FINAL REPORT

Examining the Design of National Research Programmes

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Preface

The views and opinions expressed in this report are those of Optimat Ltd and VDI/VDE-IT GmbH and not necessarily those of the European Commission. They are based on an empirical survey of national programme features and anecdotal information provided by a wide range of national policy makers and administrators.

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EXECUTIVE SUMMARY

This study, to examine the design of national research programmes, is based on a review of published information, national consultations and workshops on the situation across all 34 countries of the European Research Area (ERA). The main aim was to identify, and understand the barriers to transnational cooperation and mutual opening between national research programmes and conclude on how ERA countries can improve this aspect of the design and implementation. The study is intended to complement the wider work by CREST on the application of the Open Method of Communication towards achievement of the Barcelona 3% R&D Objective.

The national landscape for R&D in Europe is extremely diverse, both in terms of relative investment in R&D and the systems for implementing national programmes. The organisational systems in the larger countries are particularly complex and research programmes can be found in ministries, research councils and agencies. At the other extreme, smaller countries often have a much simpler system with a single framework programme and/or agency. The situation is much more harmonised and coordinated in basic research than in industrial and societal programmes. This is not only because the scientific community culture is more open and international but also because there are more coordination and facilitating frameworks. The bottom-up ERA-NET Coordination Actions have significantly increased networking activity across all types of programme but there is still a lack of high-level, strategic action to increase the alignment and coordination of national programmes.

According to our survey of 127 national programmes, over 80% spend some part of the budget on transnational activities or foreign participants. The most common approach is the use of national programme funding to sponsor scientists or companies that are participating in transnational projects. The least common is the opening of national programmes to foreign participants, particularly if they need to be paid. The consultations, and our wider experience, clearly indicate that most of the national administrations are still reluctant to sponsor non-residents or contribute to central budgets. There are, of course, notable exceptions and we have reported on some of these in the case studies.

There are many reasons for national administrations to engage in transnational activities but the most important seem to be concerned with a shortfall in the quantity or quality of national research capacity. This is very clear in the strategies of the smaller countries and also in those countries that are most active in providing incentives to attract leading edge scientists, including expatriates. Some countries are also encouraging the involvement of foreign researchers to foster the international competitiveness of their science base. This is less of an issue in the bigger countries that already have a strong science base and where the participation of foreign researchers is inhibited by intense competition for limited research funding. In these countries the use of foreign researchers is generally associated with opportunities to increase the quality of the research and this is more common in societal research programmes. In industrial research programmes the development of knowledge-based industries and scientific capacity are mutually supportive. Much of the transnationality in industrial research programmes appears to be associated with the internationalisation of businesses.

Transnational investment, within national programmes, seems to be driven by one of four main objectives:

1. Development of knowledge-based industries
2. Internationalisation (of industry and research actors)
3. Increasing scientific competitiveness
4. Addressing societal or environmental challenges

The case studies highlight a wide range of strategies to achieve these objectives, both in Europe and internationally, but it is very difficult to find any formal evaluation that clearly demonstrates the socio-economic impact of these strategies. In most cases, the transnational investment is marginal (less than 5% of the budget), and often experimental, which clearly makes it difficult to isolate the additionality of the transnational actions.

The study identified 21 barriers to transnational cooperation and mutual opening. These encompass all levels of administration from policy to projects. The most prevalent are concerned with national policies on research capacity. The most important appear to be related to legal/organisational factors and lack of explicit encouragement. Significant variances have been highlighted between different types of countries, particularly between the larger and smaller economies. The larger countries appear least active because they are relatively self-sufficient, whilst the smaller countries and the new EU

Member States are quite keen but their relatively low R&D intensity is a barrier. Finally, programme users are certainly interested in more flexible national programme budgets, or a dedicated budget, to enable international cooperation but do not wish to see more domestic competition and bureaucracy through mutual opening.

The study also identified 23 factors that have a positive effect on investment in transnational cooperation and/or opening. These include explicit design rules, operational flexibility and external influencers that encourage such activities. The most prevalent enabler is external encouragement from 'influential decision makers that see the value in additional European collaboration'. This is clearly important as anecdotal evidence suggests that a lack of political will is holding back progress towards joint programmes in many ERA-NET projects. It is interesting to note, however, that this enabler is also present in 30% of the programmes that have no transnational activity. This suggests that lack of bottom-up motivation (from the programme or project level) can also be a barrier. An analysis of the most open and closed programmes indicates that embedded rules and instruments to encourage transnational activities are the most important pre-condition. This suggests that the main opportunity to influence transnational cooperation and opening policy is at the programme design or review milestones. The transitional from FP6 to FP7 is also an opportunity for national policy makers to review the lessons from the bottom-up ERA-NET Scheme.

The study concludes with 11 key issues. Some of these can be categorised as stakeholder issues, others are more diverse. They include

<u>Stakeholder Issues</u>

- Transnational strategies are based on national objectives only (lack of ERA objectives and budgets)
- Lack of perceived benefits, and therefore commitment, from the larger countries
- The smaller countries and the new EU Member States need help to achieve better inclusion within ERA networks
- Weak coordination structures for applied/industrial research
- Lack of interest (or responsiveness) from national programmes users and foreign researchers

<u>Other Issues</u>

- Many national programme administrators believe that the legal constitution for public funding of their research programme explicitly forbids the transfer of funds to non-residents

- Lack of empirical evidence and evaluations of the benefits of mutual opening
- Enablers are most effective if explicitly included at the design stage
- Limited transnational design creativity within national programmes
- Lack of opportunities for some national programme administrators to network with ERA peers
- Research capacity barriers could inhibit Barcelona 3% Objective targets

We have made some tentative suggestions on actions that could be taken to address these barriers but there are no simple or short term solutions. National administrations, by their very nature, are inherently resistant to change unless there is strong political will for such change. We have therefore recommended that this report, and the supplementary Good Practice Guide, be used to facilitate more debate with national policy makers and programme administrators to encourage the spread of good practice and develop consensus on the need for new approaches at a European level.

1 INTRODUCTION

This report summarises the main results and policy conclusions from the study entitled ***'Examining the Design of Research Programmes'*** (OJ 2004/S 149-128486). It was carried out by Optimat Ltd and VDI/VDE-IT GmbH on behalf of the European Commission Research Directorate (RTD-M2). A supplementary 'Good Practice Guide' provides practical advice to programme designers and managers.

1.1 Background

R&D expenditure in the EU Member States and related countries is over €200 billion[1] per annum and growing. The overall impact on competitiveness, sustainable economic growth and quality of life, however, is limited by the fragmentation of national programmes.

This fragmentation, and the lack of an environment to stimulate research and exploit results, was highlighted at the beginning of 2000 in the Communication 'Towards a European Research Area'[2] as one of the main weaknesses of European research. In order to overcome the fragmentation of research activities, and to come to a more coordinated design and implementation of national and European research programmes, the Communication suggests a restructuring of the European research fabric. In particular by improved coordination of national research activities and policies and the application of the principle of mutual opening of national programmes.

The study is intended to complement the wider work by CREST on the application of the Open Method of Coordination (OMC)[3] to the Barcelona 3% Objective. This is aimed at improving both the quantity and quality of research in Europe and the exploitation of results. To achieve these goals an improved coordination of national research activities and policies is required.

This study, 'Examining the Design of National Research Programmes', aims to provide a better understanding of the design, content, implementation and rules for participation of national and, where appropriate, regional public research programmes in the European

[1] Science and Technology in Europe, Statistical pocketbook, 2005 edition (ISSN 1725-5821)
[2] COM (2000)6, 18 January 2000
[3] http://europa.eu.int/comm/research/era/3pct/index_en.html

Research Area (ERA)[4]. It is mainly concerned with explicit and non-explicit restrictions that exist for transnational research cooperation and technology transfer, which might need to be addressed to achieve the goals of the ERA. Analysing the rationale behind these restrictions, and providing examples of programmes that encourage transnational research cooperation and technology transfer, should highlight options to overcome the barriers and encourage the spread of good practice.

1.2 Objectives

The specified objectives of the study were to:

1. Identify provisions and practices in research programmes that are encouraging or impeding transnational co-operation and technology transfer
2. Analyse the rationale, concerns and justification behind these barriers and give an overview of common approaches, national and regional efforts to address these barriers and trends
3. Provide case studies and specific successful measures
4. Draw up conclusions, lessons learned and suggestions for areas in which ERA countries can improve the design and implementation of their research programmes

1.3 Scope of the Study

The study has examined important national programmes that support basic research, applied/industrial research, researcher mobility/training and R&D in SMEs. These tend to be the larger programmes with a clear potential scope for transnational cooperation and technology transfer. Smaller programmes with interesting transnational features have also been included.

The geographic scope encompasses all 34 countries of the ERA. We also identified interesting examples of transnational activities in the national programmes of USA, Japan and China.

The study was limited to those 'programmes' that are subject to open, competitive Calls for proposals. It excludes direct funding instruments for research infrastructures and other forms of institutional funding.

[4] The European Research Area (ERA) includes EU Members States (25), candidate countries (Bulgaria, Croatia, Romania, Turkey) and associated countries (Iceland, Israel, Liechtenstein, Norway, Switzerland)

1.4 Study Method & Report Structure

A detailed overview of the study method is included in Appendix A and summarised below.

We reviewed the research programme funding landscapes and identified well over 300 research programmes across the 34 countries of the ERA. A simple overview of the national landscape for each country is included in Appendix B. The landscapes were validated through interviews with representatives of CREST. These and follow-on interviews with other national experts highlighted a number of interesting programmes with transnational features. Case studies for 10 such programmes are included in Appendix C. In addition to the qualitative research, we carried out a quantitative online survey of programme administrators to gather statistical data on programme features and empirical evidence on the relative importance of specific barriers & enablers to transnational cooperation and mutual opening. The survey questionnaire is included in Appendix D. In total, 127 completed questionnaires were received and the participating programmes are tabulated in Appendix E. We also carried out some desk research to identify interesting programmes with transnational features in USA, Japan and China. These are summarised in Appendix F. All those who contributed to the study, in addition to the questionnaire respondents, are acknowledged in Appendix G.

The report is presented in five main sections, including this Introduction. Section 2 provides a top-down overview of the current position in each country and the transnational features and benefits. Section 3 summarises the results and analysis of the survey feedback on barriers and Section 4 does likewise with enablers. Section 5 provides our conclusions on the design of national programmes, barriers to transnational cooperation, strategies to address the barriers, experiences & difficulties, key issues and scope for action. More detailed statistical analysis of the survey feedback on programme features, barriers and enablers is included in Appendix H, I and J. A bibliography of information is included in Appendix K.

1.5 Analytical Segmentation of Countries

In our analysis of barriers and enablers (Sections 3 and 4), we clustered countries into different affinity groups based on several variables including EU status, economic size, cultural zones and geographic location. This allowed us to highlight any significant differences in policy between these affinity groups. The key to the affinity group classification is shown in Figure 1.

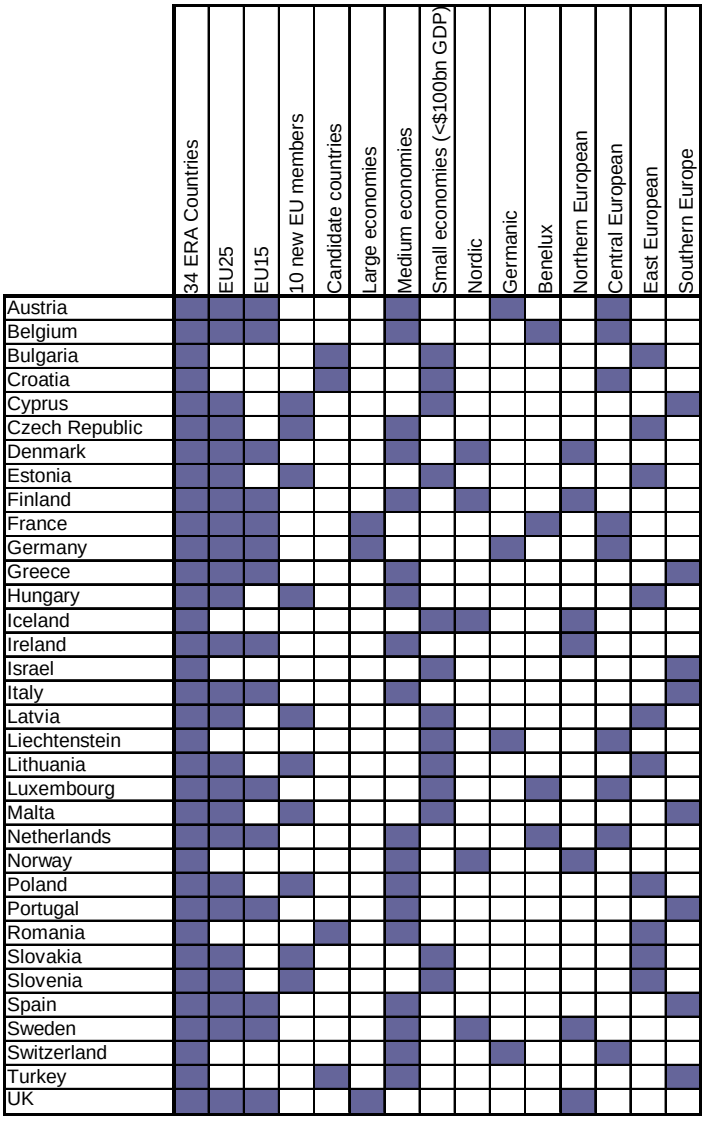

Figure 1. Affinity groupings

1.6 Acknowledgements

We would like to thank members of CREST and the many national officials that contributed to the study through interviews, workshops and participation in the online survey. Special thanks are also due to the steering group from DG Research and their colleagues. A detailed list of acknowledgements is included in Appendix G.

2 THE CURRENT POSITION

2.1 National Investment in RTD

An overview of national expenditure on R&D[5], mapped against innovation performance[6], is shown in Figure 2. Actual expenditure for each country is represented by the size of the circles. Such diversity is clearly a major issue if improved coordination is to be achieved. Later in the report, we highlight empirical evidence from the survey, which suggests that there are more barriers to national programme opening in the larger countries. This is to be expected as these countries have a relatively strong and self-sufficient science base. The survey also indicates that countries with a relatively low level of R&D investment find it difficult to achieve inclusion in EU projects.

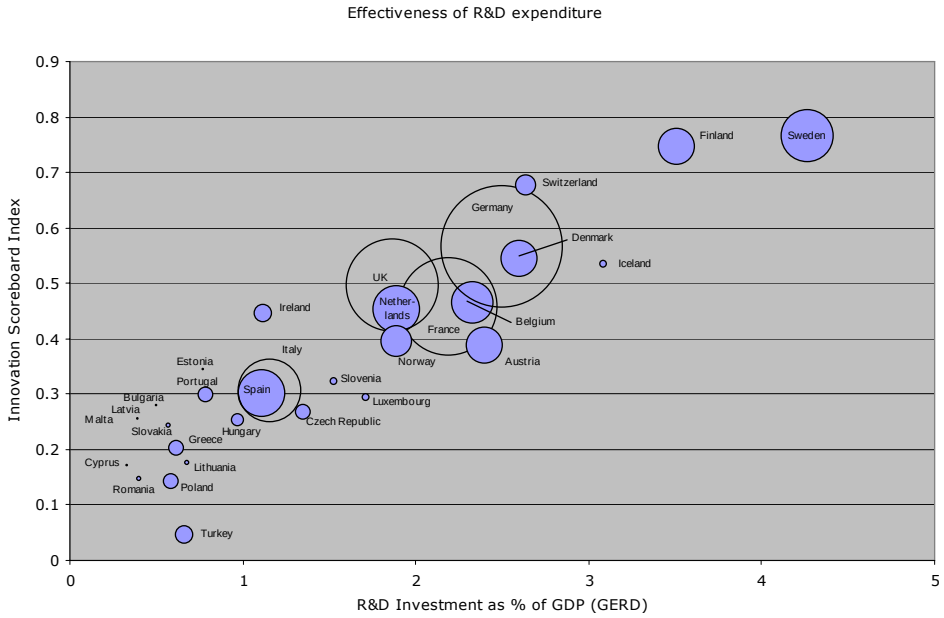

Figure 2. R&D Expenditure in ERA countries

Sweden and Finland spend the largest proportion of their GDP on R&D, with the majority of the original EU15 countries spending between 1 and 2.5%. Most of the new EU Member States spend less than 1%.

[5] Eurostat, 30 June 2005
[6] European Innovation Scoreboard 2004, http://trendchart.cordis.lu/scoreboards/scoreboard2004/index.cfm

It would appear that there is some correlation between percentage GDP spend and innovation performance, with Finland and Sweden outperforming the rest of Europe. It is also evident, however, that the actual amount of R&D funding (size of circle) has little effect on innovation performance. Membership of the EU also does not appear to have an impact, with some EU15 States being outperformed by both new members and also non-members, such as Norway, Switzerland and Iceland.

This picture will obviously change as countries move towards their 2010 targets in response to the Barcelona 3% Objective.

2.2 National Programme Strategies

Figure 3 shows a simplistic overview of the research landscape in each country, including the dominant type of programme (macro-design) and the degree of diversity of programme funding organisations.

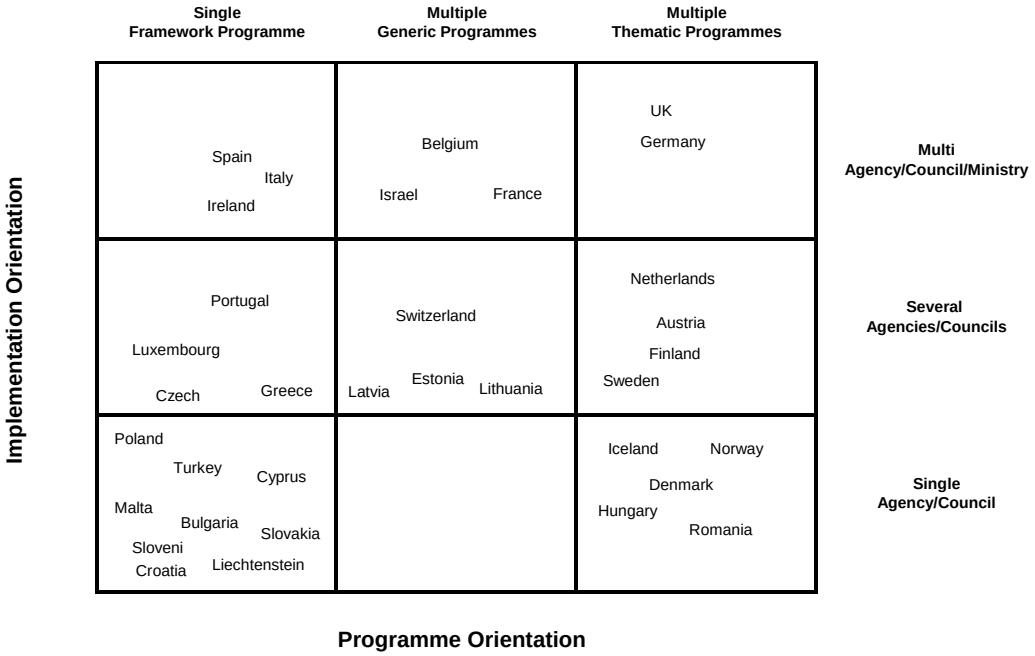

Figure 3. Programme and implementation orientation

The structure in the larger countries is particularly complex with programmes funded by Ministries, Research Councils and a variety of Agencies. At the other extreme, some countries have established a single organisation to coordinate and manage all research programmes. This is obviously more common in the smaller countries. In the medium

size countries, there is a wide range of different organisational models and programme policies. Implementing agencies are a common feature in the central and northern European countries. Seventeen of these organisations are members of a networking organisation known as TAFTIE. The landscape is also constantly changing and is particularly dynamic in the new EU Member States.

This is another illustration of the relative diversity and fragmentation of national programmes across Europe.

The area of greatest coordination, or at least harmonisation, of national policy is in basic research as most countries have a Research Council(s), Academy of Science or equivalent. These organisations are coordinated at the highest level through EuroHORCs (European Heads of Research Councils), which covers 21 countries. They also participate in a joint programme, known as EUROCORES, that is coordinated by the European Science Foundation. They, typically, have framework programmes with thematic research priorities and instruments for mobility and training of researchers. Clearly, there is a fundamental rationale for international scientific cooperation and academics are highly motivated to collaborate with their peers in other countries. There is also a multilateral framework programme (EUROCORES), which facilitates thematic, multilateral programmes in areas of common interest.

The opposite situation is the case in applied and industrial research programmes, including SME programmes. Industrial research is, typically, sponsored by economic or industry ministries. Thematic applied research, particularly for non-industrial research on societal issues like agriculture, environment and transport, is normally carried out by another ministry or delegated to a specialist agency. In some countries, however, the industry ministry may also sponsor applied non-industrial research. It is also fairly common for applied research programmes to be co-funded by a number of separate ministries through one of the implementing agencies (eg SenterNovem programmes in the Netherlands are cross-funded by the various ministries). Some applied-orientated basic research may also be sponsored through the research councils and there are examples of joint programmes between ministries and research councils (eg UK). Policy on prioritisation of applied research also varies. Some countries have clear thematic priorities; others are open to support projects in any domain. Finally, there is a lack of strategic coordination structures like those for basic research except for the ERA-NET Coordination Actions and, to a lesser extent, networks like TAFTIE. The more traditional

facilitating instruments (eg EUREKA and COST) play a useful role but the engagement is at project rather than programme level.

In general, the national strategies seem to depend on economic size and location within Europe:

- The larger economies tend to have a complex administration structure and a fragmentation of programmes across government ministries and agencies. Thematic prioritisation is common because of the intense national competition for funding.
- More integrated programme administration structures are apparent in the medium sized countries particularly in central/northern Europe. The favoured model seems to be a Research Council for scientific research and an Innovation/Technology Agency for applied research. Generally, these are cross-funded by various ministries.
- The most common model in eastern/southern Europe and smaller countries is an R&D framework programme. These have many forms. Some, particularly in the new EU Member States, are designed for partial alignment with the EU RTD Framework Programme. Others are aligned to multi-annual development plans.

It is fairly obvious that science and technology has become a more important political issue in many countries and this appears to be driving more integration at the national level. The 'Innovation Platform' in the Netherlands, which is prioritising thematic areas based on a combination of both scientific and industrial strength, is a good example. Much of this national investment in the knowledge economy is in response to global competition but the 2010 Barcelona targets are also having an influence on strategies. The new EU Member States and the Candidate Countries are particularly dynamic as they face the twin challenge of economic and scientific harmonisation.

In general, national policies and programmes are being developed without any obvious alignment with the parallel situation in other countries. One of the exceptions to this is Denmark, which created the Danish Council for Strategic Research in 2004 partly to improve the alignment between national priorities and thematic programmes in other European countries. Some of the national R&D frameworks in eastern/southern Europe, mentioned above, are partially aligned with the EU model. These are the exceptions, however, and misalignment of research landscapes is likely to remain a challenge for those that wish to engage in transnational cooperation and mutual opening. This suggests that facilitating frameworks, platforms and interfaces will be the most practical option to achieve better cooperation and opening in the short term at least. In the longer term, the OMC initiative to support the Barcelona 3% Objective and the

implementation of ERA-NETs may create more alignment if they can influence policy at the critical design or evaluation milestones in programme life cycles.

Short summaries of the research landscapes are included in Appendix B.

2.3 Analysis of Transnational Features

There are a number of options to increase the impact of national programmes through transnational cooperation and opening. These options can be described as transnational features (or transnationality within national programmes) and include:

- Allowing national researchers to utilise programme funding to participate in transnational research projects (or feasibility studies for such projects)
- Allowing national researchers to utilise programme funding to participate in cross-border technology transfer projects
- Utilising programme funding to support cross-border mobility or training of researchers
- Utilising programme funding to support the participation in European or international committees or networks
- Utilising research capacity and expertise from other countries (foreign partners or subcontractors)
- Using foreign evaluators
- Providing incentives for foreign researchers to become residents (permanent or temporary)

Relative prevalence of the various transnational features is shown in Figure 4.

