prevented to do so effectively because of a lack of resources.

It is clear that technology transfer offices (TTOs) of PROs should not be expected to be self-sustainable (at least not in the short to medium term) – even in the US only a small fraction of them are. The aim of increasing technology transfer in universities should be to promote the exploitation of R&D results in the wider interests of the society and economy, rather than merely making them commercial research entities. There is therefore a need to earmark a fraction of the public funding to ensure that the necessary management capacity is created and maintained in PROs, and to encourage them to actually manage and exploit their R&D results.

## Recommendation 13

**Detailed data relating to the activities of TTOs (patenting, licensing, spin-off creation, etc.) should be collected in a coordinated way, so as to be able to benchmark these activities against each other. IPR performance indicators should be developed at European level and be directly comparable to that collected by AUTM in North America<sup>9</sup>.**

## Rationale

This recommendation is linked to the previous one and envisages a metric to determine the success of the current measures, which are in place.

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<sup>9</sup> Only the UK collects and publishes reliable data which is directly comparable to the AUTM data. This has allowed policy makers to derive a number of useful conclusions about Technology Transfer in the UK and focus their efforts.

## Recommendation 14

Member States are advised to establish mechanisms to promote the management of Intellectual Property in PROs. To do this:

- Universities and other PROs are encouraged to establish their own guidelines regarding IPR management and exploitation. Public funding for technology transfer could be linked to such guidelines being in place at the PRO<sup>10</sup>. Furthermore, funding (in general) could make disclosure of profit-sharing arrangements between partners a mandatory requirement;
- National (and EC) R&D programmes and individual projects within them are advised to consider their economic / business impact due to IPR exploitation during evaluations.

### Rationale

At present, only a few Member States have introduced methods to promote the management of Intellectual Property rights within PROs linked to funding. Indeed, most countries merely promote it through awareness-raising mechanisms. However, linking such requirements to TT funding (in particular) would ensure that PROs take this “third stream activity” as a new core mission. Furthermore, evaluations (either mid-term or final) of projects rarely use independent business advisors, leaving business opportunities and potential sources of income/risk often unexplored. The use of external advisors (be they from business support units, business angels, etc.) would also provide researchers with more experience of interaction with business people – thus improving their understanding of business needs.

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<sup>10</sup> Such a mechanism has already been implemented in Ireland where the “National code of practice” can be applied on a voluntary basis, though it is a requirement to have implemented it to receive certain types of funding.

## Action 15

Support the development and implementation of European guidelines for the management and exploitation of IPR in Public Research Organisations and public-private partnerships. These guidelines will help public research institutions to develop and enforce, on a voluntary basis, charters setting out the main principles to be applied regarding the ownership and licensing of research results, the sharing of revenues, etc.

## Recommendation 15

Member States and the EC should promote the validation of the European guidelines being prepared by stakeholders. To do this:

- Member States are proposed to monitor the progress of the work on the guidelines with the aim of assisting their validation and eventual implementation. To this end Member States could undertake suitable initiatives (e.g. national workshops involving both industry and PROs) to raise awareness on these guidelines and discuss their implementation at a national level;
- Member States considering the development of new national guidelines may wish to do so on the basis of these European guidelines;
- The Commission should promote collaboration and networking among existing European technology transfer associations.

## Rationale

One way of facilitating university-industry relations – and of contributing to the creation of a shared market for R&D collaborations and technology transfer activities, at European scale – is to provide a basic set of common principles (e.g. working practices regarding IP management; the principles of IP ownership; management of equity shares in spin-outs; IPR valuation and evaluation of portfolios, etc.) which could be used as a reference in such relations. In this perspective, four important European associations (EUA, EARTO, EIRMA and ProTon) have grouped together and are in the process of creating European guidelines. Some Member States already have national guidelines on the same topic (e.g. FR, IE), and these European guidelines aim to build on them. European guidelines may be of great value to Member States who have no codes of practice / guidelines in place as they would promote a common reference for interaction across Europe.