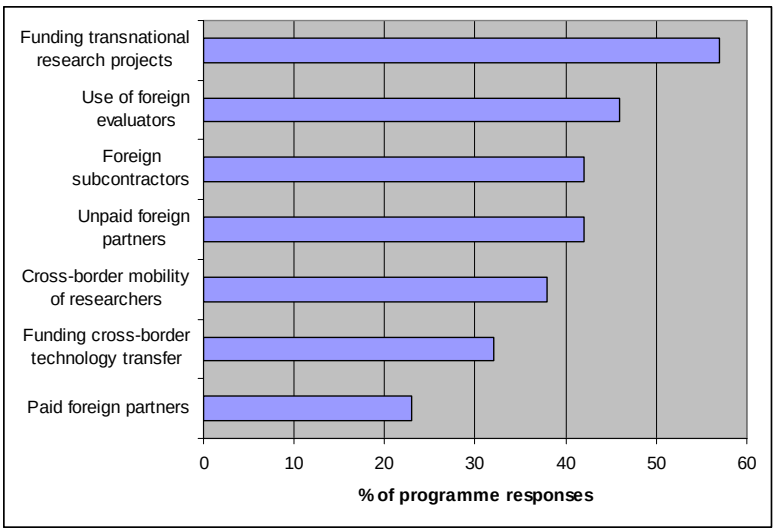

Figure 4. Prevalence of transnational features

The main findings and our interpretation from national consultations can be summarised as follows.

2.3.1 Funding of Transnational Projects

The most common activity is the funding of transnational research projects (almost 60% of surveyed programmes). Less than 40% have funded cross-border mobility or training of researchers. This includes not only dedicated mobility programmes but also basic research programmes that have an instrument to sponsor mobility projects. Cross border technology transfer is less prevalent (just over 30%). These appear to be most common in SME and mobility programmes or specifically designed instruments (eg networking projects). An example of this can be found in the cross-border networking projects that are supported by the CIR-CE programme in Austria.

Although formal technology transfer activities do not appear to be very common, this disguises the more subtle 'knowledge transfer' activities that are apparent in the cross-border mobility of researchers. These, however, tend to be an integral part of basic research programmes and it is less common to find such cross-border mobility activities in industrial-orientated programmes. The Industrial PhD programme in Denmark is an interesting example. The Japanese also appear to be particularly active in facilitating multilateral projects and organising knowledge transfer events that are controlled by the Japanese partners. By taking the initiative, it is more certain that the benefits to Japan will be maximised. The USA has a programme that encourages its young researchers to work in other countries to give them more exposure to global issues and knowledge.

In Europe, the actual spend on transnational activities is marginal, with the majority of programmes spending less than 5%. The exceptions tend to be countries like Austria and the Scandinavian countries, which are particularly active in cross-border collaboration but often only with their cultural neighbours. This seems to be typical across all countries. The ones that spend more tend to be thematic or are transnational by design.

In general, the transnational activities are mainly with EU countries (65%) but a significant number have involved cooperation with USA (30%) and Japan/China to a lesser extent. The new EU Members are particularly active in collaborating with USA. The larger countries (especially Germany) seem to be particularly active in collaborating with China. For example, Germany regards China as an important future trading partner

and uses many different approaches to stimulate cooperation. Some are aiming to improve the cooperation on a scientific level; others are intending to establish long term cooperation between German SMEs and Chinese companies through joint R&D projects.

Around 25% of the programmes are linked to ERA-NET Coordination Actions and a similar number have supported EUREKA[7] projects. Less than 10% have experience of EUROCORES[8]. There are some obvious differences between different types of countries and programmes and this is discussed in Section 4 (enablers). The multilateral frameworks in the Nordic countries are also apparent. There are clearly, however, a lot of programmes that have been engaged in transnational activities outside the most obvious frameworks.

The survey also asked about contributions to multilateral programmes with a central budget. Only 16% have made such contributions and we are aware that there is a high degree of resistance to this option within the ERA-NET community because of the loss of financial control that it entails. The EUROCORES framework, for example, avoids this issue by allowing each country to pay its own researchers. Also, some of the examples are related to the Nordic countries, where contributions are made to programmes managed by the Nordic Innovation Centre. Some of the others may be related to the EURYI[9] programme run by EUROHORCS (European Heads of Research Councils), which has a central budget for the training of young researchers. There are also some thematic frameworks related to common areas of interest, such as space and marine science. The larger countries have more programmes (25%) that make such contributions, which may also include membership fees to international networks.

2.3.2 Use of Foreign Researchers

The most obvious indicator of opening national programmes is the policy and practices related to the use of researchers from other countries. Around two thirds of surveyed programmes allow research participation (or subcontractors) from other ERA countries (ie non-residents). Only 15%, however, indicated that this is ***actively encouraged***[10] and this was more noticeable in at least some of the programmes of Austria, Belgium, Cyprus, Czech Republic, Iceland, Ireland, Luxembourg, Netherlands, Norway and

[7] www.eureka.be
[8] www.esf.org/esf_activity_home.php?language=0&domain=0&activity=7
[9] www.esf.org/esf_genericpage.php?section=8&domain=0&genericpage=1879
[10] Survey respondents were asked if their policy on the use of non-resident researchers was active encouragement, allowed when there is a clear benefit, or allowed only when there is no national capacity

Sweden. An example of active encouragement can be found in Ireland, where the main selection criterion is research excellence and this is most easily achieved by involving leading edge foreign researchers. In most of these countries, however, there are also programmes where this is not actively encouraged suggesting that this policy is very programme-specific.

Only 23% of the sample had actually paid foreign partners (most notably in Belgium, Cyprus, Ireland and some Scandinavian countries). The objective is, generally, to increase the quality of research and sometimes (in the case of the smaller countries) to encourage the international competitiveness of the national research base. In most cases, however, this was a very small percentage of the budget. Cyprus is the most notable exception, as 30% of the framework programme budget can be spent on foreign researchers. The rationale is that Cypriot researchers will develop sustainable relationships with leading foreign researchers and, thus, become more involved in the EU Framework Programme and other multilateral projects. The SBO Programme in Belgium (strategic basic research) discriminates in favour of international research teams by scoring applications on research excellence and allowing up to 20% of project funding to be spent on foreign partners. Both of these programmes are described in more detail in the case studies (Appendix C). Ireland (marine science, basic research programmes) and Norway (oil & gas, ICT programmes) have also spent significant amounts of the budget on non-residents in some programmes.

The most common policy (43% of respondents) is that non-residents may be ***allowed when there is a clear benefit to the project***. This clearly puts the onus on the applicants to demonstrate the added value and this can be very difficult. The case study evidence from the more open countries like Belgium and Cyprus is that positive encouragement is needed to motivate programme users to propose international projects. The survey results suggest that there is a more active encouragement to use foreign experts in basic research programmes and anecdotal feedback supports this assertion. What is clear from the survey is that there is more active encouragement from the smaller countries and much less from the larger countries for obvious reasons of scientific competitiveness and self-sufficiency.

Finally, foreign researchers are also being used in many programmes as evaluators. This appears to be particularly common in Austria, Estonia, Ireland, Scandinavia and the UK.

2.3.3 Attraction of Foreign Researchers

The development of science-based competitiveness is a major policy objective in most countries. We found a number of interesting practices related to the attraction of high quality researchers from other countries. Some are offering substantial incentives to attract expatriate researchers to return to their country of origin (ie reversal of the historical brain drain) and this is particularly evident in Cyprus, China, Ireland and Hungary. Some others (eg Netherlands) have programme instruments to attract 'knowledge workers' to become resident in the country as there is widespread concern about researcher skills gaps.

2.4 Benefits of transnational activity

2.4.1 Relative importance of benefits

Almost 60% of all respondents that participated in the national survey indicated that the transnational features of their programme had resulted in tangible benefits. The pattern of responses for different type of benefits is shown in Figure 5.

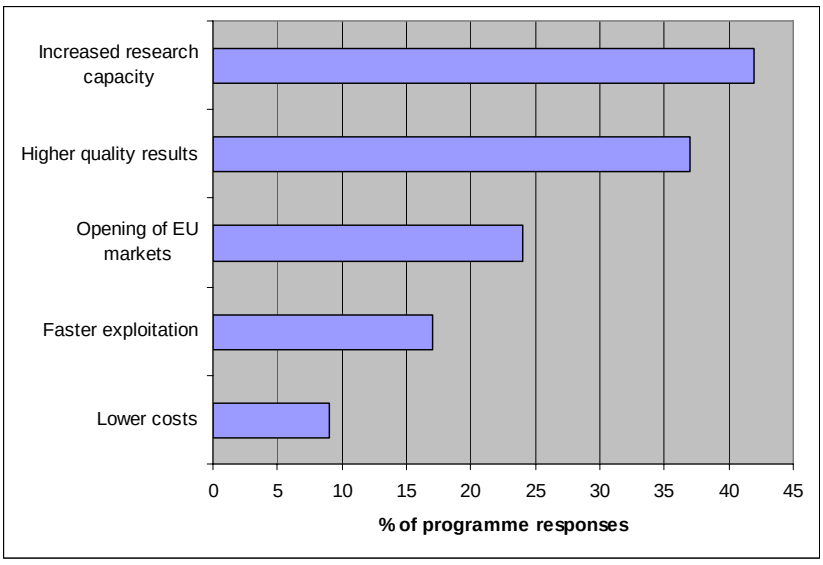

Figure 5. Benefits of transnational activities

Clearly, ***higher quality results*** and ***increased research capacity*** are the most important benefits in the opinion of those that are implementing the programmes. The

prevalence of these benefits is higher than average in Eastern and Northern Europe. Increased research capacity benefits are particularly prevalent in mobility programmes.

The wider consultations suggest that foreign researchers are being used in basic research programmes to foster national scientific competitiveness and excellence. In applied research, they are, generally, being used to address weaknesses in the national science base or to provide some unique expertise for a particular project.

Participation in international research teams, with each country funding their part of the project, is seen as a value adding activity, especially in areas of common scientific interest. This appears to be particularly relevant for the Research Councils and is perceived to have both direct and indirect benefits. The quality of results should be improved because the overall cost is shared and the breadth and depth of knowledge is greater. Such participation, however, is also perceived to increase the international competitiveness of the national science base. Some of this is clearly very subjective and there are also administrative/coordination costs and inefficiencies that are inherent in transnational projects. This makes it very difficult to quantify the benefits and there seems to be a shortage of empirical evidence from formal evaluation. We also have the impression that many of the more strategic initiatives have been implemented in the recent past and it may be too early to evaluate the results.

It is interesting that some programmes have resulted in benefits related to ***Opening of EU Markets*** and this is more prominent in SME programmes. Technical collaboration with supply chain partners or end users in other countries is a logical first step in preparation for commercial partnerships, especially in knowledge-based industries and/or emerging markets. Candidate, Germanic and Southern European countries appear to be better at achieving such benefits. For example, the Austrian CIR-CE programme supports collaborative networking, innovation and training projects between Austrian SMEs and partners in 15 countries in central-eastern and south eastern Europe. German researchers are actively participating in the bilateral research teams of the new applied research centres in Hungary and there is a relatively high intensity of research programme cooperation between Germany and China. Programmes in southern Europe tend to be less thematic and structured and there appears to be more flexibility in supporting companies that wish to engage in cross-border collaboration.

Elsewhere, Denmark is supporting international collaboration between Danish researchers and their peers in emerging export markets with the motto "research

collaboration today, trading cooperation tomorrow". The 'Torch Programme' in China is designed to support the internationalisation of China's high tech industries through an integrated approach to the development of technical and commercial relationships. The common link in these is an integrated approach to international market development through technical collaboration.

The benefit of ***faster exploitation*** is more relevant in applied research and SME programmes but can also be derived from mobility programmes. For obvious reasons of market size, transnational exploitation is relatively more important to the smaller countries. For example, the FIT-IT programme in Austria supports applied research in areas such as embedded systems, which is of particular relevance in automotive applications. There is a lack of car manufacturing in Austria so the results need to be exploited in export markets such as Germany. For this reason, the FIT-IT programme encourages and supports the participation of end users from other countries. An evaluation[11] of internationalisation of Tekes programmes in Finland recommended that more emphasis should be placed on participation by foreign end users rather than foreign researchers.

It is perhaps surprising that the benefit of ***lower costs*** is less evident as scarce public sector budgets is a major issue that has intensified the competition for R&D resources in many countries. The survey suggests that programme owners are more interested in adding value than reducing cost. The larger countries are well above average in achieving lower cost benefits.

2.4.2 Objectives of transnational activities

The analysis of feedback on benefits and our wider consultations suggest that there are four main reasons for transnational cooperation and opening. These are:

1. Development of knowledge-based industries
2. Internationalisation (of industry and the science base)
3. Increasing scientific competitiveness
4. Address societal or environmental challenges

The development of ***knowledge based industries*** is an increasingly important challenge for European economies. In some cases, this is driving more concentration of

[11] Competitiveness through internationalisation; evaluation of the means and mechanisms in technology programmes, Tekes 2004

national programmes on specific thematic areas that support the development, attraction and retention of high-tech companies. The relative sophistication of such industries, including multi-nationals, and the globalisation of supply chains and markets, makes it logical to encourage more transnational cooperation and opening of national research programmes. The smaller the country, the more logic there is for transnationality but the competition for research-intensive inward investment is also a factor for larger countries. The logic for transnationality in SME programmes is similar but less compelling as they are relatively unsophisticated and, apart from the smaller countries, can generally find sufficient expertise within their own country.

Transnationality in industrial programmes can support wider objectives related to ***internationalisation*** of industries and this is an overt aim of such programmes in, for example, Finland. The most direct means of achieving this is through the involvement of end users from other countries but this can be politically sensitive and some countries prefer to limit foreign participation to researchers only, which is unlikely to be as effective in building supply chain relationships through technical collaboration. Transnational instruments (such as international mobility fellowships) are also used to support the internationalisation of the science base and this is particularly popular in the context of developing young researchers. For example, this can be seen in the USA International Research Fellowship Programme, which is aimed at creating a globally engaged workforce of researchers.

The development of knowledge-based economies is an important policy objective for Europe and ***increasing scientific competitiveness*** is seen by many as the main platform to achieve this aim. There are many ways to build scientific competitiveness but collaboration with, or learning from, world class researchers is regarded as one of the most effective. There are a number of ways to achieve this within national programmes, including instruments for inward and outward mobility of researchers, sponsoring national participants in international research teams, supporting proposal development for the EU RTD Framework programme, providing incentives to attract foreign researchers and allowing leading foreign researchers to participate in national consortia. The latter is particularly relevant for smaller countries with a relatively weak science base as the quality of research proposals increases over time and there is a high degree of knowledge transfer. It also helps to build relationships that lead to the inclusion of national partners in EU funded projects.

Finally, there are compelling reasons for transnational cooperation and mutual opening to ***address societal or environmental challenges*** both in Europe and globally. This could range from taking an international procurement approach in research programmes (like the Food Standards Agency in the UK) to coordination of international projects in common areas of interest. Many of the ERA-NET Coordination Actions that have been funded by FP6 are in these areas.

The reasons for transnational activities within national programmes are compelling in many cases but, in practice, there is a relatively low level of investment in such activities across the ERA. The reasons for this are discussed in Section 3 (Barriers).

3 BARRIERS

The analysis of barriers is based on the responses to 21 specific questions on programme features that hinder transnational activity (Appendix D). Detailed analysis of the responses is included in Appendix I. The main findings and our interpretations from consultations with national officials are summarised below.

3.1 Relative prevalence of barriers

Figure 6 shows the relative prevalence of the different barriers for the whole sample of 127 national programmes.

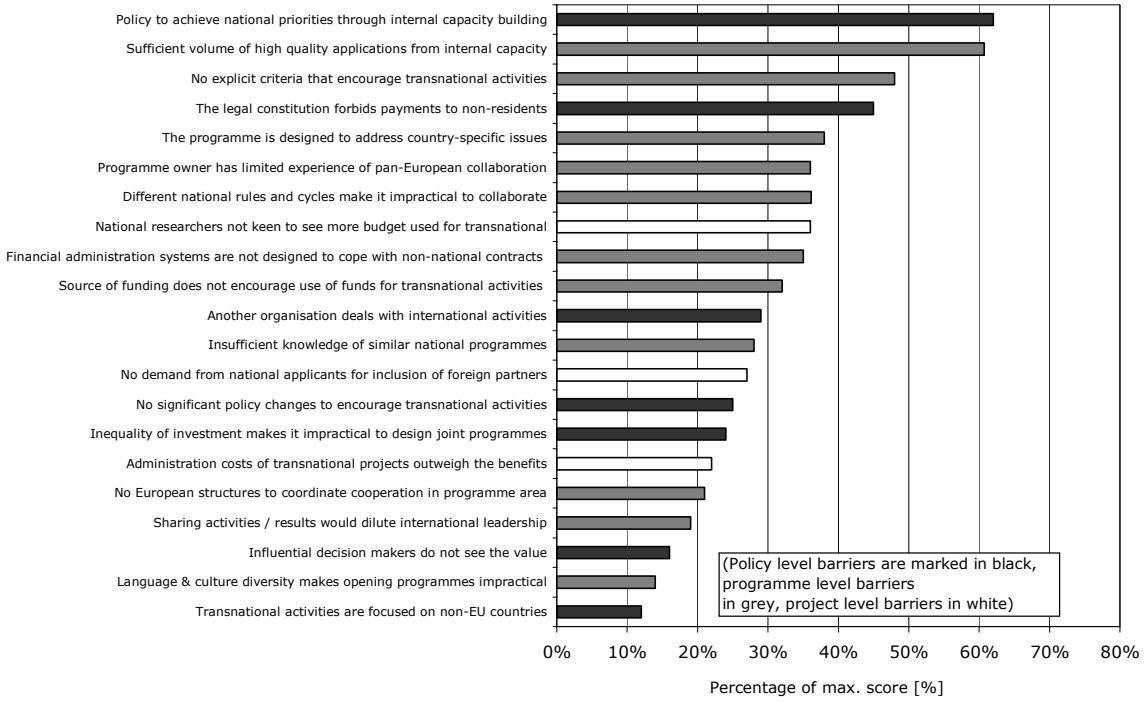

Figure 6. Frequency distribution of all barriers

This provides an indication of the relative importance of each barrier as survey respondents were invited to express their level of agreement or disagreement with each barrier for their national programme. Four barriers reached more than 40% of the maximum score and can, therefore, be considered to be of highest generic relevance across all types of programmes and countries. They are:

1. National policy for science and innovation is based on improving national scientific and technological capacity to address national priorities
2. Sufficient volume of high quality proposals are received from national applicants
3. The programme does not have any explicit criteria that encourage transnational activities
4. The legal constitution for public funding of the research programme explicitly forbids the transfer of funds to non-residents

The highest scoring barrier is related to insularity of national programme design. Scoring 60%, the majority of the cross-ERA sample agreed that their national policy for science and innovation is based on ***improving national scientific and technology capacity to address national priorities***. This is the traditional approach to national programme design and their heritage of self-sufficiency. If there is no strong reason to look outside national borders then programme managers are unlikely to do so without some encouragement, especially in the larger economies (75% of maximum score). Clearly, this highlights the considerable challenge to be faced if we are to progress towards a more open European Research Area.

It is reasonable that a ***sufficient volume of high quality proposals*** from national applicants imposes strong pressure on the programme owners and managers to satisfy the demand of national applicants. The probability of success may be small enough anyway and competition would become more intense if part of the budget is allocated for non-residents or transnational projects. This could considerably increase the discontentment within the research community, particularly in countries that have a strong science base. In smaller countries, with a weaker science base, the use of transnational instruments and foreign researchers is more common as it increases research capacity and fosters scientific competitiveness.

The ***absence of explicit selection criteria*** means that transnational proposals will be disadvantaged in the selection process. Evaluators as well as funding agencies have difficulty in dealing with proposals that include the participation of non-residents if there are no explicit criteria to judge their relative merits. In the absence of any criteria that discriminate in favour of transnational projects, it is much less likely that such proposals will be submitted in any case. In those programmes where appropriate tools are available, it is traceable how such transnational oriented proposals are handled. For example, applications to the SBO programme in Belgium are prioritised higher if they are international, involve SMEs or support sustainable development. It is, therefore, clear to

applicants that projects with an 'international' dimension will be favoured against purely national projects. This is the exception rather than the rule in national programmes.

The relatively high prevalence of opinion that the ***legal constitution forbids the transfer of programme funds to non-residents*** is controversial as the general view at the policy level is that there are no such fundamental legal barriers in most countries. It may be that the financial regulations require special approval for programmes that are 'international-by-design' as many of the best examples of paying non-residents are in this category. It is our impression that many programme owners do not have a clear understanding of whether such barriers are based on the legal constitution or the governance system that has been implemented by policy makers. In some cases, we have noticed that the eligibility rules for particular programmes explicitly limit participation to national applicants. We also received some anecdotal comments from Greece suggesting that programmes that are partly supported with EU Structural Funds have more restrictions on how the money can be used. The situation with regard to EU State Aid rules on distortion of competition also seems to have an effect but this would tend to remove legal barriers where they exist. The reality may be that there is simply no precedent in some national administrations so it is assumed that such an activity is forbidden or the administrative system may not be able to cope with non-residents. One workshop participant commented that "money can only cross borders after it leaves the Ministry". The delegated power to be innovative in national programmes also depends on the degree of autonomy of the sponsoring organisation. For example, Research Councils seem to have more flexibility than Agencies. All of these could be interpreted, by programme owners, as legal barriers to the mutual opening of national programmes.

3.2 Relative Prevalence by Programme Type

The detailed analysis of the relative prevalence of barriers across the four types of programme (basic research, applied research, training/mobility and SME R&D) was rather inconclusive. We found this a little surprising as the common opinion among experts is that transnational activities are easier to implement within basic research programmes.

We can attribute at least some of the lack of differentiation to the prevalence of 'multi-type' programmes. Just over one third of the surveyed programmes focus on only one type of project as shown in Figure 7.

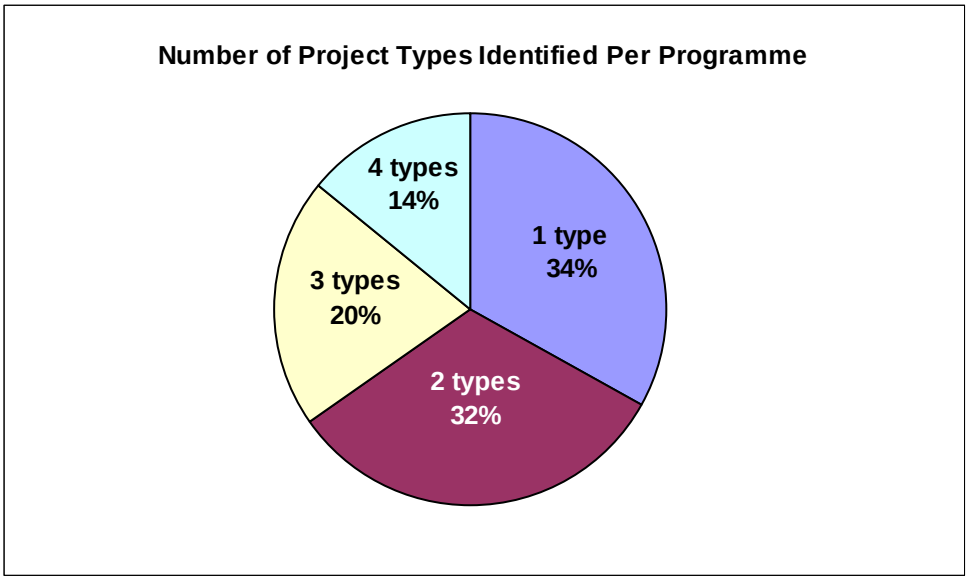

Figure 7. Prevalence of multi-type programmes

Most of the basic research programmes include instruments for mobility and there are many programmes that support both basic and applied research. There are also some framework programmes that support all four types.

We found more differences between the four types of programmes in the analysis of enablers (Section 4). This suggests that the barriers are fairly generic across the different types of programme but the design and operational rules related to transnationality are different.

3.3 National and Cultural Differences

As discussed in Section 2.2, it was clear from the national consultations that there is considerable variation in policy and practices across the 34 countries and within different groups of countries. The analysis of barriers considered the pattern of responses from different groups of countries on several factors including:

- History and status of EU membership
- Size of economy
- Culture
- Region within Europe

A detailed analysis of the pattern of responses and discussion of the results with respect to the various clusters is included in Appendix I. Key observations are summarised below.

Differences between old and new EU Member States

Three different groups (original EU15 members, 10 new EU members and the candidate countries) were analysed in order to highlight the possible influence of historical and current status of EU membership. This revealed some interesting variations in the relative importance of the barriers.

The pattern and scale of responses for ***EU15*** countries is generally in line with the average shown in Figure 6. This is not surprising as over 70% of survey responses were from EU15 countries. The pattern is very different for the 10 new member states and the candidate countries.

The barriers in the ***new EU Member States*** follow a different pattern. Legal and administrative barriers are relatively low. This is probably because research policies and structures are more embryonic and there is a clear need to cooperate to achieve integration with the rest of Europe. Country-specific issues and the relative inequality of national investment seem to be relatively more important than in the EU15.

For ***candidate countries***, the most important barrier appears to be the inability to pay foreign researchers.

Larger countries appear most insular

The relative importance of barriers also varies with size of countries from the small economies (with GNP below €100 billion) to the three largest economies (France, Germany and the UK). All of the other countries were classified as medium economic size. The results show the following main differences in relative importance of barriers.

The ***larger countries*** are above average on almost all barriers and, scoring 75% of the maximum, agree that "our national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities". The ***smaller countries***, generally, have lower barriers but the 'relative inequality of investment' is clearly an important issue. Some of the smaller countries clearly have

some difficulty in securing inclusion in multilateral and EU funded projects because their scientific capacity and intellectual asset base is relatively weak.

Some differences between cultural groups

The legal, administrative and policy barriers seem to be lower in Benelux and Nordic countries than in Germanic countries. The main exception is Austria, which has lower barriers than the other Germanic countries. Nordic countries appear to be supportive at all levels; policy, programme and project. In Germanic countries, there appears to be demand from participants but a lack of policy level encouragement. Policy feedback from Germany indicates a separation between national and international programmes. In Benelux countries there appears to be a lack of national demand for transnational activities in spite of a more open policy on transnationality. The case study for IWT (Belgium) appears to back up this lack of demand from the users to involve foreign partners in national programmes. In its strategic basic research programme, IWT has found it necessary to apply selection criteria that positively discriminate in favour of applications that include international partners.

3.4 Prevalence of barriers in the more 'Open' programmes

Most of the programmes spend less than 5% of their budget on transnational activities[12]. Around one third spend more than this and could, therefore, be regarded as the most open. In order to identify the barriers that have the greatest impact on opening programmes, we compared the more open programmes (>5% spend on transnational activities) with those that are closed (0% spend on transnational activities). This highlighted significant differences in prevalence (% of maximum score) for some barriers as shown in Figure 8. These are presented in order of relative % difference between the more open and closed programmes.

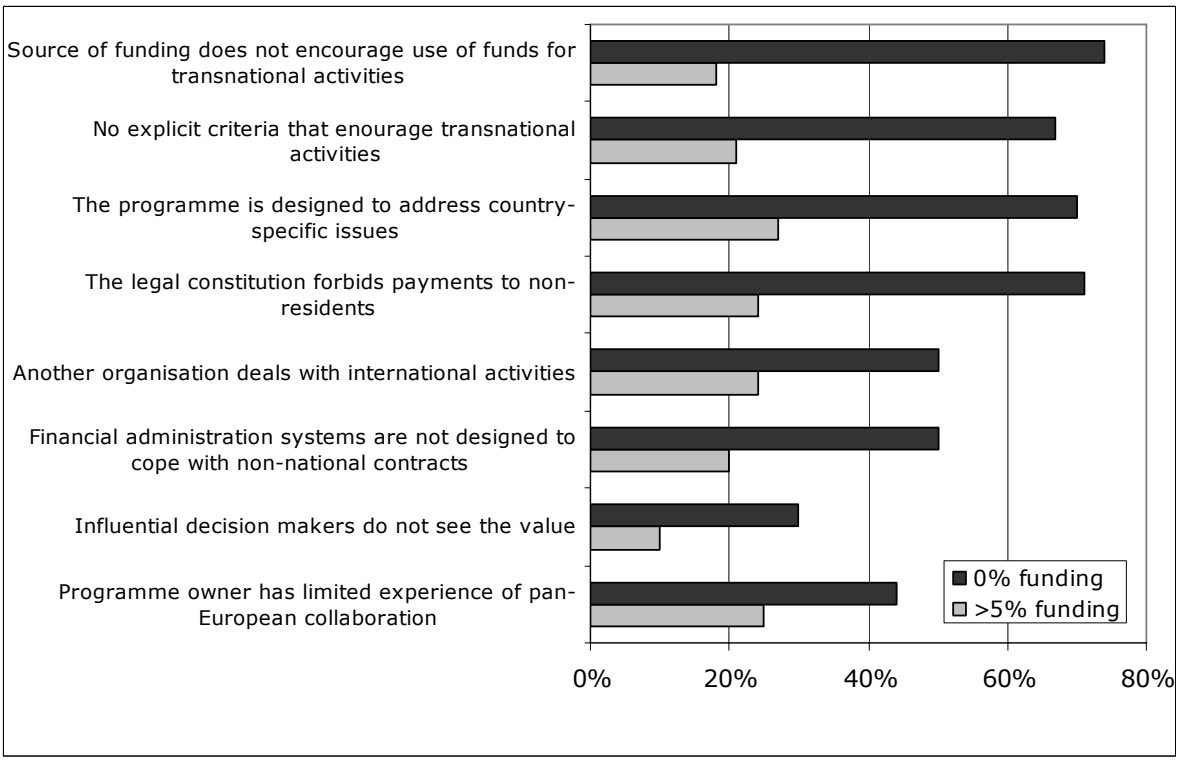

Figure 8. Prevalence of barriers in open and closed programmes

Programmes that have spent 5% or more of the budget on transnational activities have fewer barriers overall than those with 0% spend. The prevalence of some barriers reduces significantly in open programmes, whereas others remain in place. This would

[12] In the national programme survey, respondents were asked about their actual spend on transnational activities. Around 15% have no transnational spend, 33% spend more than 5%. The majority (52%) spend between 0-5% of their budget on transnational activities.

suggest that the barriers with the greatest difference are the most significant inhibitors of transnational activity. The analysis above shows these significant inhibitors. Reducing these should be the priority when aiming to increase transnational activity.

3.5 Programme User Perspectives

The survey of programme administrators indicates that around 25% are not experiencing any demand from the applicants for inclusion of foreign partners. In addition, around one third believe that the applicants would not like to have more of the national programme budget allocated to transnational activities or instruments. These statistics are similar for all types of programme except mobility programmes where there does appear to be more of a demand for cross-border actions. Predictably, there is more demand for inclusion of foreign researchers in the smaller countries and the new EU Member States. In the larger countries, the programme administrators report that national researchers would not like to see more of the budget used for transnational activities.

Informal interviews were carried out with SMEs and R&D organisations in Germany and the UK to get some user perspective on these barriers in larger countries.

The industrial users in these two large countries agree that they do not wish to see more international competition for funds in their national programme. The competition for national funding is already very intense in both countries. They can appreciate the value of transnational cooperation for some purposes but, mostly, they believe that national programmes should be for national participants. They would, however, appreciate the flexibility to include foreign partners when necessary for the project but this would be the exception. Those contacted had some experience of the EU RTD Framework Programme and/or EUREKA and their perception is that transnational projects are very bureaucratic, compared with national projects. Also, the theoretical benefits of using technical collaboration to open up export markets are not always so easy to achieve. It is interesting to compare this feedback with the situation in France where the 'Aide a la Innovation' programme (see Appendix C - case studies) is very flexible in supporting French SMEs to participate in both national and transnational collaborative projects.

Research institutes are more open for transnational activities, particularly for basic research. They agree with the industrial users that applied research programmes should

mainly involve national participants but be flexible to the use of foreign partners when there is a clear rationale.

The main incentive for the users to engage in transnational cooperation would surely be some kind of dedicated, additional funding for such cooperation. This is less important for the more flexible programmes, like the innovation programme in France, but may be essential in countries where the programmes have more rigid structures. Achieving such dedicated budgets is seen as a major goal for many of the applied/industrial ERA-NET's (virtual common pot) as it will resolve the funding issue that has been a major problem in implementing EUREKA projects. Another option is to provide a supplementary incentive for projects with international partners, like the ProInno II programme in Germany that gives an extra 10% contribution to such projects.

4 ENABLERS

The analysis of enablers is based on 23 specific factors, including explicit rules or instruments, lack of legal/political barriers, external influencers, programme owner interest/autonomy and positive prior experience. The specific factors are shown in Figure 9 under each enabler theme.

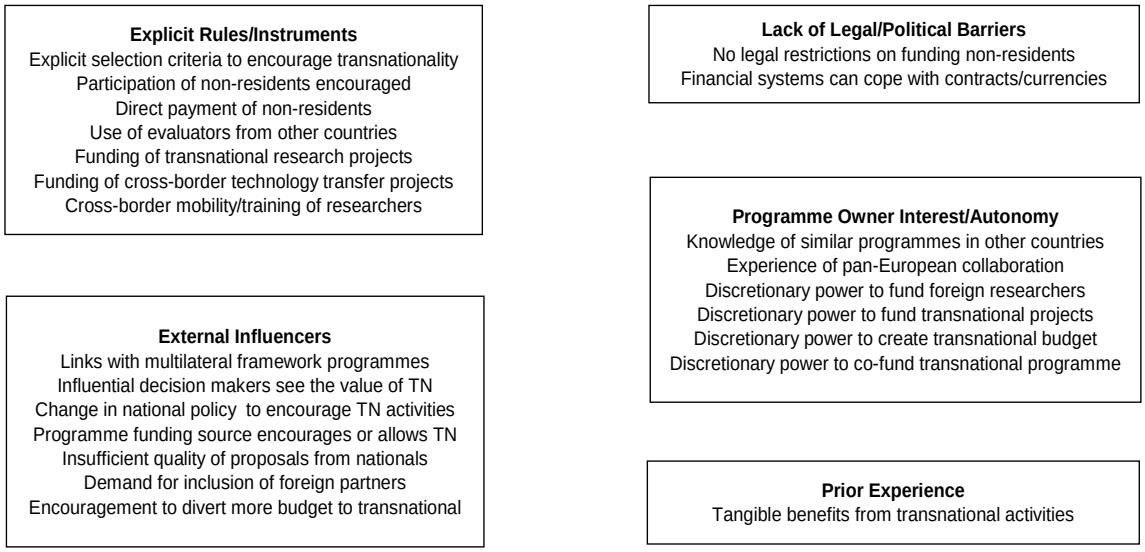

Figure 9. Enablers for transnational cooperation and opening

The detailed analysis of the questionnaire responses showing the prevalence of the above enablers is included in Appendix J. The main highlights are summarised below.

This is followed by a more detailed elaboration of more specific enablers that might be appropriate at different levels of administration (ministry, agency/council, programme administrator) to address each of the 21 barriers.

4.1 Relative prevalence of enablers

Figure 10 ranks the enablers ***in order of their prevalence*** in the 127 national programmes that participated in the online survey.

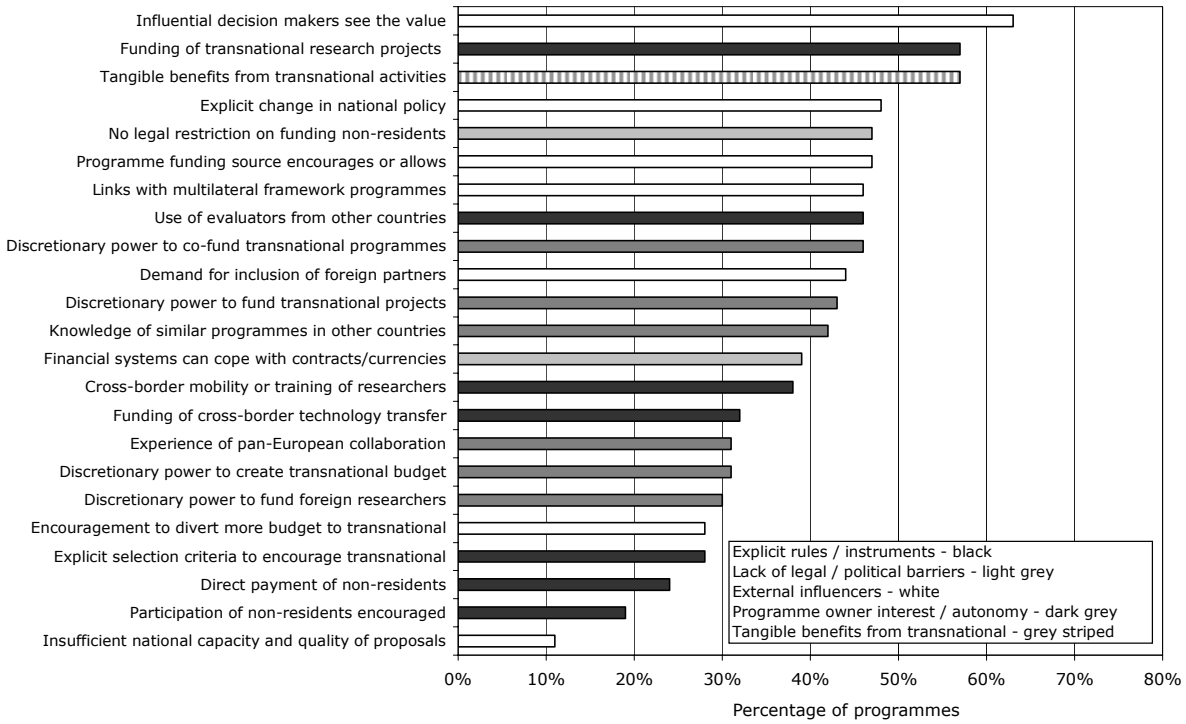

Figure 10. Relative prevalence of enablers

The most prevalent enabler is that ***influential national decision makers see the value in additional European collaboration in the area of research or technology transfer***. This is quite encouraging but it does not necessarily mean that they see the value of doing this through increasing the transnationality of their national programmes. One SME programme respondent stated that "we would design a different programme if we wanted to encourage transnational activities". Also, we could take a negative view of the lack of a higher score for this enabler as clearly some 36% of influential decision makers do not see the value. This may be related to the lack of economic evidence on the benefits of such collaboration.

As far as ***explicit rules and instruments*** are concerned, the most prevalent enabler in the sample of programmes is the funding of national researchers in transnational

research projects. The use of foreign evaluators is also quite common and also instruments to encourage cross-border mobility. Very few national programmes, however, explicitly encourage participation by non-residents.

Positive prior experience (***tangible benefits from transnational activities***) is also an important enabler, as is discretionary authority to adapt programme rules. Around half of the programme owners that participated in the survey appear to have the authority to fund national participants in transnational projects but there is less flexibility to fund foreign researchers or create dedicated budgets for transnational activities.

4.2 Relative prevalence by programme type

In spite of the prevalence of multi-type programmes, discussed in Section 3.2, there appears to be more indication of important differences in enablers between the four types of programme. Influential design makers appear to be particularly keen on transnational mobility and are more willing to pay non-residents than for the other types of programme. Mobility programme managers also seem to have a higher awareness of similar programmes in other countries. International mobility instruments are also quite common within basic research programmes and can be regarded as an explicit enabler in such cases.

Applied research programmes appear to have the lowest level of explicit criteria to encourage transnational activity, even less than SME programmes. Use of foreign evaluators is more common in basic research and mobility programmes. Funding of cross-border technology transfer projects is quite common in mobility and SME programmes.

4.3 National and cultural differences

As for the barriers, the analysis of survey results highlighted a number of interesting differences between different types of countries and cultural groups. Key observations are summarised below.

The new EU Member States have more explicit rules and instruments

The new EU Member States are much more open to transnational activities and the use of non-resident researchers than the other countries. This includes the widespread use

of evaluators/researchers from other countries and cross-border mobility. The enablers related to participation in multilateral framework are, however, rather weak and this inhibits their practical ability to engage in transnational activities. They also have less experience of pan-European collaborative programmes.

EU15 countries, typically, have well developed research infrastructures and transnational activities are seen as a value adding option rather than a necessity. The most prevalent enabler is programme rules or instruments that allow the funding of transnational research projects. It is normal, however, for each country to fund their own participants except in rare cases where foreign partners have a minor role and it is more efficient for one country to fund the whole project. An example of this is the International Joint Research Programme in Japan, which awards grants up to €0.5m to international research teams but ensures control through coordination by a Japanese institute. This seems like a pragmatic way of implementing transnational projects without the administrative bureaucracy that accompanies joint projects or programmes funded by national administrations. We understand that Switzerland also practices some unilateral funding of multilateral projects and that there have been some reciprocal pilots of this type between the research councils in the UK and Netherlands.

Small and medium sized countries are most innovative in designing programmes with transnational instruments

Programmes in the small and medium sized economies make greatest use of explicit rules and instruments but the mix is different. Like the larger economies both are most active in funding transnational research projects. Smaller countries have more instruments to enable access to foreign expertise but not necessarily through direct payment. Medium economies appear more active in cross border mobility and technology transfer. The larger countries have the best links with the multilateral framework programmes.

Nordic countries are most open to transnational cooperation

Influential decision makers are much more convinced of the value in increasing transnational cooperation between national research programmes in the Nordic countries (84%) and Eastern Europe (90%). Programmes in these countries also tend to have a higher prevalence of explicit rules and instruments to facilitate such cooperation.

4.4 Prevalence of enablers in the more open programmes

As for barriers in Section 3.4, we also analysed the relative differences in prevalence of enablers in the more open and closed programmes. This highlighted significant differences in prevalence for some enablers as shown in Figure 11.

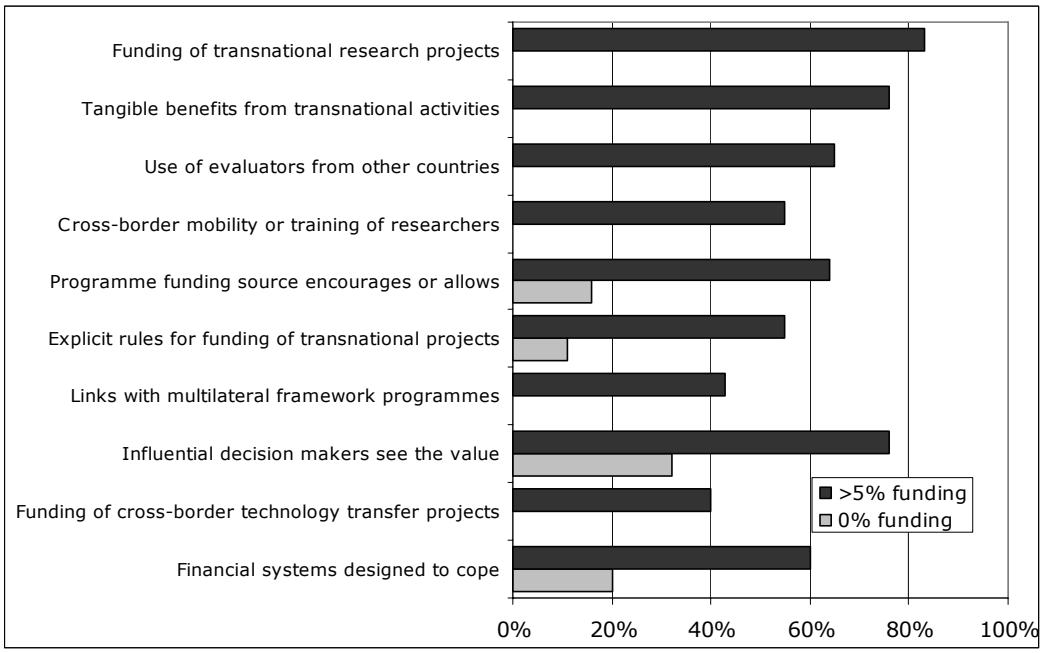

Figure 11. Prevalence in open and closed programmes

This indicates that the more open programmes have a higher prevalence of instruments to encourage transnational cooperation or sufficient flexibility to fund research projects on a case-by-case basis. The closed programmes have a total absence of such instruments, nor are they linked to multilateral frameworks.

It is interesting to note that some of the closed programmes have policy level support (ie influential decision makers see the value or funding source encourages/allows). This shows that policy level encouragement may not be sufficient on its own and again suggests that embedded instruments and operational flexibility are the most important enablers. Of course, policy level commitment is required to allow such instruments or flexibility within national programmes.

Our general impression from interviews and workshops is that clear policy encouragement and explicit programme design rules are important pre-conditions for

transnational cooperation and opening. Many of the national officials have commented that it is very difficult to engage in transnational activities if these are not foreseen at the design stage. The best opportunity to make a difference is at the review milestones of national programme cycles. Some of the best examples of current practice are relatively new and have been embedded in new programmes that were designed within the last few years.

4.5 Best practice framework

It is difficult to be prescriptive on the most appropriate approach to transnational strategies for any country, programme or national administration as the relative importance of certain barriers may vary. In addition, enablers that are effective in one situation may not be transferable to another. The framework of enablers in Figure 12 below is a first attempt to outline some approaches that could be considered at different levels of administration.

BARRIERS	Prevalence	ENABLERS		
Policy level barriers		**Ministries**	**Agencies/Councils**	**Programme Administrators**
Policy to achieve national priorities through internal capacity building	62%	Adopt a more open policy to encourage innovative transnational approaches	Evaluate the potential and actual impact of European collaboration	Provide case study examples and success stories of transnational projects
The legal constitution forbids payments to non-residents	45%	Remove legal restrictions	Clarify legal position and propose options to overcome restrictions	Ask for clear guidance on legal position
Another organisation deals with international activities	29%	Encourage internationalisation of all national research funding organisations	Increase international networking activities	Take advantage of international networking opportunities
No significant policy changes to encourage transnational activities	25%	Develop top-down strategy on coordination of national programmes	Review bottom-up experience of bilateral and multilateral cooperation	Provide case study examples and success stories of transnational projects
Inequality of investment makes it impractical to design joint programmes	24%	Consider more integrated approaches to economic and technical cooperation	Encourage participation in multilateral programmes	Adopt flexible approach to 'a la carte' funding of transnational projects
Influential decision makers do not see the value	16%	Consider strategic, longer term benefits of technical cooperation	Evaluate the potential and actual impact of European collaboration	Provide evidence of tangible benefits from transnational activities
Transnational activities are focused on non-EU countries	12%	Investigate and recognise value of European collaboration	Encourage participation in European multilateral frameworks	Participate in European multilateral frameworks
Programme level barriers				
Sufficient volume of high quality applications from internal capacity	61%	Provide additional, dedicated budgets for transnational activities	Develop programmes or instruments that are transnational by design	Highlight lost opportunities for transnational value added
No explicit criteria that encourage transnational activities	48%	Develop top-down strategy on coordination of national programmes	Use selection criteria to encourage transnational projects	Ensure selection criteria does not discriminate against transnational projects
The programme is designed to address country-specific issues	38%	Encourage internationalisation of all research programme designers and administrators	Identify other countries with similar issues and identify areas for value adding cooperation	Identify programmes in other countries that are addressing the same issues
Programme owner has limited experience of pan-European collaboration	36%	Encourage internationalisation of all research programme designers and administrators	Encourage staff to be more involved in international networks	Increase involvement in pan-European collaborative programmes
Different national rules and cycles make it impractical to collaborate	36%	Identify priority areas for coordination and harmonise where appropriate	Provide a degree of flexibility in programmes to allow alignment	Establish coordination interface with related national programmes in other countries
Financial administration systems are not designed to cope with non-national contracts	35%	Use agencies to administer any non-national contracts	Design systems to cope with non-national contracts and currencies	Allow participants to use subcontract option where appropriate
Source of funding does not allow use of funds for transnational actiities	32%	Analyse reasons why source of funding does not allow funding non-residents	Identify and adopt innovative approaches from other countries	Highlight lost opportunities for transnational value added
Insufficient knowledge of similar national programmes	28%	Encourage internationalisation of all research programme designers and administrators	Allow programme administrators to travel to meetings, conferences, etc.	Develop links with peers in other countries through participation in networks and events
No European structures to coordinate cooperation in programme area	21%	Support the development of networks and coordination structures	Iniitiate networks in priority areas	Identify and attend networking events in other countries to build collaborative relationships
Sharing activities / results would dilute international leadership	19%	Assess benefits of transnational activity to support international leadership objectives	Promote transnational activity as a method for developing international leadership	Engage in transnational activities to identify new approaches to best practice programme design
Language & culture diversity makes opening programmes impractical	14%	Encourage internationalisation of all research programme designers and administrators	Adopt evolutionary approach of building from bilateral to multilateral cooperation	More use of English language to enable opening of programmes
Project level barriers				
National researchers not keen to see more budget used for transnational	36%	Provide additional, dedicated budgets for transnational activities	Develop and promote policies for increased investment in transnational activities	Use case studies to encourage more user interest in transnational activities

Figure 12. Framework of enablers

5 CONCLUSIONS

5.1 Design of national programmes

The national programme landscape in the European Research Area is extremely diverse and complex. At the macro level, there is a wide range of funding structures and organisations. At the micro level, there are many different programme design models. Over 80% of the 127 national programmes that were surveyed have spent at least some of the budget on transnational activities or foreign participants but much of this is experimental and a European Research Area with mutual opening of national programmes is still a distant dream. It is, however, clear in many countries that the topic is now an important policy issue.