The recommendation takes into account that only a minority of all European PROs can claim to have substantive expertise and professionalism in this field. When negotiating with industry, in particular, it is important for a less-experienced PRO to have some guidance regarding what it could accept and what it should claim from an industrial partner. This would reduce transaction costs (by simplifying negotiation) and render the PRO landscape more transparent to industrial companies.

Stakeholders are key to the successful development of such guidelines. However, for such guidelines to be implemented effectively in all countries, public authorities have an important role to play, by endorsing them and recommending their use, and, where appropriate, by taking legal or administrative measures (possibly including financial incentives).

## Actions 16 & 17

- Ensure that before graduating, every student – especially from science, engineering and business schools – receives basic awareness / training regarding intellectual property and technology transfer.
- Support EU-wide coordinated IPR / technology transfer awareness and training activities targeting in particular the European research community.

### Recommendation 16

**Member States should ensure that every student – especially from science, engineering and business schools – receives basic awareness / training regarding intellectual property and technology transfer before graduating.**

#### Rationale

University researchers and graduates are rarely aware of the relevance and importance of IPR with respect to their work. All fields of academia are affected to different extents: e.g. languages by copyright law; business studies by patents, trademarks, and copyright; sciences by patents, copyrights, plant varieties, etc. It is therefore recommended that all students should receive basic training in IPR and technology transfer.

One fundamental change to implement such awareness in academics and researchers would be through the modification of the existing research assessment exercises (RAE) conducted in Member States, and in particular of the performance appraisal criteria applicable to researchers.

### Recommendation 17

**Member States should ensure that researchers' activities relating to patenting, licensing, spin-off creation and the like will be duly taken into account for performance appraisal purposes, to the same extent as classical academic criteria such as publications and prizes.**

#### Rationale

This is not only useful for awareness-raising purposes but would result in more technology being transferred to companies by PROs. Indeed, the current situation – in which researchers are often assessed on the basis of purely academic criteria – discourages researchers from actively engaging in patenting, licensing and other innovation-related activities. Metrics, such as those proposed above, would be necessary to evaluate the success of such a change in the RAE.

Furthermore, to avoid duplication of work and ensure consistency in the messages being communicated in the frame of awareness and training activities, it is recommended that:

- Member States are advised to organise themselves to exchange any relevant IP/TT awareness / training material they would have developed (e.g. brochures, press campaigns), and preferably to jointly develop such material in the future;
- Member States and the relevant stakeholders (HEIs, EPO, relevant associations, etc.) are advised to collaborate to develop specific courses and programmes on IP/TT and ensure that they are accessible at a national level.

Even if Europe had the best possible legal regimes for IP/TT, this would not lead to any actual improvement in the way R&D results are exploited in Europe, unless users (researchers, etc.) understand these regimes and know how to best use them. While some coordination of these activities at a European scale is certainly useful and should be promoted (identification and diffusion of best practices, joint development of training material, etc.), it is at the level of each training institution (mainly universities, but possibly other kinds of education institutions as well) that measures need to be taken to ensure that every new scientist and engineer has at least a basic knowledge of what a patent, a licence, a spin-off, etc. is. National authorities have an important role to play in recommending training institutions to be more active in this area.

## Recommendation 18

**Member States and/or the Commission should promote the accreditation of technology transfer professionals on a Europe-wide basis, to facilitate exchange of personnel and experience, and promote mobility, across Europe.**

### Rationale

At present there is no means for PROs (or industry) to recognize which potential candidates have the basic skills required to manage the knowledge produced by researchers. Candidates are currently hired based on their ability to identify highly-specialized technological developments (e.g. biotech PhDs), on their legal skills, on their general communication abilities, etc. However, there is no means for other PROs (or industry) to be able to identify whether a particular candidate, having worked in a technology transfer office for a number of years, has a wide variety of abilities. Accreditation, after having completed a number of courses and/or based on experience, would facilitate mobility within this sector. An official recognition of this profession would also make it more attractive for different categories of people, and this could remedy the current scarcity of skilled staff in this field.