Complex, dynamic landscape

The relative R&D investment, organisational structure and science/innovation funding models are very diverse across the European Research Area. Also, the situation is quite dynamic, particularly in the new EU Members States, and there are indications that it will become more dynamic as the national administration move towards their 2010 R&D investment targets.

More coordination in basic research

The study has confirmed the general view that there is more coordination in basic research. This includes bottom-up motivation from scientists who already have an international orientation and also a more harmonised and coordinated structure through research councils, high level forums (EuroHORCs, CREST) and multilateral programmes (EUROCORES, EURYI). The ERA-NET Scheme also seems to have increased the intensity of networking across the basic research programmes.

More 'variable geometry' in applied/industrial research

The situation in applied/industrial research programmes is much more fragmented and involves a wide range of economic and societal ministries. Some countries have established Innovation or Technology Agencies that implement programmes on behalf of one or more ministries and most of them participate in the TAFTIE network. There is,

however, a clear lack of harmonisation and a lack of high level coordination structures. The bottom-up ERA-NET Scheme is facilitating pan-European networking and cooperation between many programmes administrators for the first time but there is still a lack of a top-down strategic approach to coordination in most countries.

Limited sign of landscape alignment

In general, it seems that national policies and programmes are being developed without any obvious alignment with the parallel situation in other countries. This is becoming quite obvious in the ERA-NET Coordination Actions and the commonly held view is that the way forward is to create additional instruments (including dedicated budgets) that can be aligned to enable joint calls. At the October 2005 Manchester Conference on 'co-ordination of national research programmes' there was a general conclusion that national policy makers should now take a more strategic, top-down approach to the ERA-NET Scheme in FP7 whilst preserving its bottom-up qualities.

5.2 Barriers to transnational cooperation

The study has highlighted 21 specific barriers to transnational cooperation and opening between national programmes. Their relative prevalence and importance was assessed through an online survey of 127 programme administrators across the European Research Area.

Some of the barriers are at policy level; others are related to programme design or operational features. In some cases, the operational barriers are due to the lack of experience or motivation of the programme administrators.

Major barriers to opening of national programmes

Scoring over 60% of maximum, the majority of programme administrators agreed with the following two barrier statements, which suggests that these are the most prevalent.

- National policy for science and innovation is based on improving national scientific and technological capacity to address national priorities
- Sufficient volume of high quality proposals are received from national research applicants to meet the programme objectives

The common link between these top two barriers is a ***reluctance or lack of incentive*** to open national programmes to non-residents. The first suggests that there is still a

high degree of insular thinking in national administrations and a relatively low collaborative culture. The second barrier is highest in the larger countries where there is already intense competition for funding and it would be politically sensitive to increase this by opening the programme to foreign participants.

Policy barriers appear to be most important

The prevalence of certain barriers does not necessarily mean that they are the most important in inhibiting transnational cooperation and opening. A comparison of % differences in prevalence (% of maximum score) between the closed programmes (0% spend) and the more open programmes (>5% spend) was quite revealing. This highlighted four barriers that appear to be relatively more important in terms of prevalence in closed programmes and also percentage difference compared with the more open programmes. These are:

- The source of funding does not encourage use of funds for transnational activities
- No explicit criteria that encourage transnational activities
- The programme is designed to address country-specific issues
- The legal constitution forbids payments to non-residents

These suggest a ***lack of political will*** to engage in transnational cooperation and opening. This may be based on a lack of awareness of benefits that can be achieved through coordination of national programmes. There is, however, a clear lack of socio-economic impact evidence of the benefits that have been achieved by those that have been most active.

Differences between programme types are unclear

The survey did not highlight any significant differences in barriers between the four types of programme that were examined, except that the barriers appear to be lower for mobility programmes. This was rather surprising as experts generally agree that basic research programmes are more open to international cooperation than applied research programmes where IP, employment and competitiveness issues can inhibit. Since some 70% of the survey sample could be classified as multi-type programmes (ie permutations of basic, applied, mobility and SME), this clearly limits the analysis of differences between each type. Blurring of the edges between basic and applied research is one of the reasons for the increased interest in 'Frontier Research', which will be an important part of the agenda for the European Research Council.

Variations between countries and cultures is more interesting

The larger countries are above average on almost all barriers. This is unsurprising as the larger countries have more scientific breadth and depth and are relatively self-sufficient. The barriers tend to be lower in the newer EU Member States, and smaller countries, as they are keen to be integrated into the European Research Area. Their relatively weak scientific competitiveness, however, makes it difficult for them to achieve inclusion in European networks projects and there is perhaps a need for the larger countries be more integrated in their economic and technical cooperation policies with the new EU Member States.

5.3 Strategies to address the barriers

At the European level, it is logical to presume that greater cooperation and opening between national programmes will lead to a greater overall impact through the concentration and more efficient use of resources. At national level, this logic may not be so relevant depending on what the national programme is trying to achieve.

Strategies are dependent on the objectives of the programme

The anecdotal evidence from national programme consultations is that strategies are very much dependent on the programme objectives and to what extent these can be achieved without external knowledge and expertise. If the focus is on addressing environmental or health & safety challenges, then it may be more effective to use researchers, or acquire technology, from other countries. The opposite might be true if the objective is to develop high tech sectors, as both industrial and scientific capacity building may be required at national level. Developing scientific capability may be impossible for the smaller countries without using the infrastructure in larger countries or exposing young researchers to international research teams. Most of the innovative examples of transnational strategies in Europe can be found in the small and medium sized countries as they have the greatest need to access external expertise and facilities.

Prevalence of transnational enablers

The study highlighted 23 specific enablers that can encourage transnational cooperation or opening between the national programmes. Some of these can be regarded as design strategies (eg explicit rules, instruments or operational flexibility); others provide a view

of national policy. The three most prevalent enablers, highlighted by 50% or more of the programme owners, appear to be the following:

1. Influential policy makers see the value in additional European collaboration
2. Programme funding has already been used to sponsor transnational projects
3. Tangible benefits have been achieved from transnational activities

These suggest that strong encouragement from the policy level, operational flexibility and previous good experience are the most common enablers.

In addition, a comparison of open and closed programmes indicates that the closed programmes have a total absence of instruments to encourage transnational cooperation and also lack the flexibility to fund such projects on a case-by-case basis.

Mobility and basic research programmes tend to have more enablers

The differences between the four types of programme are more obvious when considering enablers rather than barriers. Mobility programmes score highest in most of the enablers, particularly in relation to commitment from policy makers, explicit instruments, experience of programme managers and systems that can deal with non-residents. Basic research programmes have fewer enablers than mobility programmes but have a greater use of foreign evaluators and fewer restrictions on funding non-residents than applied research programmes. They also, typically, have the support of influential decision makers who believe that "science is international, innovation is national".

Some interesting differences in enablers across the ERA

The analysis of the relative importance of specific enablers by country type was quite revealing. For, example:

- Influential policy makers in Eastern Europe and the Nordic countries appear to see more value in additional European collaboration than the other countries
- The 10 new Member States have more explicit rules and instruments to utilise the expertise of foreign researchers but have fewest links to multilateral frameworks or experience of collaborative European research

The larger countries generally have less explicit policy enablers because their science base and national markets give them the option to be relatively self-sufficient. They also tend to have a separation between national and international research activities. The small and medium sized economies are less self-sufficient so are naturally more open.

The medium sized economies, particularly in central and northern Europe, seem to be much more able to participate in transnational cooperation and mutual opening.

5.4 Experiences and difficulties

Most countries have some experience of transnational cooperation and opening of national programmes through bilateral agreements, EUREKA and/or the newer multilateral frameworks (eg EUROCORES, ERA-NET) that have been introduced to support the goals of the European Research Area. The general view is that it is relatively easy to sponsor national participants in transnational activities but much more difficult to achieve mutual opening between national research programmes.

High degree of difficulty in going beyond bilateral

Most countries are actively involved in bilateral programmes on science and technology but very few seem able to progress to multilateral cooperation without some kind of facilitating framework. This is because of the degree of difficulty in dealing with the misalignment of multiple programme designs, funding cycles and operating practices. The Nordic countries are the best example of multilateral cooperation and there are both political and organisations frameworks to facilitate this (eg Nordic Council of Ministers, Nordic Innovation Centre). Multilateral frameworks like EUROCORES obviously encourage this process in the wider European scale. Progress is also being made in ERA-NET Coordination Actions, with joint calls now emerging, and some of these emerged from bilateral collaborations.

Relatively low investment in transnational activities

A significant majority of the programmes have the option to spend some of the budget on transnational cooperation and/or opening to foreign participants but the overall investment in transnationality is marginal (most spend less than 5% of the programme budget). Even when programmes are explicitly open to the inclusion of foreign researchers, the actual participation is very low. For example, Cyprus allows 30% of their framework programme budget to be spent on non-resident researchers but, in practice, the actual figure is only 12%. The Food Standards Agency in the UK has been promoting its research programmes through Open Calls in the European research media but has very few foreign contractors because of a lack of response from outside the UK. This suggests that the leading European researchers are not very proactive in taking

advantage of opportunities to participate in national programmes in other countries unless invited to join a national consortium. It could also mean that the national researchers are not very interested in sharing their domestic market with foreign partners. Experience in Belgium suggests that selection criteria need to positively discriminate in favour of more international consortia to encourage such behaviour.

5.5 Key Issues

There is a high degree of fragmentation and inertia within national programmes that is inhibiting the theoretical benefits of coordination and mutual opening of the European Research Area. The key issues that need to be addressed to achieve the goals of the ERA can be subdivided into two types:

- Issues that are related to the power and/or commitment of stakeholders within the European Research Area
- Wider issues

The main issues highlighted by this study are:

5.5.1 Stakeholder Issues

- ***Transnational strategies are based on national objectives only (lack of ERA objectives and budgets).***

  It is clear from the case studies and other consultations that the transnational strategies, which are currently being implemented, are based on achieving national objectives or addressing national weaknesses. It may be necessary to provide some incentive, perhaps from the EU RTD Framework programme, to encourage more innovative approaches that address both national and ERA objectives. Maybe this could be achieved through a wider range of flexible instruments in additional to Article 169 and ERA-NET.

- ***Lack of perceived benefits, and therefore commitment, from the larger countries.***

  The bigger countries have less incentive to engage in transnational cooperation and opening within Europe because of their relative scientific strength and large national markets. They, however, have the greatest relative contribution to make to the opening of the ERA. It may be logical to create more incentives for such countries. Perhaps there is also a need for a specific ERA forum for the larger countries, to consider practical approaches that would be more relevant to them.

- ***The smaller countries and the new EU Member States need help to achieve better inclusion within ERA networks.***

  The smaller countries have the greatest need to access expertise and knowledge from other countries to both supplement and develop their scientific capacity. In spite of this, their relative weakness makes it difficult for them to cooperate with the more research-intensive countries because they have limited scientific value to add. Most of them have limited budgets and cannot afford, or are not allowed, to fund leading edge foreign researchers to participate in their programmes. Perhaps a more integrated approach to both economic and scientific development is required to achieve better integration of these countries into the ERA.

- ***Weak coordination structures for applied / industrial research.***

  The so called 'variable geometry' of national programmes and lack of commitment to the goals of the ERA is most acute in the industrial research programmes. This issue was the rationale for the introduction of the ERA-NET instrument in FP6 and already it has spawned a large diversity of new networks between national programme administrators. In basic research there is much more incentive, alignment and instruments for international cooperation. Applied, non-industrial research programmes also have variable geometry but, since there is more incentive to cooperate and share knowledge in the societal and environmental fields, it is likely that the ERA-NET Scheme will at least partly address the fragmentation. The recent launch of a Call for OMC-Net projects is an opportunity to improve networking and coordination at a higher programme design and policy level. Perhaps a forum for industry/economic ministries is needed (analogous to CREST, which mainly involves the science ministries) or more integrated strategies at national level to support the internationalisation of industries through technical cooperation.

- ***Lack of interest (or responsiveness) from national programme users and foreign researchers.***

  Some of the case studies and informal consultations with programme users in Germany and the UK suggest that there is limited demand from programme users for opening of national programmes to foreign researchers. This could be regarded as a response to the perceived threat of more intense competition for national research funding. This is understandable but leads to sub-optimal return on public sector investment in R&D across the ERA. Even when programmes are

very open to the use of foreign researchers the practical experience is disappointing. The most obvious solution is dedicated budgets and instruments for transnational activities within national programmes. Some countries have addressed this issue by creating programmes that are 'transnational-by-design'. Maybe there is also a need for centralised promotion of those programmes that are open through an ERA Call system in CORDIS or to look at the feasibility of more flexible instruments that will bridge the gap between national programmes and the EU RTD Framework Programme.

There are differences in the level of commitment between these stakeholder groups and some have more power than others to influence the strategic development of the European Research Area. Our interpretation of the relative power and commitment, based on the discussion of stakeholder issues, is summarised in Figure 13.

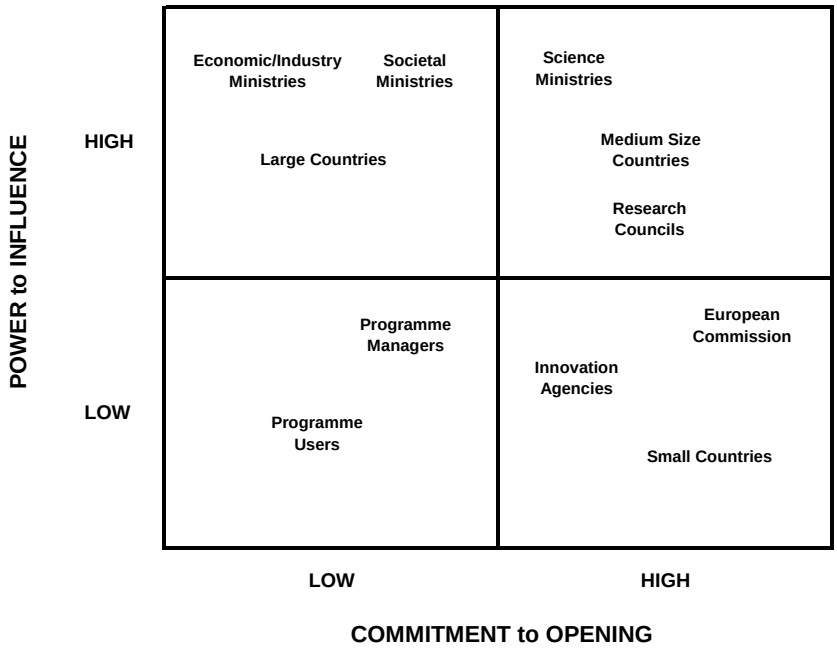

Figure 13. ERA Stakeholders

In simple terms this provides a strategic framework to consider what actions could be taken to address the issues. The key questions are:

- How can the more influential stakeholders (eg large countries, industry ministries, etc) be encouraged to increase their commitment to opening research programmes and/or establishing mechanisms and programmes for transnational research cooperation ?
- How can the more committed stakeholders (eg small countries, innovation agencies and the Commission) encourage others to engage in more transnational activities within the ERA ?

5.5.2 Other Issues

- ***Many national programme administrators believe that the legal constitution for public funding of their research programme explicitly forbids the transfer of funds to non-residents.***

  This achieved almost 50% of maximum score for the 127 programme administrators that participated in the survey. This figure rose to over 70% for those that have not spent any of the budget on transnational activities (closed programmes). This is quite a controversial issue as most policy makers insist that there is no such fundamental legal barrier in most countries. We believe that programme administrators may be highlighting lower level legal barriers embedded in the governance rules of funding organisations (eg Agencies), external funding conditions (eg EU Structural Funds) or the programme eligibility rules. This suggests that there is a need for some clarification of the legal position at national level. DG Competition may also have a role to play in creating more openness of national programmes.

- ***Lack of empirical evidence and evaluation of the benefits of mutual opening.***

  There is a lack of evidence of the tangible socio-economic impact of transnational cooperation and opening between national programmes. This is partly because many of the more strategic developments are relatively new but even the more mature programmes seem to be lacking in formal evaluation in this specific area. Most national programme administrators can articulate what they are trying to achieve through their transnational approaches and strategies but measuring and directly attributing the outcomes appears to be very difficult. The lack of such evidence makes it difficult to convince sceptical policy makers and suggests that there is a need for practical evaluation tools based on detailed case studies.

- ***Enablers are most effective if explicitly included at the design stage.***

  The study suggests that the barriers exist to a greater or lesser extent in all countries and it is the enablers (or objectives) embedded in the programmes at

the design stage that differentiate the more open programmes from the others. In most cases, unless there is a high degree of flexibility (which can be regarded as a design enabler), it is extremely difficult to make changes during the implementation phase of the programme. This means that timing is very important in terms of influencing national policy makers, as some programmes can have a five year life cycle before they can be changed. Perhaps there is an opportunity to monitor national programme design cycles and lobby national policy makers prior to major decision milestones.

- ***Limited transnational design creativity within national programmes.***

  Although we have highlighted a number of interesting examples of innovative approaches within national programmes, the majority are only making marginal investments in transnational activity. Internationalisation of markets and supply chains and the diversity of global scientific challenges should be reflected in the changing nature and design of national research programmes. We can see such radical changes in the trend towards more thematic prioritisation but the general approach to the transnational option is more tactical, especially when it is driven from the programme level. The October 2005 Manchester conference on co-ordination of national research programmes called for more strategic consideration of the integration of ERA-NETs within national research policies. More awareness and sharing of good practice and evidence from evaluations would also be helpful to programme administrators.

- ***Lack of opportunities for some national programme administrators to network with ERA peers.***

  Until recently, it was not particularly easy for programme administrators to network with their peers in other countries. The ERA-NET Scheme has been very helpful in providing both the framework and budget to enable such contact to be fostered. Although the spread of ERA-NET projects is very broad there are many who are not involved in such networks. Perhaps a simple ERA networking instrument could be created, similar to COST, to allow this when there is no ERA-NET or equivalent networking option.

- ***Research capacity barriers could inhibit Barcelona 3% Objective targets***

  Although not strictly relevant to this study, it is worth mentioning that most countries are already concerned about both the quantity and quality of human

resource for R&D. This is driven by a combination of knowledge economy objectives and increasing public sector investment in R&D, which will continue as EU Member States move towards their Barcelona 3% Objective targets. Some are actively providing incentives to attract researchers from other countries and this competition for scarce human resource will obviously intensify. Clearly, this issue is not already on the CREST agenda but it is important to consider whether competition for scarce research resources will lead to more opening or more insular behaviour.

Of course, the above is a generalisation of the position across the European Research Area and there are notable exceptions in some countries and stakeholder groups.

5.6 Scope for Action

Our tentative suggestions on options to address the key issues highlighted above are summarised in Figure 14.

Key Issues	Scope for Action
Strategies based on national objectives only (lack of ERA objectives and budgets)	EC co-funding of dedicated TN programme budgets that have both national and ERA criteria, or are transnational by design (eg simpler varients of Article 169) .
Lack of commitment from larger countries	ERA coordination forum for large countries. Special incentives for these countries.
Smaller countries (and new EU Member States) need help to achieve better inclusion within ERA networks	Encourage more economic/scientific networking with medium/larger countries through OMC-NET, etc and provide incentives to include in existing networks
Weak coordination structures for applied/industrial research	High-level ERA Coordination forum for economic ministries. More ERA-NET. Higher level networks (OMC-NET, EuroHORCs equivalent)
Lack of interest or responsiveness from national users and foreign researchers	Dedicated budgets/instruments for TN. ERA Call system via CORDIS. Create incentives bridge between national and FP7
Wide perception that legal constitution forbids transfer of programme funds to non-residents	Identify implications and potential solutions through CREST
Lack of empirical evidence and evaluation of the benefits	ERA-WATCH case studies. New tools for impact assessment.
Enablers are most effective if explicitly included at the design stage	Monitor national programme design milestones and lobby for more inclusion of transnational features
Lack of transnational innovation from national programmme administrators	More strategic national approaches to ERA-NET. More joined up thinking between science/industry ministries. Best practice materials, case studies and workshops.
Lack of opportunities for national programme adminstrators to network with ERA peers	Create simple ERA networking budget (similar to COST) where there is no ERA-NET
Research capacity constraints could inhibit Barcelona 3% Objective targets	Identify implications and potential solutions through CREST

Figure 14. Scope for Action

We would recommend that these issues and outline suggestions should be debated with national policy makers and programme administrators to encourage the spread of good practice and develop consensus on the need for new approaches at a European level.

APPENDIX

APPENDIX A
Study Method

The study was carried out through six main activities, which are described below.

1 A systematic process of secondary research to identify and classify the top 10 most important programmes in each ERA country (c300 programmes across 34 countries)

The desk research for 34 ERA-countries was carried out mainly by reviewing public domain reports (eg Innovation Trend Chart reports[13]) and the websites of national funding organisations. Additional direction was provided through informal dialogue with national contacts and Commission staff. Confidential information from the ERA-NET[14] and ERAWATCH[15] initiatives was also very useful. In some countries there are less than 10 programmes (eg some countries have a single framework programme and there are no competitive research programmes in countries like Bulgaria and Croatia) so additional programmes were included from countries that have many.

2 Qualitative interviews with at least one of the CREST representatives in each country

For each country, we prepared a simple summary of the national research landscape including the funding organisations and shortlist of potentially interesting programmes. These were then sent to the CREST representative for each country followed by a telephone interview with that person or their delegated representative. The interviews were aimed at confirming our understanding of the national research landscape, identifying any important changes in policy, securing a policy-level view of the barriers, identifying any interesting examples of transnational activity and signposting to experts on the national programmes. A simple summary of the national research landscapes is included in Appendix B.

3 Qualitative interviews with 'owners'[16] of national programmes that offer contrasting examples of specific transnational features and case studies

Most of the interviews were carried out in response to questionnaires that highlighted evidence of transnational activity. The interviews, therefore, served a dual purpose in providing a better understanding of the rationale behind the barriers and identifying interesting programmes for case studies. The case studies are included in Appendix C.

4 Quantitative, on-line survey of national programme owners

The questionnaire was based on a number of inputs including a workshop with experts in DG Research, steering group meetings, previous studies and insights

[13] http://trendchart.cordis.lu/tc_country_pages.cfm
[14] www.cordis.lu/coordination/era-net.htm
[15] www.erawatch.jrc.es
[16] The public sector official who is responsible for the implementation of the programme. In some cases the programme management function is outsourced.

from evolving ERA-NET projects. It was designed to secure information on different forms of transnational activity and the relative importance of a comprehensive list of barriers that had been derived from the prior research. Versions of the questionnaire were prepared in English, French and German. Invitations to participate in the online survey were sent by email to the relevant official in charge of all short listed programmes. A copy of the English language version of the questionnaire is included in Appendix D. The 127 national programmes that participated in the survey are listed in Appendix E.

5 Identification of lessons from USA, Japan and China

The research on USA, Japan and China was carried out through a systematic review of public domain reports, websites and limited consultation with experts. A summary of programmes with interesting transnational features is included in Appendix F.

6 Organisation of several expert workshops with different stakeholder groups

Three workshops were organised to secure expert input and guidance from different stakeholder groups. The first involved a cross-section of experts from DG Research. The second was with a small group of CREST representatives. The third was with coordinators and experts from the ERA-NET community. These proved to be very useful meetings and allowed an open exchange of emerging knowledge on barriers, enablers and good practice.

APPENDIX B
Overview of National Research Landscapes

Austria

The Austrian Innovation Policy is defined by the Austrian Government, which is mainly consulted by the Council for Research and Technology Development. Two national Agencies, FFG (Austrian Research Promotion Agency) and FWF (Austrian Science Fund) are in charge of implementing and managing national R&D programmes. The FWF is Austria's central body for the promotion of basic research, the FFG is the central national body for the promotion of applied research. The national R&D programmes are mostly thematic but generic and horizontal programmes are also ongoing in Austria. In the case of Austria, no legal restrictions of cross-border funding whatsoever apply. Whether or not to encourage participation of non-resident entities or individuals is, therefore, to be set up within each programme's scope.

Belgium

The research programmes in Belgium are highly decentralised and distributed between the federal and regional/community levels. More than 70% of the public sector funding is channelled through the regional administrations and agencies. There are a broad range of programmes, which are mostly non-thematic and continuously open. In general, programmes are open to the participation and payment of foreign researchers so long as there are clear benefits to Belgium.

Bulgaria

To date there is no specific policy that supports national R&D activities. Bulgaria is focusing instead on the stabilisation of the macroeconomic system. In 2002, the Ministries of Economy and of Science and Education started the development of a Strategy for Science, Technology and Innovation in Bulgaria. The implementation of this policy will improve the innovation environment in Bulgaria and provide alternative sources to fund research and development. No transnational activities are planned.

Croatia

Science and research is under the authority of the Ministry of Science, Education and Sport (MSES). The National Science Council acts as an advisory board for all issues of science in Croatia. In 2001, the government launched the Croatian Programme for Technological Development – HITRA. No transnational activities are planned. The MSES is responsible for the administration of the programme. The budget was €1m in 2003.

Cyprus

Research programmes in Cyprus are mainly implemented by the Research Promotion Foundation through its multi-annual Framework Programme for Research and Technology Development. The current three year programme is for the period 2003-2005. The programme is very open to transnational cooperation and has specific instruments to support participation in EUREKA, ESF activities and bilateral projects. It also encourages the participation by leading researchers from other countries by allowing up to 30% of the budget to be spent on foreign partners.

Czech Republic

Since 2004 the Ministry for Education, Youth and Sports has been responsible for a National Research Programme (NRP) with five thematic programmes and three cross-sectoral programmes. The funding and the project administration are carried out by several Ministries and the Academy of Sciences of the Czech Republic. A new National Research Programme II (NRP II) is prepared and will start in 2005. The programme is open for transnational activities as long as the partners from foreign countries do not ask for financial assistance.

Denmark

The Ministry of Science, Technology and Innovation (VTU) is solely responsible for research in Denmark and the implementing agency, the Danish Research Agency, has two research councils - Strategic and Independent. Denmark restructured its research system in 2004 and further changes will take place following the government's 'globalisation council' in Spring 2006. One of the aims was to strengthen the connection between national and international research efforts, with a focus on cooperation and mobility, with thematic priorities being adapted to match those of other European countries. Danish programmes are not currently open to foreign participants due to legal restrictions on spending public money on research outside of national borders. Legislative changes are currently being prepared to ensure greater Danish participation in transnational research activities.

Estonia

The Ministry of Economic Affairs and Communication is responsible for planning, coordinating, executing and monitoring the national Innovation Policy. It is advised by the Innovation Policy Council and assisted by Enterprise Estonia, the main funding and implementation agency. The Ministry of Education and Research is responsible for all Research and Education Policy related aspects. Currently there are several generic programmes ongoing in Estonia aimed at different technological and scientific fields. Foreign participants are mostly welcome in national programmes, but without any funding. Nevertheless, in some Estonian programmes, there are significant numbers of foreign participants represented.

Finland

Finland has separate science and industry ministries and two main implementing agencies for publicly funded research – the Academy of Finland (basic research), which has four research councils, and the National Technology Agency (Tekes, applied/industrial research). Finland has a large number of relatively low budget thematic programmes. Tekes openly invites other technology-oriented foreign entities to work with it, with cooperation in the shape of joint projects, technology transfer or simply the exchange of information.

France

In France there are two ministries dealing with research activities; the Ministry of Research and New Technology and the Ministry of Economic Affairs. The Centre of National Science (CNRS) is a publicly-funded research organisation, acting as a Research Council, which defines its mission as producing knowledge and making it available to

society. The administration of innovation activities has been centralised by consolidating the French Agencies for innovation and financial support under the frame of a new organisation (OSEO). Transnational activities are designed within specific programmes in order to increase national competencies. Partners from abroad can, generally, be included without gaining funds.

Germany

The main actors in innovation policy among the Federal Ministries are the Federal Ministry of Education and Research (BMBF) and the Federal Ministry of Economics and Technology Labour (BMWi). The BMBF's main activities in innovation policy refer to financing public R&D infrastructure, running technology programmes (direct R&D promotion through thematic programmes) and fostering innovation in Eastern Germany. The BMWi's innovation policy focus is on competition policy, R&D programmes in energy, aviation and multimedia and on R&D support programmes for small and medium-sized enterprises (SMEs). Several other Federal Ministries are also engaged in innovation policy to some extent. Several implementation agencies are responsible for generic and thematic programmes. Transnational activities can be seen within some programmes, mostly with the aim of enhancing national capabilities. Germany is participating in several multilateral programmes with transnational focus as well as an active partner in EUREKA to stimulate transnational R&D activities. In general, foreign companies can participate and gain funding if they set up subsidiaries in Germany, or if a programme specifies their participation.

Greece

Greece has separate ministries for Education and Development, which provide the majority of public funding for R&D. There are no research councils (i.e. no basic research programmes) and the main implementing agency for applied, industrial, SME and mobility programmes is the General Secretariat for Research and Technology (GSRT). Greece has a multi-annual framework programme, the 'Operational Programme for Competitiveness (OPCOM)', running from 2000 to 2006. This is mainly non-thematic and largely funded via the European Structural Funds, which restricts the level of transnational activity. Despite this, OPCOM has a number of specific sub-programmes aimed specifically at increasing international cooperation.

Hungary

Research funding in Hungary is implemented by the Hungarian Academy of Science and the new National Office of Research and Technology (NKTH), which was established in 2004. Applied research funding is distributed through a new National Framework programme, known as the Research and Technology Innovation Fund, which includes thematic sub-programmes and is partly funded by an industrial levy. The current policy is primarily orientated towards applied research and attracting researchers to Hungary, including ex-patriates, to increase the research capacity.

Iceland

Iceland has separate science and industry ministries, with one implementing agency for all science and technology programmes (RANNIS). New legislation regarding science and technology policy and funding was enacted in Iceland in January 2003, resulting in the formation of the Science and Technology Policy Council, chaired by the Prime Minister.

There are a small number of programmes, with a mixture of thematic and non-thematic content. Iceland has a strong track record of transnational activity with the majority of its researchers training overseas, resulting in strong relationships with international institutions.

Ireland

Research programmes in Ireland are organised within a multi-annual National Plan for research, technology, development and innovation (RTDI). The current programme covers the period 2000-2006. Within this framework, there are a broad range of implementing organisations, agencies and two Research Councils that manage both thematic and non-thematic programmes. The main implementing agencies are Science Foundation Ireland for basic research and Enterprise Ireland for industrial research. The programmes, generally, have a high degree of flexibility and are able to support transnational research activities. Ireland is generally quite open to the participation and payment of foreign researchers.

Israel

Industrial research programmes in Israel are implemented by the 'Office of the Chief Scientist' within the Ministry of Trade and Labour. Basic research programmes are operated by the Israel Science Foundation. Both organisations are primarily government funded. These programmes are not open for transnational cooperation, due to the fact, that Israel has several special programmes for international cooperation. These bi- and multi-national funds, imply participation in a joint R&D programme with foreign counterparts (e.g. BIRD, Israel USA). Basic and applied research is funded by these programmes.

Italy

Four Ministries are involved in the development and control of research policy in Italy: the Ministry of Instruction, Universities and Research-MIUR, the Ministry of Agricultural and Forestry Policies, the Ministry of Health and the Ministry of the Environment. Beside these, two public entities are responsible for scientific and research activities in Italy. The National Research Council (CNR) is distributed all over the country through a network of institutes. ENEA, the Italian National Agency for New Technologies, Energy and the Environment promotes and carries out basic and applied research and innovation technology activities through a nation-wide network of branch offices.

Latvia

The priority of the Latvian government is the development of the Latvian infrastructure to an equal level with other Member States of the EU. The Latvian Council of Sciences controls 50% of the national science budget. The budget is mainly spent on supporting the implementation of targeted applied research projects, the development of research infrastructure and the development of the educational sector.

Liechtenstein

Research and technology policy is drafted by the Ministry of Economic Affairs. Liechtenstein's research efforts are primarily controlled by a highly advanced, high tech

industrial sector. Although there are no publicly funded research programmes in the country, industrial research promotes transnational communication, technology transfer and mobility.

Lithuania

The Ministry of Education and Science plays the most significant role in research funding, allocating two thirds of the annual budget, with the Lithuanian State Science and Studies Foundation allocating the remainder. The main target for Lithuania is to develop national business competitiveness to EU-levels.

Luxembourg

The Ministry of Culture, Higher Education and Research is responsible for devising and implementing national policy for public R&D. The National Research Fund was set up in 1999 and concentrates on a small number of niche thematic areas. The government has made commitments to encourage the development of international mobility and to develop world leading expertise in specific niches that will encourage international cooperation and inward investment.

Malta

Malta's first RDTI programme commenced in 2005, following the development of a RTDI Strategy by The Malta Council for Science & Technology in 2003. Although projects are open to the participation of non-nationals, this is not highlighted due to political sensitivity surrounding the funding of research.

Netherlands

Basic research programmes in the Netherlands are sponsored by NWO (Netherlands Organisation for Scientific Research), which is linked to the Ministry of Science. Applied research and innovation programmes are implemented by SenterNovem (Technology Agency), which operates under the structure of the Ministry of Economic Affairs. Both are cross-funded by various government departments. National policy on science and innovation is becoming more consolidated through the establishment of a high level 'innovation platform' involving both ministries and high level stakeholders from the industrial and scientific communities. The majority of programmes are thematic and there is increasing concentration on specific priority areas. NWO is very proactive in international cooperation but SenterNovem is much more constrained in what it is able to do.

Norway

Responsibility for R&D and innovation is divided between all ministries, each responsible for promoting and funding research activities within its own area. The Ministry for Education and Research is responsible for overall R&D policies, for funding the majority of basic research and for coordinating sector R&D policies. The Research Council of Norway is a national strategic body and funding agency for research and innovation activities. Approximately 50% of its budget is spent on programmes, most of them thematic. Internationalisation is one of three structural priority areas (together with 4 thematic and 3 technology areas) in Norwegian research policy from 2006-2010. National

research efforts will be evaluated in light of international developments, research cooperation with the EU will be of key importance, world class infrastructures will be used as platform for international collaboration and to attract more foreign scientists to Norway.

Poland

Since February 2005, the Minister of Science and Information Society Technologies (MSIST) is responsible for the funding of scientific research. Previously, the Minister acted as a Chairman of the State Committee for Scientific Research that governed all public R&D funds. With the new Act, an advisory Council for Science with 71 members, 33 of them elected by the scientific community, is formed. There is one programme "Strengthening of Co-operation between the R&D Sphere and the Economy", which will run until 2006. This programme is administrated by the MSIST and has no transnational features. The annual budget is approximately €60m.

Portugal

R&D in Portugal is funded by the Ministry of Science Innovation and Higher Education and, under this, public R&D is controlled by the National Foundation for Science and Technology (FCT). The Innovation Agency (ADI) also operates under the ministry and funds projects and programmes relating to innovation, applied/industrial research and SME support. Programmes are a mixture of thematic and non-thematic, with currently limited transnational activity.

Romania

The Ministry of Education and Research (MER) has the main responsibility for the National RDI Plan, currently consisting of 14 thematic programmes. The MER is also responsible for core programmes, sectoral programmes, scientific events and mobility activities, with the aim of building up the country's infrastructure to prepare it for EU membership. The National Council for Science and Technology Policy coordinates RDI policy and other social and economic policies. The responsibilities for programme agencies are currently being rearranged.

Slovakia

The Ministry of Education of the Slovak Republic is responsible for the National Science and Technology Policy and also for the National Research and Development Programmes. In Slovakia there are five cross-cutting programmes and four thematic programmes which are carried out from 2003. Their administration and funding is under the Ministry of Economy, the Ministry of Agriculture, the Ministry of Employment, Social Affairs and Family, the Ministry of Construction and Regional Development and Slovak Academy of Sciences. The new programmes will be prepared in 2006.

Slovenia

The Ministry of Higher Education, Science and Technology is responsible for basic research. The main objective is the strengthening of the scientific infrastructure, regarding equipment and human resources. The Ministry of Economy, which is

responsible for innovation policy, runs several applied R&D programmes for enterprises and also a Young Researchers Programme.

Spain

The Inter-Ministerial Commission on Science and Technology is the body devoted to the co-ordination of the activities of the various ministries involved with innovation policy. It is also responsible for the co-ordination of the National RDI Plan, with the support of the General Secretariat for Scientific Policy. As consultative and support departments, there are two main bodies: the General Council on Science and Technology and the Advisory Council for Science and Technology. The General Council on Science and Technology has as its main objective the co-ordination of the Autonomous Communities and the relations between them and the central administration. The Advisory Council on Science and Technology has been created to promote the participation of society in R&D policy. The Centre for Development of Industrial Technology (CDTI) plays a major role in implementing RDI policy, with a budget of €250m. Regional support for R&D can also be seen and within 17 autonomous communities a wide range of regional science and research plans and programmes can be regarded. They all carry out their regional plan for scientific research and technological development and wish to develop relevant research and innovation infrastructure, as well as network for sustainable development.

Sweden

All ministries in Sweden support research activities by the 'sectoral research principle', by which each sector assesses its own needs for R&D and weighs these against others. The Ministry of Education and Science supports basic research via the Swedish Research Council. The Ministry for Industry, Employment & Communications supports applied, industrial and SME research via a number of agencies, with programmes primarily controlled by the Swedish Agency for Innovation Systems (VINNOVA). Sweden has a policy of promoting R&D and investing the most, in percentage GDP terms, in Europe. It is continually increasing the level of participation in European framework programmes and networks as well as developing multilateral programmes within the Nordic region.

Switzerland

The Swiss National Science Foundation is responsible for various national and international research programmes. It has the autonomy it needs to promote independent scientific research. The most important instrument is the Swiss Innovation Promotion Agency (KTI/CTI). It supports applied R&D projects that are carried out by innovative firms with third-level institutions. Through funding and innovation management services and know-how, the KTI/CTI provides support for the setting-up and development of high-tech firms. As Switzerland is a very small country, the national authorities have assigned the lead on policy development to a group of renowned science and technology experts. These experts guarantee an international level of research, science and technology for Switzerland. Within thematic and generic programmes, the responsible board can decide if transnational activities are useful and necessary to meet the goals.

Turkey

Most of the research programmes are designed and implemented by TUBITAK, the Scientific and Research Council of Turkey, which reports directly to the Prime Minister.

The programmes are generally non-thematic. Public sector funding for R&D is increasing rapidly from a relatively low base and participation in international projects is encouraged. This includes financial incentives for Turkish research groups to involve Turkish companies in international projects like EUREKA.

United Kingdom

Research programmes in the UK are widely distributed through seven government departments and eight Research Councils. Additional programmes are funded by the national agencies for environment and food standards and the regional agencies for economic development. Most of these funding organisations implement their programmes through a thematic prioritisation structure. Industrial research programmes have recently become more consolidated into a single 'Technology Programme' and most of the SME programmes are implemented through the regional economic development agencies. The degree of openness and flexibility to transnational activities varies between the funding organisations.

APPENDIX C
Case Studies

The study highlighted a wide range of interesting examples of programme policies and design features. In some cases a particular organisation or instrument within a programme was the interesting feature rather than the programme itself.

The following 11 examples were selected as case study subjects because they offer contrasting perspectives and experiences at both policy and programme level across the different types of programmes. They are typical of the innovative approaches that are being taken in different ERA countries to achieve the benefits of transnational cooperation and the difficulties that they have encountered.

- Aide à l'innovation Programme (France)
- CIR-CE Programme (Austria)
- Corint Programme (Romania)
- FinNano Programme (Finland)
- Food Standards Agency Programmes (UK)
- Industrial PhD Programme (Denmark)
- IWT Programmes (Belgium)
- NWO Programmes (Netherlands)
- ProInno II Programme (Germany)
- Research Promotion Foundation Programmes (Cyprus)
- Research and Technology Innovation Fund (Hungary)

Aide à l'innovation (France)

Support innovative projects in SME, including transnational

Key point summary

- Programme re-designed to encourage more international projects
- Flexible and open ended programme, delivered through regional offices
- Annual budget of €215 million

Overview of the programme and its objectives

Aide à l'innovation is a programme to increase innovation activities mainly within SMEs. This includes the creation of innovative companies, supporting technology transfer projects in business (ie to develop new products or processes, to support access to external competencies), to find investors and/or partners in France or abroad, accessing financial markets and feasibility studies. The programme is a modification of two prior measures 'support for the creation of innovative companies' and 'support for technology transfer'. Furthermore, within the programme, a special initiative called "youth and innovation" is carried out in order to help young people creating their own innovative project or company and to contribute a better professional integration for young people.

In 2005, a new organisation was established (OSEO anvar) to provide a more integrated package of support for SME innovation in France. OSEO anvar has 25 regional offices to enable local delivery of support services.

The Aide à l'innovation programme has since been redesigned (with the agreement of the Ministry for Industry, SMEs and Research) to change its perspective towards the support of European aspects of competitiveness and innovation. This was based on increased interest in transnational activities from programme users.

The main objectives of the programme are to:

- support the achievement of national markets,
- motivate collaboration and cooperation with partners,
- smooth the way towards international markets,
- sustain growth and employment through the development of innovation,
- support the access to financial markets and specific funds for the development of SMEs.

Projects to be supported must show a high-technology content, have economic interest, have high growth potential and take into account the creation of employment. The industrial, commercial and financial capacity of the SME or entrepreneurs is also important to the funding criteria.

For the development of a new technology-based product: a zero interest loan, reimbursable in case of success, is provided to the SME. The loan can cover over 50% of

the total project cost. For the creation of an innovative company, a grant of over €30,000 is available.

Practical experience

The programme allows subcontracting to foreign partners and uses programme evaluators from other countries. French SMEs have used the programme to collaborate with partners from USA, China, India, Brazil and Israel as well as other EU countries. Much of this has been through EUREKA projects, which account for some 5-10% of the programme budget. Additionally, some activities within Aide à l'innovation are related to the Innovation Relay Centres (IRC).

The programme supports more than 2,000 SMEs every year and €185 million is spent on over 400 feasibility studies. Around €24 million is spent on technology transfer projects. The transnational activities within the programme have led to higher quality results, increased research capacity and a better opening to the European market.

Conclusions

The regional structure of OSEO anvar allows innovation support to be provided to SMEs in a simple and flexible way, since the administrative structure is flat. The access to financial support is also very easy.

Due to increasing interest, the programme has redesigned toward more transnational activities within 2005, although language, time, mentality and the way of funding can be regarded as barriers for more transnational activities within this programme.

CIR-CE (Austria)

Co-operation in Innovation and Research with Central and Eastern Europe

Key point summary

- Transnational-by-Design programme
- Aim is to stimulate transnational co-operation between Austrian and 15 east and south-eastern European countries to exploit international markets
- Broad scientific and technological approach
- Different instruments used (networks, innovation projects, training projects)
- €6.4 million funding, programme duration 2005 – 2008

Overview of the programme and its objectives

CIR-CE is a new programme, funded by the Austrian Federal Ministry of Economics and Labour. It aims to identify and exploit strategic synergies and complementarities between Austria and its partners in central eastern and south-eastern Europe. The focus of the programme is on the opportunities and needs of the technology-oriented corporate sector. Several different transnational co-operation instruments are used to achieve the goals of the programme.

The main objective is to strengthen joint endeavours in the global environment. The programme supports opportunities that exploit the combinatorial strengths of SMEs in Austria and eligible countries. Austria is in a strong position to benefit from the eastern expansion of the European Union and develop new, mutually beneficial partnerships.

The CIR-CE programme is based on Austria's exceptional geopolitical situation concerning central/eastern European and south-eastern European states and the growing importance of research and innovation as vital, sustainable engines of growth. The programme is, therefore, supportive of the Lisbon/Barcelona process, which will be an important economic driving force for Europe as a whole, including central/eastern and south-eastern Europe. The main opportunities for mutual benefit from the CIR-CE programme are:

- 'Clustered systems' that, currently evolving, eastern and south-eastern Europe will receive additional growth impulses from such strategic cooperation,
- Austrian connection to emerging markets in these countries will be ensured from an early stage.

The CIR-CE programme marks the continuation and expansion of the approach implemented by the former STRAPAMO pilot action. The essential point of the programme is to create a "strategic alliance of clustered systems", meaning that a project has to be carried out by a group of agents (companies, especially SMEs, research institutions, intermediary organisations) in Austria as well as in the partner country(ies). It is a mandatory requirement that projects must focus on a specific technological field.

Several instruments are available to enable the strategic cooperation envisaged by the programme:

Network projects

Network projects are at the beginning of the process ("paving-the-way phase"). Generally, so-called "intermediaries" (clusters, competence centres, cooperative research institutions and technology parks) are facilitating agents. CIR-CE requires integration of the corporate sector to play an active role and to co-organise specific working sub-packages (at least three companies from Austria and the partner countries have to take part).

Innovation projects

Innovation projects constitute the next step in the process. The corporate sector assumes the controlling function on this level. Initiation of specific new knowledge-based products or processes, technology transfer (including patent development) and process/structural solutions (quality assurance, etc.) are at the focus of innovation projects. At least two companies from Austria and from one partner country are required to participate in an innovation project.

Training projects

Training projects only partially constitute an individual project category as they can only be submitted as complementary projects to networks or innovation projects. Projects are to specifically address common, transnational training needs.

Due to the objectives and strategic aims of the CIR-CE programme, it is clearly transnational by design. The applicant needs to be located in Austria and all projects must be organised in the form of consortia with several partners. The minimum consortium requirements are the Austrian applicant (mostly intermediary organisations) and mandatory partners from at least one of the 15 eligible countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Former Yugoslav Republic of Macedonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, Yugoslavia).

Eligible for support are intermediary organisations (such as competence centres, technology centres clusters), enterprises (in particular SMEs) and research institutes. Project duration is generally between 12 to 36 months. At least three related companies from Austria and from at least one partner country must be involved in the partnership.

Up to 75% of the overall costs up to a maximum € 400,000 per project can be funded.

Practical experience

The CIR-CE programme only started in 2005 and will be active until 2008. The planned budget is €6.4 million. Around 40 applications were submitted in response to the 1st Call and several hundred interested parties participated in regional information days. 15 proposals (funding volume around € 2.05 million) have been selected in the 1st Call. Three of them are innovation projects, eleven are network projects.

As the main applicant must be Austrian, that organisation needs to take responsibility for all contractual, financial and project management activities. This makes it quite easy for the funding agency in charge to deal with such a transnational and complex programme.

Within the predecessor STRAPAMO, which funded 12 projects, the most relevant technological fields were material science, environmental and information technologies, as well as food technology. As for the partner countries, mainly partners from Hungary and Slovenia were funded. The rationale for both of these countries was because of the closeness to Austria and the fact that rather good R&D capacities as well as good industrial partners, are available. Projects were also funded with Slovakian and Croatian partners.

Within the STRAPAMO action, more than 25% of the budget was used to fund the foreign partners. It is expected that, in the CIR-CE programme, a comparable amount of funds will be allocated to eligible foreign partners.

Conclusions

Due to the clear transnational approach, the new Austrian CIR-CE programme seems to be an excellent example of how national priorities can successfully be matched by transnational co-operations. The geographic proximity of Austria and the central eastern and south-eastern countries offers a vast variety of economic opportunities. Different transnational activities are funded and the technological and scientific scope is very broad. Since the main applicants must be Austrian organisations, then they accept the full responsibility for all funding related issues. This means that existing administrative structures and tools can be used by the funding agency.