Schemes which currently exist, and the use of which should be promoted more, include the Marie Curie scheme which sponsors researchers to work in industry / technology transfer offices in other Member States and vice-versa. Furthermore, the ProTon network also helps its members find placements in other technology transfer offices to assist in their career development.

# CREST recommendations in the area of SMEs and research

## Action 18

Strengthening the involvement of SMEs in R&D and Innovation programmes of the Member States by setting targets for SMEs participation or making them more SME friendly.

## Recommendation 19

To get an optimal involvement of SMEs in R&D activities, Member States should consider the heterogeneity of SMEs and tailor (segment) policies to reach a broad range of firms. The segmentation of policies should therefore take into consideration the advantages of systemic approaches, namely by promoting inter-programme relationships.

### Rationale

As SMEs are not a homogeneous set, policies addressed to them should be segmental namely in accordance to: (i) in-house capabilities; (ii) technically skilled individuals; (iii) levels of R&D performance; (iv) size and type of SME business.

The policies aiming at boosting R&D performance of SMEs might be segmented to take account of the heterogeneity of the firms and their developmental stage.

The mix of policies aiming at SMEs and arising from different bodies should be carefully analysed in order to optimize the targeted effects and allow for additionality in terms of impacts on the firms.

### Examples

- In Germany, there is a set of programmes aimed at providing diversified support to SMEs through the technology-oriented visiting and information programmes. The purpose is to better enable the innovative SME sector to organize innovation processes and to apply and develop new technologies competitively (programmes BIS – information system in trade - and the INSTI network).
- In the Czech Republic, the IMPULS programme has close relationships with two other programmes targeting R&D activities: TECHNOS, aimed at funding R&D projects carried out by single SMEs and KOMSORCIA addressed to R&D activities conducted by groups of organizations, involving universities, public research organizations and firms.
- In Portugal, the NITEC scheme is related to the programme promoting consortia to develop R&D projects (programme IDEIA) and both are managed by the same organization.
- In Austria, the Industrial Research Promotion Fund provides an excellent example of segmentation within a single programme: it includes specific sub-programmes addressed to start ups, to feasibility studies, to the development of research-industry cooperation and to the promotion of international cooperation.

## Recommendation 20

- All types of SMEs should be encouraged to be involved or benefit from R&D activities. Special attention should be paid to potential high-growth SMEs.
- Dedicated schemes for SMEs should be used to address and target very specific needs such as start ups, new technology based firms, spin offs.

## Rationale

The question arises whether programmes should be designed with a focus on specific types of SMEs (low-tech, mid-tech, high-tech) or should be established irrespectively of their technological capabilities or size.

There is room for some programmes or schemes targeted to a special type of firms (for instance, schemes based on venture capital for high intensive R&D SMEs). Yet the existence of some sort of stairway by which SMEs may progress along their trajectories may justify the disclosure of larger spectrum schemes targeting the so called “extended middle” of SMEs.

The high growth potential SMEs which are innovative (mostly young) firms often show a high-tech profile but also present a lower technological intensity and tend to work on international markets.

## Examples

In many EU countries R&D and innovation programmes are not exclusively focused on SMEs, although a large proportion actively support the upgrading of these firms, namely by promoting their absorptive capacities and know-how / technology transfer. Let us stress a few schemes especially addressed to specific types of SMEs (one of them in U.S.):

- In Germany, the programme EXIST-SEED is addressed to start-ups from University research;
- In France, the National Award scheme supports the creation of technology based firms;
- In Greece, the PAVE-NE programme is exclusively addressed to young companies, less than 5 years old at the time of application;
- In Portugal, the NITEC scheme, although open to all companies, provides more favourable conditions for companies that meet several criteria, such as size, regional location and experience of collaboration with scientific and technological organizations;
- In U.S., the Small Business Innovation Research (SBIR) is a highly competitive programme that encourages qualified SMEs to explore their potential in the nation’s R&D arena. High-tech innovation is stimulated. Single SMEs are eligible for SBIR funding. The programme provides support to three phases: (i) feasibility study; (ii) expansion on the results; (iii) commercialization of the results of phase II.