Conclusions

Due to the clear transnational approach, the new Austrian CIR-CE programme seems to be an excellent example of how national priorities can successfully be matched by transnational co-operations. The geographic proximity of Austria and the central-eastern and south-eastern countries offers a vast variety of economic opportunities. Different transnational activities are funded and the technological and scientific scope is very broad. Since the main applicants must be Austrian organisations, then they accept the full responsibility for all funding related issues.

CORINT (Romania)

Increasing the relevance and impact of R&D activities

Key point summary

- Programme part of the National RDI Plan
- Around 5 % of the overall budget of the RDI plan
- 25% of programme budget is allocated for transnational activities
- Accompanying training and consultancy support is available to facilitate transnational cooperation

Overview of the programme and its objectives

CORINT started in 2001 as part of the National Research, Development and Innovation Plan, which is managed by the Romanian Ministry of Education and Research. The Ministry delegated the responsibility for Research programmes to the National Centre for Programme Management (NCPM). The CORINT programme budget accounts for 5.5% of the total national RDI Plan. It encompasses six Sub-programmes, namely:

- EU-RO (80 projects)
- NUC-INT (6 projects)
- EUREKA-R (20 projects)
- NATO-STI (8 projects)
- ESTROM (Environmental Science and Technology in Romania)
- CEEX Research of Excellence (new programme, 13 projects so far)

The purpose of the CORINT programme is to strengthen Romania in well defined fields of high national interests including harmonising Romanian legislation with the EU (EU-RO), achieve EU-standard in nuclear affairs (NUC-INT), facilitate the cooperation between EU and Romania with regard to advanced technologies (EUREKA-R), stimulate SME development related to environment, social and human protection (NATO-STI), increase development in environmental science and technology (ESTROM) and promote the national participation into the European and international research programmes (CEEX). The international aspects of the programme account for 25% of the budget.

The overall strategy of the programme is to:

- Increase the relevance and impact of R&D activities
- Stimulate innovation to support principles of economic and social demands, with respect to the sustainable development of the economy;
- Transform the innovation process into a direct support for increasing the quality of the products and services offered by Romanian companies and increasing their capacity to be competitive in the global market;

- Implement the specific 'AQ communautaire', in order to ensure the compatibility between the legislation, institutional bodies and procedures in Romania and European Union.

Therefore, the programme management agency NCPM aims to create standardised financial administration for all programmes, enabling the total openness towards national and international cooperation. It also aims to achieve flexibility in disseminating the information on project elaboration, through the creation of a special training-focused Management Unit. Furthermore NCPM provides consultancy and technical assistance to support the process of elaborating and running the projects carried out within national and international programmes.

Practical experience

NCPM regards further accompanying measures as relevant for running successful RDI programmes. Therefore, they organise training sessions and maintenance within the process of project formation. NCPM provides assistance in finding partners and forming fellowships for projects included in RDI programmes.

Projects within CORINT are funded by from three sources; 50% from the European Social Fund, 25% from the budget of NCPM and 25% from project partners.

Conclusions

The CORINT Programme is an example of a national framework programme that has explicit, dedicated instruments to enable transnational cooperation. This is further enabled by NCPM through accompanying training and consultancy measures to facilitate international projects.

FinNano Programme (Finland)

Global competitiveness through international cooperation

Key point summary

- Smaller country with a restricted research base
- Agency drive to increase the level of transnational activity
- International cooperation required to enlarge science base and potential markets
- Explicit programme policy statements encouraging international partnerships
- High level of international mobility for researchers
- Increasingly active involvement in European and international research networks

Overview of the programme and its objectives

FinNano (nanotechnology) is one of the newest Technology Programmes at Tekes, running from 2005 to 2009, and benefits from Tekes' drive to increase the level of international activity within its programmes. It aims to strengthen Finland's position as an innovative, hi-tech country and recognises that much of the necessary knowledge and expertise will come from overseas. The funding for the programme totals €70 million, including €25 million in research funding and €20 million in corporate financing.

The primary objective of the programme is to turn Finnish research organisations into partners that are internationally sought after and to make Finland one of Europe's best nanotechnology developers and exploiters. The programme aims to reinforce Finland's competitiveness within the field of nanotechnology and make the country internationally attractive for new business activity.

Rationale for the transnational design feature(s)

In 2004, Tekes, Finland's agency responsible for technology programmes, completed a study on 'Competitiveness Through Internationalisation'. This showed that the "internationalisation of research, development and innovation activities in collaborative programmes can generate extensive competitiveness and push internationalisation of participants through knowledge transfer, cooperation, building community identities and market integration".

As Finland is a small country with a limited research base and limited markets, Tekes believes that global competitiveness in technologies cannot be achieved without international cooperation. As in the past it had relatively few national programmes with transnational cooperation, Tekes is now "constantly searching for both practical and pragmatic ways to increase the level of cooperation between the national R&D programmes in Europe". Tekes openly invites other technology-oriented foreign entities to work with it, with cooperation in the shape of joint projects, technology transfer or simply the exchange of information.

As its aims cannot be achieved by research within Finland alone, the FinNano programme encourages and supports international networking and mobility, fosters the participation of Finnish researchers, research institutions and enterprises in various European

nanotechnology R&D programmes and links regional 'hubs' of expertise to international networks. This will enable participants to build up knowledge on which companies and institutions are the best in the world, to see the technologies that are in development and to build partnerships for future projects or exploitation.

Practical experience & future plans

The programme was defined as being international in nature during the planning stages and the stated intention is for over 25% of the programme budget to be spent on international activities. No limit has been set on the actual amount, with the level depending on project applications. The programme sets special funding criteria for project applications, such as there being international mobility by the second year. International joint projects are encouraged, although Tekes can fund only Finnish partners, including foreign companies that are registered in Finland. To promote joint projects, one of the objectives of the programme is to get the maximum benefits from the EU framework programme, EUREKA and COST. FinNano is, for example, involved in the NMT ERA-NET and will finance Finnish partners in the common call being launched in Spring 2006. The current project database suggests that 88% of projects have an international element.

SMEs are being involved in international activities as the programme (like all Tekes technology programmes) encourages partnerships between large and small companies within projects, encouraging their R&D and internationalisation strategies. Partnerships are also encouraged between companies and academic institutions, particularly to exploit new technologies. SME involvement is essential as the programme's activities suit new, emerging, rapid-cycle industrial or technology sectors, where the prerequisites for success are based on a capacity for quick innovation and the commercialisation of innovations.

Conclusions

The FinNano programme was designed as an international programme and its ambitious aims could not be achieved without international activity. As the programme only commenced in 2005, it is difficult to assess the potential level and impact of international activities, but they are likely to be significant. By promoting international mobility and joint projects, the programme is broadening the research infrastructure, giving academic and industrial researchers access to globally leading technologies. By being involved in global markets, it is opening up opportunities for Finnish companies, with SMEs in particular gaining invaluable experience of working on a global stage with the latest technologies. This level of openness should enable FinNano to achieve its aims.

Food Standards Agency (UK)

International procurement of scientific research

Key point summary

- Larger country with strong national research base
- New agency established in year 2000
- Scientific input needed to support health & safety objectives
- International procurement approach to research priorities
- Active involvement in European and international research networks
- Seeking to develop wider researcher base but so far limited response from foreign researchers

Overview of the programme and its objectives

The Food Standards Agency (FSA) is a non-Ministerial government department set up by the UK Parliament in the year 2000 to protect public health and consumer interests in relation to food. Before that, this function was split between the health and agriculture departments in the different countries of the UK. The FSA requires scientific input and, therefore, funds a wide range of research to understand food issues and meet its policy aims and objectives. It does not provide research grants but specifies and commissions contract research. A number of independent scientific committees and working groups assist in assessing scientific evidence from research and identifying research needs. The annual research programme spend is around €40m.

The programme is open to research participants from other countries and contributes to transnational research projects on an ad hoc basis. Most of this is applied research. The FSA is also a partner in the ERA-NET on Food Safety (SAFEFOODERA) and participates in steering of the EU RTD Framework Programme thematic priorities.

Rationale for the transnational design feature(s)

Since the FSA does not have any in-house research capacity it takes a procurement approach to sourcing the best scientific input for its priority areas. It also recognises that collaboration with peers in other countries and influencing the priorities of EU research will have a leverage effect on the overall impact of its own programmes.

Basically, the rationale is to draw on a wider range of expertise and avoid duplication of effort. International collaboration also allows a much higher scale and scope of research than would be possible at national level.

Some food standards issues are also addressed at European level through EU regulations and it makes sense to develop common scientific approaches and methodologies through collaborative pre-normative research. If everyone starts from a common scientific base then it is easier to implement common regulations and standards.

All of this is also supportive of the multinational nature of the larger food companies and the trend towards cross-border supply chains. Increasing volumes of imported foods coming into the UK creates new threats to food standards and is another reason for international scientific cooperation.

Practical experience

In practice, the level of direct contracting outside the UK is relatively low in spite of wider promotion of its Open Calls for research proposals in media like Research Europe and CORDIS. This is partly because the UK science base is relatively strong and foreign suppliers may feel that the probability of a successful bid is too low. They may also be uncomfortable with contracts under UK law or the FSA approach to intellectual property rights.

Collaboration with other organisations in Europe and co-funding of relevant research projects and programmes is showing much promise. An example of this was in the development of a common method for allergy testing. A project involving 20 countries was co-funded under FP6 to design a common assessment method and carry out assessment trials in all of the countries. This provided a very large sample of comparable data to validate the quality of the method and enabled a common standard to be developed. There is no common model of food standards agencies across Europe and not all have a research function. Also, there can sometimes be conflicts in collaborative research projects between partners that have different research management rules and procedures – for example, between the wish to protect and exploit knowledge and the FSA's obligation to publish scientific information in line with its policy of open and transparent operation.

There are quite a few organisations and networks in the food standards domain that have a role to facilitate transnational research, including the European Food Safety Authority (EFSA). This makes it easier to facilitate international collaboration.

FSA is being proactive in transnational collaboration with countries that have a common interest in working together in particular areas (eg Norway, USA) whilst remaining open to participation in initiatives by others.

Future Plans

FSA is only five years old and the next strategic plan (2005-2010) and draft Science Strategy 2005-10 have a strong element of partnership and collaborative working, particularly in research, with other organisations in the UK and internationally. This will include a higher involvement and collaboration with the bodies with lead responsibility for funding basic research.

On the European front, it is likely that most of the activity will be through SAFEFOODERA. This is still at the information sharing stage and seeking to identify common areas of interest. It is anticipated that the ERA-NET consortium will pick several areas of synergy to focus on then try to work together in some form of joint programme.

Conclusions

Food standards are a very logical domain for transnational cooperation and mutual opening and FSA has a strong commitment to such collaboration. In spite of being very proactive in promoting opportunities for foreign researchers and active involvement in

European/international networks, it has proved difficult to achieve rapid internationalisation of its research activities, although FP6 co-funding and the ERA-NET project are promising areas for further development. Its approach has now become more evolutionary and selective.

Industrial PhD Programme (Denmark)

Internationalisation of business through young mobile researchers

Key point summary

- Primary aim is to stimulate R&D in enterprises in Denmark and to encourage networking between enterprises in Denmark and Danish and foreign universities
- For Danish PhD fellows it is mandatory to study three to six months abroad or in external organisations or universities. Most traditional PhD fellows chose to study one semester abroad. Around one third of Danish Industrial PhD fellows study three to six months on foreign universities
- Industrial PhD fellows don't need to be Danish nationals
- The Programme allows participation by foreign universities

Overview of the programme and its objectives

Industrial PhD is funded in cooperation with private enterprises in Denmark and the Ministry of Science, Technology and Innovation. Its main objective is to develop R&D within enterprises in Denmark and create networking between enterprises and universities. It does this by educating PhD researchers within business and industry, enabling them to gain insights to the applied aspects of R&D and by supporting researchers in the development of personal networks, which include companies, universities and research institutions.

The Industrial PhD fellow is employed in the enterprise during the three years of study. The fellow can be employed in the enterprise prior to the application date but can also be employed when the application is approved. The fellow must have top grades from a relevant research based Master Course (a BA + MA degree). The programme subsidises 35% of the salary, the university fee and parts of the costs to courses and conferences while the fellow completes a defined R&D PhD project that must be within the business area of the enterprise. The enterprise pays all other costs to research and office equipment, counselling and administration in the enterprise. On average, the enterprise covers 65-70% of all costs. The PhD fellow spends half of their time at the enterprise and the other half at a university. If appropriate, the project can further involve a government research institute or other enterprises as third parties.

The company in which the Industrial PhD fellow is employed does not have to be Danish but it must be located in Denmark and have sufficient capacity in terms of competencies and financial strength to see the project through to completion. Ownership of the project and its outputs, including technologies that are developed or transferred, lie with the company (although it may need to negotiate with the university). This creates an additional incentive for the company to make the project a success.

The Industrial PhD Programme qualifies the fellow for both an official PhD degree and a certificate of successful participation in the Danish Industrial PhD Programme.

Rationale for the transnational design feature(s)

Although now under the Ministry of Science, Technology & Innovation, Industrial PhD was developed by the Ministry of Business and Industry (since 2002, the Ministry of Economic & Business Affairs) and designed primarily to meet the needs of business and industry. Denmark is a small country with small markets. As a consequence, the vast majority of companies have an international outlook, being either multinationals or having markets outside of the country, and they require the flexibility to work transnationally within the programme.

Denmark's research infrastructure and knowledge base is also restricted. Approximately half of all traditional Danish PhD students currently train in overseas universities. Danish companies that wish to work with academia are also accustomed to working with overseas universities if the required expertise is not available locally. It was, therefore, natural for the Industrial PhD programme to operate along similar lines, even though the distance travelled by students is restricted by the requirement to work with a company located in Denmark.

Practical experience

As there is no requirement for the participating university to be Danish, approximately one third of PhD fellows train in an overseas university, using a supervisor from a Danish university. This is less than for an average Danish PhD due to the requirement to spend half of their time working within the company in Denmark.

There is no requirement for the PhD fellow to be a Danish national and between 5 and 10% of participants are from outside Denmark, including China, Portugal, France, Hungary, Italy, Iceland and Sweden.

Feedback from participants shows that:

- There is increased knowledge at the universities and improved networks and cooperation with businesses – this includes networks outside of Denmark.
- The quality level of the PhD work is typically as good as or better than a regular PhD.
- Companies enhance competencies and develop new fields of world-class R&D.
- 44% of companies expected to see increased turnover as a result.
- Around half of the companies which have hosted Industrial PhD projects in the last six years claim that the project has resulted in one or more patents.
- PhD fellows enjoy and value their international experience, with it adding a perspective to their study that they had not envisaged before.
- The unemployment rate of all fellows who have completed the education since 1988 is less than 1%.

Initially the programme managers had to overcome administrative difficulties to allow it to work within timescales that are acceptable to companies. They did not have any legal or political barriers to designing a transnational programme.

Future Plans

The programme was introduced 35 years ago and currently has the support of the government, which included it in its White Paper when commencing its second term. Future development efforts are aimed at increasing the budget and the participation of SMEs, reducing the concentration of companies in Copenhagen (i.e. spreading the benefits throughout the country) and promoting the use of the programme in all academic areas, such as engineering, health, social sciences, arts.

Conclusions

The programme benefits from Denmark's position as a medium-sized country with small markets and a restricted research infrastructure. Both its companies and its academics are accustomed to working internationally and the Ministry has recognised this in the development of the programme, avoiding any restriction on mobility. While it is Danish companies that benefit directly, the cooperative networks that are put in place also benefit the international partners.

While it does supports academia, the programme is very much focused on supporting and developing businesses and industries. Consequently, it has been designed to be very flexible and responsive to business needs, with the international elements simply reflecting the operating environment faced by Danish companies. Keeping it simple and avoiding imposing any barriers has allowed the natural, market-driven development of transnational activity.

IWT Programmes (Belgium)

Increasing R&D quality and competitiveness through the participation and funding of foreign researchers

Key point summary

- All programmes are open to foreign participants because of relatively weak research base
- Strategic basic research programme explicitly discriminates in favour of projects with international partners to foster scientific competitiveness
- Generally low level of foreign participation in most programmes because of a lack of initiative by national applicants
- Moving towards mutual opening and recognition with neighbouring countries but progress is slow because of different policy attitudes to opening

Overview of the programme and its objectives

IWT (Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie) is the Institute for the Promotion of Innovation by Science and Technology in Flanders. It is an implementation agency for the Ministry of the Flemish Community and Region in Belgium. This part of Belgium uses almost 50% of the overall public sector investment in R&D.

IWT is primarily concerned with applied research and innovation but also funds some basic research. Fundamental research is financed by the Fund for Scientific Research in Flanders (FWO). IWT has a variety of (mainly non-thematic) sub-programmes for industry and research institutes ranging from strategic basic research to technology transfer. There is also a programme specifically for SMEs. Some of the programmes are continuously open; others are subject to an annual Call for proposals.

Rationale for the transnational design feature(s), including expected benefits

Belgium, in general, has been very open to the participation of foreign researchers for some time. There was no specific milestone. The practice gradually evolved from historical precedent of supporting such projects on a case-by-case basis.

The transnational design features vary between IWT programmes and includes the following:

- ***Programme for Industrial R&D***. This programme allows foreign partners to participate as paid subcontractors and external reviewers from other countries are sometimes used. Flemish partners in EUREKA projects can also be funded from this programme.

- ***Strategic Basic Research Programme (SBO)***. This programme is mainly for universities and up to 20% of the budget in any project can be used for participation of foreign researchers. This is subject to the pre-requisite that the Flemish economy will benefit from the project. International reviewers are the rule in this programme.
- ***Collective Research***. This instrument within the VIS Programme (Flemish Cooperative Innovation Networks) is for projects submitted by industrial associations and submitted by research centres. Participation by foreign research centres is allowed.

The basic rationale for the policy of openness to foreign participation is the need to access leading edge knowledge that may not exist in a small country like Belgium. Also, there is a need to drive up scientific competitiveness to deliver high quality research projects and achieve greater participation in the EU RTD programmes. This is particularly important in basic research, which is the reason for the more explicit 20% budget in the SBO Programme. Encouraging national applicants to work with international partners is considered to be the most effective means of fostering scientific competitiveness.

Practical experience

Whilst programmes are very open in theory to foreign research participants, in practice there is a relatively low participation. The programmes are not publicised outside Belgium and there is an assumption that national applicants will involve external partners if appropriate. In general, there is no incentive to use foreign partners except for the SBO programme.

The SBO programme was strategically planned several years ago to actively encourage foreign participation. The main selection criteria are scientific excellence and projects that involve international partners receive higher evaluation scores than those with only national participants. This is creating a positive incentive but it is too early to evaluate the impact as most projects are not completed.

In the industrial programmes, the main benefit has been increased research capacity leading to higher quality results. In some cases the transnational cooperation has opened up new markets.

Future Plans

IWT is keen to develop mutual opening initiatives with other countries and is very active in ERA-NETs. Bilateral cooperation with the Netherlands is high on the political agenda but programmes in the Netherlands are less open. Dialogue is ongoing with the Netherlands and the German Federal Land of North Rhine Westfalia, aimed at mutual opening of SME programmes.

IWT believes that simply achieving agreement on mutual opening between administrations or agencies is not enough and that some kind of brokerage system will be required to encourage higher levels of cross-border collaboration.

Conclusions

IWT is very open to transnational cooperation and opening of its research programmes and this is, generally, the case in Belgium as a whole. In practice, this openness is not being very well exploited by the users. In strategic basic research, where there is a need to improve scientific competitiveness, it has been necessary to use criteria that positively discriminate in favour of applications with international partners.

NWO Programmes (Netherlands)

Step-by-step approach to transnational cooperation and opening

Key point summary

- NWO is the research council for the Netherlands
- Transnational activity has evolved over the last few years through bottom-up actions and participation in European facilitating frameworks like EUROCORES
- Objective of international cooperation is to increase scientific competitiveness in selected thematic areas
- Programmes are not open to foreign researchers but there is a policy of attracting good researchers to the Netherlands
- The degree of flexibility and openness to transnational cooperation will increase in the next strategy cycle from 2007

Overview of the programme and its objectives

The Netherlands Organisation for Scientific Research (NWO) is responsible for enhancing the quality and innovative nature of scientific research and initiating new developments. It covers all scientific disciplines and is mainly concerned with university research. It uses some 10% of public funding for R&D and the majority is provided by the Ministry of Education Culture and Science.

Its research programme is more thematic than in the past and there is increasing alignment between science and policy. The Netherlands established an 'Innovation Platform' in 2003, involving high level stakeholders from the public sector, industry and the science base. It is chaired by the Prime Minister. Through this, a more integrated policy for the future development of the Dutch knowledge economy has been developing. One of the outcomes is a clearer focus on areas of scientific specialisation where there is the potential to create critical mass by exploiting the combined scientific and industrial strengths of the Netherlands.

The NWO Programme strategy follows a five year cycle. The current strategy (2002-2006) is about ***Themes plus Talent***, which reflects a policy of concentration on areas of excellence and developing the pool of knowledge workers. Internationalisation is also one of the key elements of the current strategy. The overall programme is organised into thematic sub-programmes and specific instruments for bilateral cooperation and international mobility. Individual sub-programmes are designed on a bottom up basis and, generally, have the flexibility to selectively fund participation in multilateral projects and other transnational activities.

Rationale for the transnational design feature(s), including expected benefits

NWO believes that international cooperation and competition contributes to the quality of research. It, therefore, chooses to be actively and proactively involved in international developments, with individual researchers and research organisations.

This is particularly relevant to a small central European country like the Netherlands, which is very export-orientated and can only achieve excellence in a limited number of fields. An open market within Europe allows the science base to become more competitive and the quality of research increases. The preferred approach is to encourage Dutch researchers to participate in international projects and also attract foreign researchers to reside in the Netherlands. Unlike their neighbours in Belgium, the programmes are not open to non-resident researchers.

The strategy of increasing internationalisation of the NWO Programme was also driven by a commitment to the policy of supporting the aims and objectives of the European Research Area.

Practical experience

Their experience is that the quality of research and the national scientific competitiveness are both fostered through international collaboration. So far, there has been no formal evaluation of the benefits as involvement in transnational research is still relatively recent.

NWO's programmes have become more thematic since the early 2000's. This coincided with the launch of the European Research Area concept and new European frameworks like EUROCORES, EURYI and, more recently, ERA-NET. This has allowed NWO to be quite proactive in initiating transnational projects in its chosen thematic specialisms. This includes hosting the first Article 169 project. There has also been some minor programme alignment (eg the TALENT programme on mobility has been aligned with the EURYI framework, which provides a central budget for European mobility of young investigators).

NWO is quite autonomous and is ready, willing and able to participate in the emerging joint Calls in ERA-NETs in the areas of plant genomics and chemistry. Its experience is that the value added is easier to see in such specific scientific areas and this justifies getting involved in complex international research. This is in contrast with the Dutch Innovation Agency (SenterNovem), which is much more restricted in its freedom to participate in transnational cooperation.

Its experience is that the bigger countries are less keen on transnational cooperation, because the benefits are less obvious, and other similar size countries are at different stages of openness. This makes it difficult to generate pan-European collaborations and therefore a pragmatic, selective approach is generally taken with specific countries. The actual investment in transnational cooperation is still relatively low compared with the overall budget.

Future Plans

The next cycle of NWO programmes, starting in 2007 will take transnational cooperation and opening to the next level. All of the programmes will be open to foreign researchers, subject to the pre-condition that they become residents. Individual programmes will have more flexibility to be innovative in cross-border cooperation, including small-scale mutual opening with other research councils. There is also the possibility of a specific central budget to support transnational activities.

Conclusions

NWO has been taking an evolutionary approach to transnational cooperation during its current five year strategy and has been proactive in exploiting the new European facilitation frameworks like EUROCORES and ERA-NET. This has been possible through a flexible bottom-up approach within the thematic programmes. The next strategy cycle from 2007 will increase the degree of openness and increase the opportunities for NWO to participate fully in the development of the European Research Area.

PRO INNO II (Germany)

Encouraging SMEs to be more international in technical collaboration

Key point summary

- Encouraging SMEs to become more knowledge based
- Inter-company and research/industry cooperation encouraged
- 10% extra grants for international projects
- Programme manager facilitates cross-border partnerships through its network of offices in other countries
- 13% of projects have international partners

Overview of the programme and its objectives

PRO INNO II; the German programme to increase innovation competencies within SME, is funded by the German Ministry for Education and Research. It is the follow up programme to PRO INNO I, which was implemented from 1999-2004. The programme objectives and targets have not changed. The objective is to support a variety of R&D-projects within companies and cooperation and collaboration between companies, also between companies and research institutes and through staff exchange with research institutes. All activities are accompanied and promoted by foreign offices of the programme owner AIF (Association of Industrial Research Institutes), which carries out co-operative research for SMEs in various sectors of economic activity.

The main objectives of the programme are to:

- encourage market oriented research and development within industry,
- decrease the technological and economical risks of R&D,
- facilitate high-grade R&D cooperation,
- decrease transaction costs,
- strengthen collaboration activities.

Projects with the purpose of developing innovative products, processes or other technical services can be funded. The programme covers all technologies.

The PRO INNO II programme aims to support Germany's economic structure, since more than 95% of industry in Germany is small and medium sized companies. The former communist part of Germany is actively supported within this programme by special funding rates.

Projects can receive 50% of the total cost up to a maximum of €300,000. Higher rates can be provided for certain types of company and consortium. SME's, projects with EUREKA status and projects with partners from other countries can receive 60% of their costs.

The programme is very popular as it is very flexible and can support four types of project.

Cooperation between companies:

These projects should aim to strengthen the competitiveness of all involved companies. There should exist a certain kind of mutual understand between the involved companies but no contractual relations. At least two companies must cooperate and none of them should obtain more than 75% of the whole costs within the project. The cooperation should contain at least one company fulfilling the PRO INNO definition of SMEs. Other cooperation partners may come from abroad and need not be SMEs. The foreign partners cannot receive funding and it is quite normal for these cooperations to be EUREKA projects.

Cooperation between companies and research institutes:

These projects are normally concerned with technology transfer. There does not need to be any contractual relationship between project partners, only a mutual interest in cooperation. Each partner applies separately for funding. Companies obtain 50% of project costs but research institutes should obtain not less than 25% of the projects budget.

Cooperation by one company within R&D project:

One company carries out a collaborative R&D project and therefore can be funded. The R&D partner (eg institutes, universities) should get between 25% and 50% of eligible personnel costs. The client is the company, which receives all rights of use.

Staff exchange:

This part of PRO INNO II enables certain kinds of staff exchange within a company-led R&D project. The company can hire research staff on a full-time basis for a period between three months to two years to assure the achievement of new competencies for the company, in general.

Practical experience

The original PRO INNO I programme supported over 450 projects and 72 new projects have already been funded by PRO INNO II. In PRO INNO II, nearly 80% are cooperation projects and 20% are concerned with staff exchanges.

Partners from more than 50 nations have participated in PRO INNO I, which is the previous programme to PRO INNO II. Widespread participation of other nations can, therefore, be expected in the new programme. Around 13% of all funded projects are internationally assigned. The majority of funded projects have been in the areas of ICT, engineering and materials.

Higher incentives (ie 10% extra grant) for cooperation with foreign partners is highly appreciated by the applicants. This was emphasised when the original programme (PRO INNO I) was reviewed and the special rates for projects with foreign partners was dropped. These incentives have been reintroduced within PRO INNO II and the proportion of international projects has increased.

An advantage of the PRO INNO II programme is the fact that the programme owner AIF has several foreign offices, which enables international projects to be facilitated.

The core of any international SME engagement is personal contact. Those first experiences lead to further activities like research projects or an R&D mission with foreign partners. AIF is, therefore, running cooperation events once a year in order to initiate contact between companies and researchers from Germany and abroad.

Nearly 50% of all international projects within PRO INNO II come from countries where offices from AIF are situated.

Conclusions

Due to the programmes design, and the international accompanying measures of the programme owner, the PRO INNO II programme seems to be an excellent example of how national priorities can successfully be achieved through transnational co-operations. There is no technological restriction in the programme's design and it is sufficiently flexible to allow several different types of cooperation to be achieved.

Research Promotion Foundation (Cyprus)

Building a European class research base through opening of the national programme

Key point summary

- New EU State
- National (three year) framework programme
- Weak research infrastructure
- Academic researchers returning from abroad
- 30% available for foreign researchers
- Aiming for better integration into the European Research Area

Overview of the programme and its objectives

Scientific and technological research activities in Cyprus are mainly funded by the Research Promotion Foundation (RPF), an independent organisation established in 1996 by the government of the Republic of Cyprus.

The *'Framework Programme for Research and Technological Development 2003-2005'* has a budget of €20m and a number of competitive sub-programmes and instruments. These include a thematic applied research programme (for academia and research centres), a programme for enterprises and also researcher mobility programmes. The programme aims at creating favourable conditions for the balanced development of research infrastructure and knowledge, thus making Cyprus more competitive in the international research area and the development of new technologies. The objectives are:

- The improvement of the population's quality of life
- The enhancement of the competitiveness of the Cyprus economy
- The increase of the potential for conducting high level research
- The promotion of Cypriot participation in international research.

The programme has an explicit rule that allows 30% of the total budget to be spent on non-resident researchers and specific instruments to enable Cypriot organisations to participate in transnational projects. These instruments are known as 'EUREKA Cyprus' and 'Participation in the ESF'.

Rationale for the transnational design feature(s), including expected benefits

The rational for the transnational rules and instruments is to help good Cypriot researchers to collaborate with the best in Europe and the world. The quality of research expertise has increased since the establishment of the University of Cyprus in 1992, which encouraged many expatriate academics to return to the country. The research infrastructure is still weak and the programme enables access to the research infrastructures of more developed countries.

In addition, the best research groups in Europe do not naturally involve Cypriots in consortia for the EU RTD Framework Programme. Providing financial incentives for the leading edge foreign researchers to participate in the RPF Programme will (hopefully) lead to greater inclusion of the Cypriot researchers in EU funded projects.

Practical experience

The actual participation of foreign researchers so far has been 12% of the budget (less than 50% of the maximum allowable). The mix of foreign researchers has been quite diverse with around 30% from Greece and the remainder from other European countries and the USA. Quite a lot of the collaborations are based on previous networks of returning expatriate researchers.

Whilst there has been no formal evaluation of the impact of the '30% rule', it is clear that Cypriot participation in the 6th EU RTD Framework Programme has been more diverse than before. Previously, participation had been mainly in the IST Programme but there is now a better spread of involvement across the other thematic domains. This suggests that the incentives provided for foreign researchers is having the desired effect of achieving more inclusion within the European Research Area.

Future Plans

The new framework programme 2006-2008 will have a significantly increased budget (€50m) with new instruments to encourage larger and longer term projects. The limit for foreign participation in any project will be increased to around 40-50% and all of the programme information will be dual language (English and Greek). The main indicator of impact of the transnational features will be higher levels of external research income from international projects.

Conclusions

Although the R&D investment by Cyprus is relatively small, the programme is quite strategic in its transnational features and incentives for foreign researchers. It is clearly supportive of the national policy of integration within the European Union and aims to build research excellence to the level of European competitiveness.

Research & Technology Innovation Fund (Hungary)

Building a high-tech economy through international cooperation

Key point summary

- Policy objective to speed up economic growth through a more efficient innovation system
- Different types of instruments used to enable the R&D and industrial communities to work together to create internationally competitive products & services
- Involvement of foreign researchers working with Hungarian research teams

Overview of the programme and its objectives

In order to speed up economic growth in Hungary, the institutional and legal frameworks have been revised. A new government office, the National Office of Research and Technology (NKTH), was established in 2004, supervised by the Minister of Education. Under the supervision of NKTH, the Agency for Research Fund Management and Research Exploitation (KPI) is responsible for managing innovation programmes. The Research and Technology Innovation Fund was established to promote demand-driven innovation and knowledge-based competitiveness of companies. It is a framework programme for a number of thematic sub-programmes and other instruments and is partly funded by mandatory contributions from all companies registered in Hungary.

One of the interesting instruments of the Fund is the establishment of applied research centres that are jointly funded in partnership with another country. Three thematic research centres have been established with other countries, including France (biotechnology), Germany (ambient intelligence) and Russia (nanotechnology). Each of these centres has between 50 and 100 researcher staff working on joint projects. The new framework programme also supports bilateral networking and mobility.

Rationale for the transnational design feature(s)

Hungary has traditionally specialised in basic research and applied research was rather neglected. Applied R&D has now been given more prominence within the National Development Plan and this has led to a more strategic approach to the development and industrial exploitation of new technologies. One of the objectives is to increase the quality and focus of research activities. Since the applied research base is rather weak, there is a need to access knowledge to increase the quality of projects and accelerate the scientific competitiveness of the Hungarian research base. Only Hungarian researchers can use the R&T Innovation Fund budget. This is also regarded as an opportunity to attract back some of the 7,000 young Hungarian researchers who are presently working in other countries.

Practical experience

The R&TI programme in general has increased the scale and quality of applied research projects and these are now considered to be comparable with EU standards. In addition, the applied research centres have become more multilateral through the participation by visiting researchers from other countries on mobility missions and international fellowships. The approach appears to be adding value as intended in spite of the inability

to pay foreign researchers to come to Hungary. The research centres provide both a focus for joint research activities and an opportunity to build technical relationships that might lead to future economic cooperation.

Future Plans

It is planned that other relevant programmes will develop trans-regional cooperation links in the future. For example:

- the Péter Pázmány Program is concerned with the development of Regional University Knowledge Centers (RET) that allow R&D professionals, companies and other organisations to work together on internationally competitive R&D projects
- the Oszkár Asbóth program (FSIP) is concerned with the establishment of internationally competitive R&D clusters to support the foundation, development and attraction of high-tech companies. This will also support the development of young scientists and the resettlement of qualified scientists back to Hungary

The general approach is, therefore, to develop an internationally competitive, knowledge-based economy through a variety of research and innovation instruments.

Conclusions

The aim of the R&T Innovation Fund is to create innovative products and services through collaboration between the academic and industrial communities, including experts from other countries and international businesses.

APPENDIX D
Online Survey Questionnaire (English language version)

The online survey questionnaire of national programme was implemented in three languages: English, French and German. The text of English language version is included below.

Section 1 - Programme Details

Please confirm the following basic details about your programme.

1.1 Programme Name

1.2 Type of projects supported (please tick all that are applicable)

Basic research
Applied/ Industrial research
Mobility/ Training of researchers
SME R&D

1.3 Which of the following best describes your programme?

Annually negotiated budget
Fixed budget for a certain time period

1.3.1 If ANNUALLY NEGOTIATED then what is the typical annual (public sector) budget for the programme?

1.3.2 If FIXED then what is the (public sector) budget?

1.3.3 If FIXED then over what time period is the budget allocated?

1.4 If the current programme is derived from a previous programme then please provide the name.

Section 2 - Programme features that encourage transnational activity

Some national programmes have specific design features that encourage transnational activities. Others have the flexibility to sponsor transnational activities that are supportive of the programme objectives. Please give us your feedback on the scope and extent of such features in your programme.

* 2.1 Does your programme involve research participants (or subcontractors) from other ERA countries?

2.1.1 Which of these statements best describes the programme policy for involvement of non-resident researchers?

Allowed only when there is no national capability
Allowed when there is a clear benefit to the project
Actively encouraged

2.1.2 What are the options for involving non-resident partners? (please tick all that are applicable)

Subcontractors to national partners
Unpaid partners
Paid partners

2.1.3 What specified limits are in place for the amount of the programme budget allocated to non-resident researchers?

No specified limit
Less than 5%
Between 5% and 25%
More than 25%

2.1.4 What proportion of the programme budget has ACTUALLY been spent on research activities carried out by non-residents?

Less than 5%
Between 5% and 25%
More than 25%

2.1.5 Do you use evaluators from other countries?

2.2 Has your programme funded any of the following types of transnational research activities?

* 2.2.1 Transnational research projects

* 2.2.2 Cross-border technology transfer projects

* 2.2.3 Cross-border mobility or training of researchers

2.2.4 What proportion of the programme budget has been spent on transnational research activities?

Less than 5%
Between 5% and 25%
More than 25%

2.2.5 What geographical areas have these projects involved? (please tick all that are applicable) – include areas

2.2.6 Has any of this transnational research funding been related to any of the following multilateral frameworks (where everyone funds their own national researchers)? (please tick all that are applicable)

EUREKA
EUROCORES
COST

ERA-NET
Other

2.2.7 Apart from the EU RTD Framework Programme, has your programme contributed to any other programme with a centralised budget?

2.2.7.1 If Yes, please provide details about these programmes

2.3 Other transnational activities

2.3.1 From the following list of other transnational activities, please indicate which, if any, your programme provides funding towards. (please tick all that are applicable)

Feasibility studies for a transnational project or programme
Participation in European committees/ networks
Participation in International committees/ networks
Other

2.3.2 What proportion of the budget is used to support such transnational activities?

Less than 5%
Between 5% and 25%
More than 25%

* 2.4 Have the transnational features of your programme resulted in any tangible benefits?

2.4.1 Which of the following benefits have been achieved? (please tick all that are applicable)

Lower costs
Higher quality results
Faster exploitation
Increased research capacity
Opening of EU markets
Other

2.4.2 Would you be prepared to provide more information for case study purposes?

Section 3 - Programme features that hinder transnational activity

Barriers to transnational cooperation and technology transfer between national programmes can be considered at three levels of administration; policy level, programme level and project level. Please advise to what extent you agree with the following 'barrier' statements.

POLICY LEVEL BARRIERS

3.1 The legal constitution for public funding of my research programme explicitly forbids the transfer of funds to non-resident organisations or individuals

3.2 The administration of international science and technology activities is controlled by another department or agency

3.3 Our national activities related to international science and technology transfer cooperation, apart from our contributions to the EU RTD Framework Programme, are primarily focussed on non-EU countries

3.4 The relative inequality of national investment in science and technology (national intellectual assets) makes it impractical to design joint research or technology transfer programmes within the European Research Area

3.5 Our national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities

3.6 The most influential decision makers in our administration do not see the value in additional European collaboration in the areas of research or technology transfer

3.7 I have not detected any change in national policy to encourage more transnational activities within national research, and related, programmes

3.8 Please provide any additional policy level barrier comments in the text box below

PROGRAMME LEVEL BARRIERS

3.9 The source of funding for my programme does not allow, or encourage, the use of programme funds for transnational activities

3.10 The programme objectives are based on seeking international leadership and would be diluted by sharing the activities or results with other countries

3.11 The issues that the programme is designed to address are specific to our country

3.12 My knowledge of similar national programmes in other countries is not sufficient to engage in transnational cooperation

3.13 The different national programme investment rules and funding cycles make it impractical to collaborate with related programmes in other countries

3.14 Our financial administration systems are not designed to cope with non-national contracts and/or other currencies

3.15 I have limited experience of pan-European collaborative programmes

3.16 There are no appropriate European structures (eg networks, foundations, associations) that could coordinate transnational cooperation in the area of our programme

3.17 The diversity of European languages and cultures makes it impractical to achieve the theoretical benefits of collaboration and mutual opening of national programmes

3.18 We receive a sufficient volume of high quality project proposals from national research applicants to meet the programme objectives

3.19 The programme does not have any explicit selection criteria that encourages transnational activities

3.20 Please provide any additional programme level barrier comments in the text box below

PROJECT LEVEL BARRIERS

3.21 The administration costs of transnational projects outweigh the benefits

3.22 There is no demand from national research applicants for inclusion of foreign partners in the national programme

3.23 Our national researchers would not encourage us to allocate more of the programme budget to participate in transnational projects or related activities

3.24 Please provide any additional project level barrier comments in the text box below

Section 4 - Programme design autonomy

Some programmes have sufficient flexibility to be adapted in response to unforeseen opportunities to add value. Others cannot be changed during the life cycle of the approved budget.

4.1 Do you have the discretionary or delegated authority to adapt your programme rules to allow the funding of foreign researchers? – yes/no

4.1.1 If No, then what level of approval would be required to adapt the programme rules to enable the funding of foreign researchers?

Political/ Ministerial
Government Ministry
Research Agency/ Council

4.1.2 If you had the desire to adapt the programme to enable the funding of foreign researchers, when would be the earliest time to make such a change?

Within one year

Within three years

Beyond three years

4.2 Do you have the discretionary or delegated authority to adapt your programme rules to allow the funding of national participants in transnational projects or activities?

4.2.1 If No, then what level of approval would be required to adapt the programme rules to enable the funding of national participants in transnational projects or activities?

Political/ Ministerial

Government Ministry

Research Agency/ Council

4.2.2 If you had the desire to adapt the programme to enable the funding of national participants in transnational projects or activities, when would be the earliest time to make such a change?

Within one year

Within three years

Beyond three years

4.3 Do you have the discretionary or delegated authority to adapt your programme rules to set a dedicated budget for transnational activities?

Yes No

4.3.1 If No, then what level of approval would be required to adapt the programme rules to set a dedicated budget for transnational activities?

Political/ Ministerial

Government Ministry

Research Agency/ Council

4.3.2 If you had the desire to adapt the programme to set a dedicated budget for transnational activities, when would be the earliest time to make such a change?

Within one year

Within three years

Beyond three years

4.4 Do you have the discretionary or delegated authority to adapt your programme rules to enable co-funding transnational activities? – yes/no

4.4.1 If No, then what level of approval would be required to adapt the programme rules to enable co-funding of transnational activities?

Political/ Ministerial

Government Ministry

Research Agency/ Council

4.4.2 If you had the desire to adapt the programme to enable co-funding of transnational activities, when would be the earliest time to make such a change?

Within one year

Within three years

Your details

To enable us to control the quality of this research please provide the contact information requested below

* Name of person completing this survey

* Contact email address

* Contact telephone number

APPENDIX E
Surveyed Programmes

Country	Organisation	Programme name
Austria	Federal Ministry for Education, Science and Culture	Österreichisches Genomforschungsprogramm GEN-AU
	Eutema	FIT-IT
	FFG	CIR-CE
		Regionale Impulsförderung 2000 - Modul REGplus
		protec 2000+ / Programmlinie protec-NETplus
		Initiative Mikrotechnik Österreich
		Austrian Nano Initiative
		Kplus programme
		asap - Austrian space applications programme
Belgium	FNRS - National Fund for Scientific Research	FNRS & FONDS associes
	FWO - Fund for Scientific Research - Flanders (Belgium)	FWO Research Projects
	DGTRE (Ministry for the Walloon Region Directorate-General of Technologies, Research & Energy)	Waleo II - technologies with the service of medicine and health
	IWT - Institute for the Promotion of Innovation by Science and Technology in Flanders	Thematic Innovation Stimulation
		TETRA-Fund
		Agricultural Research
		KMO Programme for SMEs
		SBO
Cyprus	Cyprus Research Promotion Foundation	EXPATRIATES
		Thematic Actions
		Research for Enterprises
Czech Republic	Ministry of Education, Youth and Sports	National Research Programme
Denmark	Danish Energy Authority	Energy Research Programme
	Danish Institute of Agricultural Sciences (DIAS)	DARCOF II
	Danish Research Agency	Programmes of the Danish Council for strategic research, renewable energy, information technology, food, nutrition & health, nanotechnology, biotechnology & information and communication technology, nanoscience and nanotechnology
		Strategic research programme on renewable energy and environmentally sustainable energy production
	Ministry of Science, Technology and Innovation	Industrial PhD Programme
Estonia	Enterprise Estonia	Estonian Competence Centre programme
		Competence Center (CC) program
Finland	Academy of Finland	Future Electronics Research Programme TULE
		SYSBIO - Systems Biology and Bioinformatics Research Programme
		PROACT - Research Programme on Proactive Computing

Country	Organisation	Programme name
		Microbes and Man Research Programme (MICMAN)
	Tekes	ELMO- Miniaturizing Electronics
		ClimBus Technology Programme
		MASINA technology programme of mechanical engineering in Finland
		FinNano
		Drug 2000 Tekes Technology Programme
		DENSY - Distributed Energy Systems
	Technology Industries of Finland	TRIO
France	BRGM	RITEAU
	OSEO	OSEO ANVAR Innovation
	Ministry for higher education and research	GENANIMAL
	Ministry of transport equipment & tourism	PREDIT3
Germany	Federal Ministry for education and research (BMBF)	IT 2006
		System Schiene 2010
	FNR - Fachagentur Nachwachsende Rohstoffe e.V.(Agency of Renewable Resources)	Nachwachsende Rohstoffe Programm des Bundesministeriums für Verbraucherschutz, Ernährung und Landwirtschaft zur Förderung von Forschungs-, Entwicklungs und Demonstrationsvorhaben
	Forschungskoop	PRO INNO II
	Forschungszentrum Jülich GmbH	WING - Werkstoffinnovationen für Industrie und Gesellschaft
		Flusseinzugsgebietsmanagment
		Systems Biology of Microorganisms
	projecktträger Forschungszentrum Karlsruhe (PTKA)	Rahmenkonzept "Forschung fur die Produktion von morgen"
	TUV	Mobilität und Verkehr
		Bauen und Wohnen im 21. Jahrhundert
	VDI/VDE-IT	Rahmenprogramm Mikrosysteme
		Förderprogramm Mikrosystemtechnik Bayern
		Landesinitiative Mikrosystemtechnik Niedersachsen
		Innovations- und Technikanalyse
		InnoNet
Greece	GSRT - Greek Ministry of Development General Secretariat for Research and Technology	International Cooperation in Industrial Research and Pre-Competitive Activity
		Programme for the development of industrial research for enterprises (PAVET)
		Research and Technological Development Consortia
		Cooperation with S&T Institutions in non-European Countries - 2005
Hungary	NKTH - National Office for Research and Technology	Large International R&D Projects
		Gábor Baross Programme
	OTKA - Hungarian Scientific Research Fund	Hungarian Scientific Research Fund
Iceland	Rannis - Icelandic Centre for Research	The Research Fund
		Postgenomics and Nanotechnology
		Technology Development Fund
		RTD programme on the Environment- and Information

Country	Organisation	Programme name
		Society Technologies
Ireland	Enterprise Ireland	RTI Initative
	EPA - Ireland's Environmental Protection Agency	ERTDI Programme
	IRCSET	Irish Research Council for Science, Engineering & Technology (IRCSET)
	Marine Institute	Marine RTDI Measure 2000-2006
	Science Foundation Ireland	Research Frontiers Programme
Italy	Ministry of Education, Universities and Research	FIRB – Supplementary Fund for Basic Research
Latvia	Latvian Investment and Development Agency	State aid program to support 'development of new products and technologies'
Luxembourg	FNR - National Research Fund for Luxemburg	SECOM - Security and efficiency of new practices in e-commerce for all socio-economic actors
		BIOSAN
Malta	Malta Council for Science & Technology	National RTDI Programme
Netherlands	NWO - Netherlands Organisation for National Research	Casimir
		NWO Programma Water
		Priority programme materials research (PPM)
		Advanced sustainable processes by engaging catalytic technologies (ASPECT)
	SenterNovem	Innovation Oriented Research Programme (IOP)
		Innovatiesubsidie samenwerkingsprojecten
Norway	Research Council of Norway	Mobilisation for R & D Related Innovation
		NANOMAT – Nanotechnology and New Materials
		PETROMAKS – Umbrella for most of the petroleum-orientated research supported by the RCN
		NORKLIMA – Climate change and its consequences
		VERDIKT – Strengthening Norwegian ICT Competence
		Food Research Programme
		Nordplus Neighbour
Poland	Ministry of Economic Affairs and Labour	Strengthening co-operation between R&D sphere and economy
Portugal	adi - innovation agency	Demonstradores
		IDEIA - applied research and development in companies
Romania	CNMP	CORINT
	Romanian Space Agency	AEROSPACE - AEROSPATIAL (RO) (2002-2006)
Spain	Ministerio de Educación y Ciencia (Ministry of Education & Science)	International Cooperation in Science and Technology
		National Research, Technological Development and Innovation Plan 2004-2007
		PETRI (Programa de Estimulo a la Transferencia de Resultados de la Investigacion)
	SPRI	INTEK BERRI
Sweden	VINNOVA - Swedish Agency for Innovation Systems	Designade material, inklusive nanomaterial (Designed material including nanomaterials)
		Sweden-Israel Testbed Programme (SIBED II)
		Efficient product development
		Swedish Competence Centres Programme
		Green Materials from Renewable Resources

Country	Organisation	Programme name
Switzerland	SNF - Swiss National Science Foundation	NFP 49 Antiobiotikaresistenz
		Muskuloskelletale Gesundheit
		Hormonaktive Stoffe
	Swiss Federal Office for Professional Education and Technology	KTI WTT
Turkey	Ministry of Industry & Trade	SME Technology Development and Innovation Support
	TTRV	Support for R&D projects
	Tubitak - Science and Technology Research Council of Turkey	Industrial R&D Grant Programme
		Technology Management Programme
UK	Biotechnology and Biological Sciences Research Council	BBSRC Programmes
	British Geological Survey	ECORD-net
	DEFRA	Wildlife & Countryside Science Programme
		Joint Defra/ Environment Agency Flood and Coastal Erosion Risk Management R&D Programme
	Department for Transport	DfT research programmes
	DTI	LINK Collaborative Research Scheme
		Technology Programme - Collaborative R&D
	Engineering and Physical Sciences Research Council	EPSRC Programmes
	Food Standards Agency	FSA research programmes
	Natural Environment Research Council	NERC Programmes
	Scottish Executive	SMART:SCOTLAND, SPUR AND SPURplus
	Small Business Service	Grant for Research and Development
	Uktransplant	ALLIANCE-O
	Welsh Development Agency	SMARTCymru

APPENDIX F
Interesting programmes in USA, Japan and China

In addition to the European case studies, we also examined the design of research programmes in the USA, Japan and China with the aim of identifying interesting examples of transnationality in their national programmes. A summary of the research landscape and some examples of interesting programmes are included below.