## Recommendation 21

Programme stability, where useful, should be kept, by avoiding radical and frequent changes in supporting schemes.

### Rationale

Firms, in particular SMEs, tend to be uncomfortable with variability of the schemes across time. This is more critical for SMEs given the lack of resources to “digest” the new “engineering” of a scheme and preparing proposals for submission. Familiarity and acquaintance with a programme tends to be an important factor favouring the propensity of SMEs to use it. Certainly the need to address changing conditions and new challenges should be taken into consideration and requires adaptations in the programmes.

### Examples

- The Danish “Innovation Consortia” programme is a good example of stability, having remained basically the same since 1996, though with some adjustments.
- In Germany, the Direct R&D project funding (PROINNO 2) includes a stability and adaptation philosophy together with other interesting practices such as simplifying processes.
- In France, the support for Innovation in SMEs provided by ANVAR has been reorganized.
- In Israel, the R&D Technological Incubators programme has remained in force for 20 years, with some adaptations.

## Recommendation 22

- SMEs should be encouraged to participate in programmes / schemes supporting cooperative projects requiring the involvement of firms (of different sizes) and TTOs.
- In designing such programmes, attention should be paid to the instruments and regulations to be used so that they might be suitable for SMEs.
- Particular measures should be taken to ensure the participation of SMEs in international collaborative R&D projects, namely stimulating networking with other R&D partners.
- Attention should be paid to the complementarities and synergies between national and international programmes / schemes.
- There may be advantages in providing the possibility of the two steps application procedure where possible, so that the burden on SMEs might be minimised.

The dimension of the projects may be relevant for the successful insertion of SMEs. Too large a number of partners may be a factor hindering the full integration of SMEs in R&D activities.

## Rationale

Cooperative projects may be a powerful instrument to let SMEs access R&D and Innovation results (even though just as users). By this process, firms may capture new know-how and are embodied to progress in their technological trajectory as well.

Collaborative efforts with partners of different countries provide a learning process in the trajectory of any firm and of SMEs in particular. It also allows some SMEs entering into new dynamics of involvement with R&D activities (even though the latter are performed “on behalf of” the firm). Partnerships, networks and clusters can make a decisive contribution to the development of their technological stage and providing them scale and scope.

Again, the friendliness of a scheme may be a critical factor in overcoming the barriers existing between companies and TTOs.

The provision of a “two step” application procedure may facilitate the insertion of SMEs in these cooperative projects allowing for a learning process and avoiding the “traumatic” effects that the non-approval of projects may induce following considerable efforts by the firms.

Very large-scale projects may be problematic for SMEs given the organizational complexity required and the burden it causes to them.

## Examples

- At national level, it is worth mentioning the scheme “Forderung der Forschungskoooperation in der mittelstandischen Wirtschaft” which was designed to increase SME involvement in innovative processes through cooperative R&D projects with research organizations.

Different schemes at international level exist. Let us stress the following ones:

- The CRAFT (FP of the EU) approach allows for a friendly and flexible insertion of SMEs in R&D cooperative projects, and has the potential to launch companies on R&D trajectories. Many SMEs initiated R&D activities and evolved on the “ladder” into higher intensive research performance following the learning process provided by CRAFT participation;
- SMEs and clustering / networks, like the ones provided by EUREKA projects, allow the constitution of research in consortium where different types of partners (such as SMEs and TTOs) can crossfertilize their capacities and build in new knowledge;
- The ERA-NET scheme provides an excellent tool for the coordination of Member State programmes addressing the R&D needs of SMEs, and could be further explored to offer a flexible alternative for stimulating the involvement of SMEs in transnational R&D projects;
- The various instruments of the FP offer good opportunities for the involvement of SMEs in R&D activities, since the companies “feel comfortable” vis-à-vis the dimension and complexity of the consortiums in which they are challenged to enter.

## Recommendation 23

All mechanisms which might facilitate the insertion of skilled personnel holding competences in R&D activities should be fully encouraged.

### Rationale

The R&D and Innovation activities are critically dependent on the profile of specialization of Human Resources. The same holds true for SMEs which, in general, show a shortage of skilled personnel with the required competences to perform R&D activities. That is why cooperative activities with other entities (TTOs or other companies) are so relevant.

The following types of schemes may be of crucial relevance in enabling SMEs to perform or being involved on R&D activities and allowing them to evolve in the “stairway” towards higher stages of technological background: (i) mobility into SMEs; (ii) provision of grants to highly qualified personnel engaged in R&D projects with interest to the SME; (iii) employment of highly skilled personnel by providing incentives, for instance, of a fiscal nature.

### Examples

- In Denmark, the scheme “Mobility of researchers and co-financed employment of researchers” was launched in 1998. The scheme aims at giving companies and SMEs the possibility to employ a researcher for a pre-defined period of time.
- In Ireland, the TECHSTART scheme subsidises SME employment of young graduates from a technological discipline. This scheme was designed to target SMEs that are technology “laggards”.
- In the UK, the Teaching Company scheme has evolved over a long period (since 1975) and was designed to subsidise high quality graduates to work for 2-3 years in a company. The graduates work on a strategically important R&D or Innovation projects under the supervision of senior company staff and experts from a University associated to the project.

## Recommendation 24

In specific conditions (and often in a cooperative research approach), demonstration projects and construction of prototypes should be encouraged from the point of view of inducing a learning process by SMEs.

### Rationale

The potential of projects of this type in the dissemination, transfer and exploitation of knowledge may play a very important role in the capacity building of SMEs by enabling them to enter into higher stages on their technological trajectories. The demonstration projects may be particularly relevant for low or medium tech SMEs, by providing acquaintance with new methods and technologies which otherwise would remain outside the scope of the firm.

### Examples

- \_ In the Czech Republic, the programme KONSORCIA has a particular concern with extension and demonstration effects of the results achieved.
- \_ In Portugal, DEMTEC is a scheme with the potential to promote the diffusion of innovation.

## Recommendation 25

Technological support services in SMEs should be supported as an instrument to create enhanced conditions for R&D and Innovation activities.

### Rationale

Capital grants, reimbursable advances, risk / venture capital, and guarantee schemes meet the needs of SMEs in enabling their involvement in R&D and Innovation activities. Therefore, one should not underestimate the important role of the support to technological services of SMEs in the sense that such a support may contribute to the capacity building of the firm and make it progress towards higher stages in the “stairway” perspective mentioned above.

### Examples

In Germany, SME advisory services are quite developed and worth analysis.

## Recommendation 26

Following the new Structural Funds regulation for the 2007-2013 period, where emphasis is given to the follow-up of the Lisbon strategy, Member States shall, when designing the new programming documents, give priority to R&D and innovation activities performed by SMEs.

### Rationale

The Structural Funds can contribute to the creation of more competitive enterprises in eligible regions since conformity with Community competition rules is taken into account. Attention should be paid to the potential multiplying effects that such investments may induce. The impact may be reinforced if synergies and complementarities with other nationally based or European programmes are developed.

### Examples

In Portugal, programmes in the field of Economy (namely in the Industry and Energy sectors) based on Structural Funds have been supporting some cooperative projects, focusing innovation or R&D activities involving SMEs and some TTOs (namely the so called “interface” entities such as “technological centres”). The programme is designated by Programa Operacional da Economia and more recently by PRIME.

## Actions 19 & 20

- Increase awareness of research intensive SMEs about the appropriate use of risk capital, notably through actions at regional level.
- Make better use of risk capital and guarantee mechanisms to improve access to debt and equity financing for research and innovation activities in SMEs.

## Recommendation 27

- The financial markets, namely risk / venture capital, should play an enhanced role in boosting Innovation and R&D activities. The particular market absences / failures in each MS should be identified and the corresponding interventions duly put in place taking into account the specific conditions prevailing. Attention should be paid to addressing structural market failures rather than short-term cyclical issues.
- In this context, SMEs with rapid/high growth should be targeted. Member State policy makers should try to change the culture towards a larger utilization of the risk capital schemes.

## Rationale

Risk / venture capital can represent a key financial incentive for improving R&D and Innovation compared to other types of financial players such as banks. The financing of SMEs is of key importance as they can make a significant contribution in developing new products and processes based on R&D and Innovation activities.

A well balanced composition of different policy activities may lead to an impressive change in boosting venture capital, specifically if the following measures are put in place: (i) the strengthening of the high-tech companies; (ii) the stimulation of new start-ups; (iii) the offer of specialized R&D programmes. This statement is derived, mainly, from experience in Israel.

## Examples

- In the UK, schemes have been designed to address clearly national / regional market failures taking into account the characteristics of financial markets. The following schemes also take account of specific targets: (i) “UK High Technology Fund”; (ii) “English Regional Venture Capital and Early Growth Funds”.
- In Germany, the establishment of growth segments at the stock exchange – especially for young and fast growing technology companies – is an important incentive for strengthening the market for growth financing.
- In the same country, another scheme is worth mentioning: “Venture capital for small technology-oriented firms (BTU)”.
- In Sweden, the scheme “Industrifonden” provides growth companies with development capital, competence and networks as a type of an active co-financier.

## Recommendation 28

Member States should design non-distorting measures aimed at stimulating initiatives and investments in early stage phases. In this context, relevant actions might deal with: (i) injecting public funds to catalyse the market and leverage the working of private initiatives; (ii) developing bridging mechanisms, such as technology transfer offices in Universities and public research organizations and incubators; (iii) launching dedicated venture capital funds, possibly addressing specific market failures that impact on specific industries.

### Rationale

The creation of new technology based firms (NTBFs) may contribute to strengthening Innovation and R&D activities in different sectors of the economy. In particular, SMEs may be an important recipient of new results, techniques and methodologies provided by the NTBFs.

There is a clear need to enhance investments in seed/early stage capital markets. It is at this stage that the failures pervading capital markets are most relevant. Furthermore, at this same stage, public policy may be more effective and less distorting.

### Examples

In Spain and Belgium, schemes have been launched based on appropriate mixes of European instruments, namely those managed by the European Investment Fund and country measures.

## Recommendation 29

- Loan guarantees for R&D investment and counter guarantees for Venture Capital funds should be made more widely available.
- In designing loan guarantees it should be taken into account that loan guarantees are more effective when they are part of an integrated programme of financial and advisory support.

### Rationale

Although equity finance is making a more significant contribution to SME financing today, credit remains their most important instrument, namely for well-established high-tech SMEs. The basic rationale for loan guarantees is to improve the supply of external finance to SMEs by overcoming market failures in credit rationing.

### Examples

In UK, the “Small Firms Loan Guarantee Scheme” (SFLGS) has been regularly evaluated and has proven to be effective.

## Recommendation 30

- Launch initiatives towards making entrepreneurs more aware about the advantages of using risk capital mechanisms.
- Cooperation between public and private organizations is envisaged as essential for leveraging these kind of initiatives.

### Rationale

There is a trend towards considering that the main barrier to the use of risk capital schemes and financial lies on the supply side. Therefore, it may happen that in some Member States, entrepreneurs and SMEs are not fully aware of the possibilities provided by these risk capital schemes.

### Examples

There are few programmes / initiatives aimed at increasing the awareness of research-intensive SMEs about the appropriate use of risk capital. Awareness-raising initiatives tend to be more common in countries like the UK and Ireland whose national financing systems are already equity based.







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