USA

Overall investment in R&D (GERD) was 2.7% of GDP in 2000, of which just over 2% was by the private sector (BERD). Current federal expenditure on R&D is around $130b. Public sector funding for R&D is channelled through 12 federal departments and 18 agencies. The two main federal agencies that sponsor R&D programmes are the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). NSF is primarily concerned with the frontiers of science, health and security. NIST is more concerned with productivity, trade and quality of life.

Interesting transnational features in USA programmes include:

NSF encourages international collaboration through the Office of International Science and Engineering (OISE). It has a horizontal role across the NSF Directorates and has a number of specific programmes, ie

- International planning visits and workshops, to support the early phases of developing research or educational activities with a foreign partner(s).
- International Research Fellowship Program (IRFP), to introduce young scientists and engineers to research opportunities abroad to support the NSF goal of creating a diverse, competitive and globally-engaged workforce of US researchers.
- Partnerships for International Research and Education, is a bottom—up programme that selectively sponsors research projects with foreign groups or institutions that are aimed at addressing global scientific issues and encouraging new models for international collaborative research.

NIST has its own research laboratories but also funds applied R&D through its Advanced Technology Program and the Manufacturing Extension Program. International collaboration is handled through its Office of International and Academic Affairs (OIAA) and is based on a formalised system known as international agreements (IAs) that are signed with foreign agencies and organisations and may be subject to an inter-agency review. At a less formal level, NIST operates a Foreign Guest Researcher Program to allow visiting scientists from around the world to work with NIST scientists.

Japan

Overall investment in R&D (GERD) was 3.12% of GDP in 2003, of which 2.3% was by the private sector (BERD). Annual government expenditure on R&D is around €25b. In 2001, there was a major reorganisation of ministries and agencies. The main outcome in the context of R&D was the creation of a merged Ministry of Education, Culture, Sports, Science and Technology (MEXT) and increased independence for universities and institutes. MEXT has two main agencies that fund R&D programmes; the Japan Science

and Technology Agency (JST) and the Japan Society for Promotion of Science (JSPS). In addition, the Ministry of Economy Trade and Industry (METI) has an agency known as The New Energy and Industrial Technology Organisation (NEDO), which has programmes related to energy and new technologies.

Interesting transnational features in Japanese programmes include:

JST is concerned with development and commercialisation of new technologies and uses international collaboration to enhance the Japanese research environment and address challenges that require an international approach. Specific programmes include:

- Strategic International Cooperation Programme, to support international exchanges between researchers in specific areas that are of common interest to support high level intergovernmental cooperation agreements. This is underpinned by the establishment of customised, low cost guesthouses for foreign researchers known as 'Takezono House' and 'Ninomiya House'

JST also has a number of instruments that are designed to facilitate both interdisciplinary and transnational exchange of knowledge and experience.

JSPS is concerned with the promotion of science, including fostering young researchers and creating international networks. Highly qualified foreign researchers are encouraged to carry out joint research in Japan through a number of fellowship programmes. These are enhanced by hosting international scientific meetings and bilateral programmes. In 2003, JSPS also initiated a new programme (Core-to-Core Programme) to build a cooperative international framework in leading edge fields of science with 15 western nations. In each field, a coordinator is appointed in Japan and the respective participating countries to facilitate joint research activities, scientific meetings and researcher exchanges.

NEDO has an International Joint Research Grant Program, which is aimed at advancing Japan's industrial technology. Grants up to Yen70m (€0.5m) are awarded to international research teams consisting of Japanese and overseas researchers from at least two nationalities, including Japan. Projects must be coordinated by a Japanese institute.

China

Overall investment in R&D (GERD) was 1.3% of GDP in 2003, of which 0.7% was by the private sector (BERD). GERD target is 2.5% by 2016. Annual government expenditure on R&D is around €13b. Since the early 1990's, the Chinese government has restructured their science and technology system to resemble that of the more developed nations. The most important organisations that fund research are the Ministry of Science and Technology (MOST), Chinese Academy of Science (CAS), Chinese Academy of Engineering (CAE) and National Science Foundation of China (NSFC). One of the big issues and opportunities for China is the 33,000 Chinese researchers that work in other countries.

Interesting transnational features in Chinese programmes include:

- The High Technology Research and Development Programme, launched in 1986, encourages international collaboration and exchange with the overt aim of importation, assimilation and absorption of foreign technologies into Chinese R&D activities

- The Torch Programme, which is designed to support the internationalisation of China's high tech industries. As well as supporting R&D projects the programme supports the development of a wide range of technical and commercial relationships with other countries
- The Talent Programme provides significant incentives, including generous research grants and CEO positions in companies, to attract outstanding young Chinese scientists to return to China. The programme also supports outward mobility to support the training of young researchers. In addition, there is a special fund for Chinese scholars abroad to spend part of their time working or lecturing in China. This is known as the 'two-base' model (one at home, one abroad)
- Major International Joint Research Programme, which provides funding for large international projects involving Chinese scientists or that need access to foreign infrastructure

The general message from these international case studies is that both China and Japan are being quite strategic about using transnational cooperation to support their national programme objectives. They are clearly trying to tap into global scientific knowledge to maximise the quality of research projects and also encouraging their young scientists to learn from the best in the world.

APPENDIX G
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APPENDIX H
Geographical Analysis of Transnational Features

Analysis of Features

The collated data on the online survey responses were analysed to identify programme design and implementation features that are commonly used, that are used by specific country groupings and that are used within specific programme types.

Programme design features

Programme budget and funding instruments

The following table presents analysis of the size and structure of programme budgets, for those programmes participating in the online survey.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Programme statistics																			
% Fixed budgets (not annually negotiated)	63%	63%	64%	83%	67%	56%	63%	77%	66%	57%	56%	66%	56%	80%	67%	73%	66%	63%	62%
Average annually negotiated budget (€m)	29.0	11.8	34.1	28.9	28.2	50.5	21.5	4.1	10.9	30.8	25.6	32.3	26.3	28.9	17.7	34.3	29.3	17.5	29.3
Average fixed budget (€m)	67.4	49.8	74.6	73.6	34.4	170.8	43.5	5.6	18.7	43.9	52.6	87.1	54.9	95.5	22.5	83.8	50.5	156.2	40.2
Average fixed budget per annum (€m)	18.5	13.4	19.7	22.2	13.8	41.6	12.5	1.4	4.7	10.6	9.3	21.0	11.0	28.0	9.5	19.8	11.4	39.5	10.2
Average duration of fixed programme (years)	3.7	3.7	3.8	3.3	2.5	4.1	3.5	3.9	4.0	4.1	5.7	4.1	5.0	3.4	2.4	4.2	4.4	4.0	3.9
Follow-on programmes	23%	25%	27%	8%	33%	34%	21%	8%	19%	18%	19%	32%	19%	10%	17%	23%	24%	20%	30%

Figure 15. Analysis of programme funding

The average fixed programme budget across Europe is €18.5m per annum, with significant variances by location and country type. Large economies have much larger programmes than medium and small economies. Nordic countries have a large number of programmes with small budgets, averaging at €4.7m per annum. The 10 new EU members have a small number of national programmes with large budgets.

Only 37% of programme budgets are negotiated annually, with the size of the budget typically larger than fixed annual budgets.

On average, 23% of programmes follow-on from previous programmes. This is much more likely in large economies than medium or small economies. Surprisingly, it is also more likely in candidate countries than the EU15 or 10 new members.

Programmes typically run for 4 to 4.5 years, with the main exceptions being Benelux (5.7 years) and Candidate Countries (2.5 years).

Geographical scope

The following table shows the geographical areas covered by programmes taking part in the online survey.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Other geographical areas involved in programme																			
EU25	65%	63%	63%	67%	67%	56%	66%	77%	75%	54%	50%	80%	50%	60%	61%	77%	67%	86%	76%
Candidate/associated	28%	24%	24%	25%	50%	22%	27%	46%	31%	21%	19%	34%	19%	20%	33%	39%	26%	46%	38%
USA	30%	27%	24%	58%	17%	19%	29%	62%	41%	7%	25%	42%	15%	50%	22%	45%	31%	49%	38%
Japan	13%	15%	14%	17%	0%	16%	12%	15%	9%	7%	19%	16%	10%	10%	11%	19%	11%	23%	14%
China	11%	14%	13%	17%	0%	22%	7%	8%	0%	14%	19%	6%	15%	10%	11%	13%	9%	14%	8%
Developing countries	10%	13%	13%	8%	0%	16%	9%	8%	3%	4%	6%	10%	6%	0%	22%	13%	8%	20%	8%
Same language countries	10%	13%	11%	25%	0%	13%	7%	23%	0%	7%	19%	4%	13%	10%	22%	11%	11%	17%	13%

Figure 16. Geographical scope of programmes

Where they were involved in transnational activity, respondents were asked to break down the areas and countries that were involved. Generally, 60 to 80% involve the EU25, with this being lower in Germanic and Benelux countries. Small economies, including countries from the 10 new members and candidate countries, are much more likely to work with candidate countries. Surprisingly, the 10 new members (and to a lesser extent small economies / Eastern European countries) are almost as likely to work with the USA as with EU25 countries. 22% of programmes in large economies involve China.

Programme implementation

Funding rules, criteria and conditions

Programmes have been analysed to assess the rules, criteria and conditions relating to the participation of non-nationals.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Transnational funding																			
Funding allowed when no national capacity	9%	10%	9%	9%	0%	17%	6%	6%	13%	11%	0%	10%	9%	0%	8%	10%	9%	9%	10%
Funding allowed when clear benefit to project	43%	45%	45%	45%	17%	50%	42%	31%	47%	44%	27%	51%	36%	40%	38%	45%	46%	51%	46%
Funding actively encouraged	15%	13%	12%	27%	0%	3%	15%	31%	0%	11%	27%	12%	16%	20%	15%	19%	16%	20%	19%
Non-resident participation allowed																			
Subcontractors to national partners	42%	44%	43%	55%	17%	50%	37%	50%	33%	48%	27%	45%	40%	40%	38%	40%	46%	37%	49%
Unpaid partners	42%	45%	44%	36%	0%	43%	42%	38%	7%	52%	47%	43%	47%	20%	38%	50%	46%	51%	51%
Paid partners	23%	23%	22%	45%	0%	17%	24%	31%	27%	11%	20%	33%	13%	20%	23%	29%	25%	31%	24%

Figure 17. Analysis of transnational funding rules

Transnational funding is rarely actively encouraged and is most likely to be allowed when there is a clear benefit to the project, with 40% to 50% being the typical range. Programmes in candidate countries are less likely to allow funding in this case, programmes in large economies more likely.

23% of programmes allow for paid partners, with 42% allowing for sub-contractors to national partners or for unpaid partners. Nordic and Germanic countries have very different strategies, with Nordic countries more likely to have paid partners and Germanic countries more likely to use unpaid partners.

The following table shows the limits imposed on transnational activity funding (in terms of percentage of budget) and the amount of programme budget that is actually spent on transnational activities.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Funding limits - allocation to non-residents																			
No specified limit	50%	47%	48%	55%	17%	50%	48%	56%	53%	37%	40%	65%	38%	50%	31%	60%	53%	74%	54%
Less than 5%	3%	4%	3%	9%	0%	7%	3%	0%	0%	7%	0%	2%	4%	10%	0%	3%	4%	3%	3%
Between 5% and 25%	3%	3%	3%	0%	0%	3%	3%	0%	0%	7%	7%	0%	7%	0%	0%	3%	4%	0%	3%
More than 25%	3%	3%	1%	18%	0%	0%	1%	13%	7%	0%	0%	2%	0%	0%	15%	2%	3%	0%	5%
Budget actually spent on non-resident activities																			
Less than 5%	31%	32%	33%	36%	17%	47%	25%	25%	33%	19%	33%	41%	24%	40%	8%	34%	32%	31%	32%
Between 5% and 25%	15%	16%	14%	27%	0%	3%	17%	31%	13%	11%	20%	14%	13%	10%	31%	18%	17%	23%	19%
More than 25%	4%	3%	3%	0%	0%	0%	7%	0%	0%	4%	0%	8%	2%	0%	0%	5%	6%	9%	6%

Figure 18. Analysis of transnational funding limits and spending

Few programmes specify a limit on the amount of budget that can be allocated to non-residents. Where any of the budget is spent at all on non-resident activities, it is typically less than 5%. The 10 new members and mobility/training programmes are most likely to spend more than 5%.

Participation in multilateral frameworks

Multilateral frameworks are a significant enabler for the development of transnational activities within programmes. Participation levels are highlighted below.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Multilateral framework involvement																			
EUREKA	23%	22%	23%	8%	50%	31%	22%	8%	22%	25%	13%	22%	21%	20%	33%	15%	27%	29%	30%
EUROCORES	7%	8%	7%	8%	0%	9%	6%	8%	3%	0%	13%	10%	4%	10%	6%	13%	2%	14%	2%
COST	11%	10%	10%	8%	33%	13%	11%	8%	9%	0%	6%	16%	2%	20%	17%	15%	13%	29%	11%
ERA-NET	24%	26%	27%	17%	33%	41%	22%	0%	19%	25%	6%	34%	17%	40%	11%	31%	25%	43%	24%
Other	11%	5%	4%	8%	50%	3%	13%	15%	19%	4%	6%	12%	6%	30%	11%	13%	14%	23%	16%
Contribution to framework programme with a centralised budget outside of EU RTD	16%	16%	16%	8%	0%	25%	12%	15%	19%	4%	13%	26%	8%	10%	11%	23%	14%	26%	14%
Benefits identified																			

Figure 19. Analysis of participation in multilateral frameworks

ERA-NET is the most frequently used framework, with the participation of 24% of programmes and 41% of programmes from large economies. Northern European, Eastern European and mobility programmes are also significant users of ERA-NETs. Programmes from small economies. Benelux and Southern Europe appear not to make significant use of ERA-NET's. Candidate countries are significant users of the EUREKA framework, alongside other, more localised frameworks.

Benefits of transnational activity

Programme managers were asked during the online survey which benefits they feel are gained from opening their programmes to transnational activities. The following table summarises their response.

Programme features	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe	Basic	Applied / industrial	Mobility / training	SME R&D
Benefits identified																			
Lower costs	9%	11%	11%	8%	17%	25%	2%	15%	3%	4%	6%	14%	6%	10%	6%	11%	11%	9%	11%
Higher quality results	37%	37%	35%	42%	67%	22%	41%	46%	44%	25%	38%	44%	27%	50%	39%	40%	41%	46%	43%
Faster exploitation	17%	17%	17%	17%	17%	16%	17%	15%	22%	18%	13%	18%	15%	10%	22%	13%	19%	20%	21%
Increased research capacity	42%	43%	44%	33%	50%	38%	44%	38%	41%	21%	44%	50%	33%	50%	39%	52%	44%	63%	49%
Opening of EU markets	24%	25%	27%	8%	50%	22%	27%	8%	16%	36%	19%	14%	29%	30%	33%	10%	29%	26%	33%
Other	12%	12%	11%	17%	17%	9%	11%	23%	9%	7%	6%	14%	6%	0%	22%	13%	12%	14%	13%

Figure 20. Analysis of identified benefits of transnational activity

Higher quality results and increased research capacity are the two main benefits identified. Increased capacity is seen as a greater benefit in candidate countries, Northern and Eastern European countries and in basic research and mobility programmes. It is seen as less of a benefit in Germanic countries. Higher quality is seen as a greater benefit in countries where the research infrastructure is less developed: the 10 new members, candidate countries, small economies, Eastern Europe and Southern Europe.

The opening of EU markets is seen as the greatest benefit by Germanic countries. Lower costs and faster exploitation were not seen as significant benefits.

APPENDIX I
Analysis of Barriers

Preliminary analysis and expert consultations identified a wide range of features that both promote and hinder transnational activities, including the opening of national programmes to non-residents. These were then developed into a set of questions for the online survey of national programmes (Appendix D). The responses provide empirical evidence of the relative prevalence of 'barriers' and 'enablers'. Barriers are discussed in this section, enablers in Appendix J.

National consultations

Online Survey

Barriers to transnational research cooperation, technology transfer and the mutual opening of national research programmes can be considered at three levels of administration; policy level, programme level and project level. In the early part of the study, we synthesised a list of 21 potential barriers through a combination of reviewing prior reports, ERA-NET dialogue and several workshops. We then used the Online Survey to test the presence and intensity of the various barriers by asking if programme administrators agreed or disagreed with the following statements. Multi-choice questions were used to allow for partial agreement.

Policy level barriers

1. The legal constitution for public funding of the research programme explicitly forbids the transfer of funds to non-resident organisations or individuals
2. The administration of international science and technology activities is controlled by another department or agency
3. National activities related to international science and technology transfer cooperation (apart from the EU RTD Framework Programme) are primarily focussed on non-EU countries
4. The relative inequality of national investment in science and technology (national intellectual assets) makes it impractical to design joint research or technology transfer programmes within the European Research Area
5. The national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities
6. Policy decision makers believe that national programmes do not need to involve transnational collaboration as this is sufficiently achieved by other programmes
7. There has been no change in national policy to encourage more transnational activity within national research, and related, programmes

Programme level barriers

8. The source of funding for the programme does not allow, or encourage, the use of programme funds for transnational activities
9. The programme objectives are based on seeking international leadership and would be diluted by sharing the activities or results with other countries
10. The issues that the programme is designed to address are specific to the country

11. Knowledge of similar national programmes in other countries is not sufficient to engage in transnational cooperation
12. The different national programme investment rules and funding cycles make it impractical to collaborate with related programmes in other countries
13. The financial administration system is not designed to cope with non-resident contracts and/or other currencies
14. Limited experience of pan-European programmes
15. No appropriate European structures (eg networks, foundations, associations) that could coordinate transnational cooperation within the area of the programme
16. Diversity of European languages and cultures makes it impractical to achieve the theoretical benefits of collaboration and mutual opening of national programmes
17. The programme receives a sufficient volume of high quality proposals from national research applicants to meet the programme objectives
18. The programme does not have any explicit criteria that encourage transnational activities

Project level barriers

19. The administration costs of transnational projects outweigh the benefits
20. There is no demand from national research participants for inclusion of foreign partners in the national programme
21. The national researchers would not encourage the allocation of more of the programme budget to participate in transnational projects or related activities

The relative importance of barriers might be influenced by different factors like national innovation policy, administration structures, type of programme, specific instruments or national and cultural differences. These factors can influence the barriers at different levels (policy, programme or project level). The analysis provides a quantitative summary of the most interesting results with respect to the relative importance of barriers.

Qualitative input

In addition to the online survey, the rationale behind the barriers had also been investigated by asking national representatives, mainly the official programme administrators and CREST members, by separate phone interviews, for their personal views and estimations of the importance of policy, programme and project level barriers. In addition, some programme users in Germany and the UK were consulted and experts from various national funding agencies were also involved in the discussion and analysis process. Informal workshops were organised with small groups of CREST representatives and experts from the ERA-NET community. The feedback and the openness of the representatives and experts involved led to a very good picture of the relative importance of existing barriers and the rationale behind. The input we have received was very important in understanding the results gained by the online survey.

Different national innovation landscapes and national strategies can strongly influence the relative importance of barriers and enablers. In some countries, the national R&D and innovation strategy is very supportive for the opening of national programmes and

other innovation related instruments to involve non-residents. Other countries have very little interest in opening their programmes as their objectives can be achieved without foreign partners. We have therefore carried out a detailed analysis of the survey responses with respect to specific groupings of countries (country typology) to highlight these national and cultural differences.

Scoring

Respondent answers were scored according to the perceived strength of the barrier and follows:

- With survey answer options 'yes' (2 points), 'unsure' (1 point) and 'no' (0 points).
- With survey answer options 'agree' (3 points), 'mostly agree' (2 points), 'partly agree' (1 point), 'disagree' (0 points).

The strength of each barrier is given as a percentage of the maximum score achievable for that barrier.

Relative importance of barriers

The results from the online survey indicate that the relative prevalence of the 21 specific barrier is as shown below.

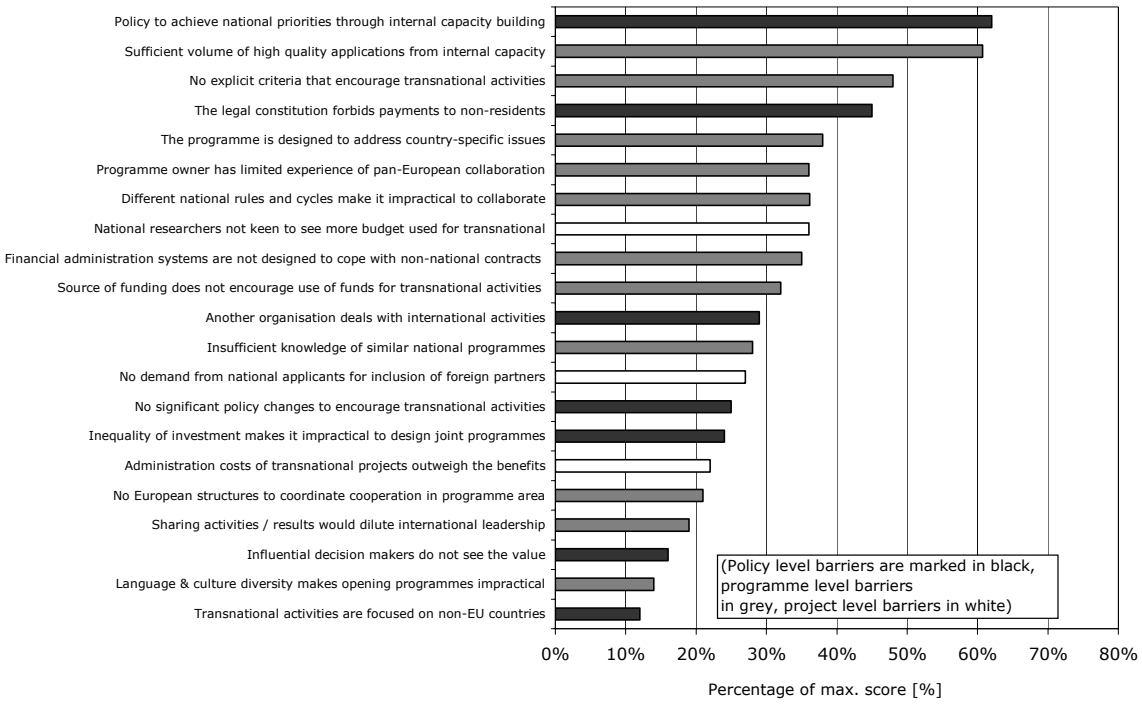

Figure 21. Frequency distribution of all barriers

Four barriers achieved a score of more than 40%. Although there are other barriers that may be more prevalent in certain types of countries or programmes, these four are generically the most significant. They are:

- National policy for science and innovation is based on improving national scientific and technological capacity to address national priorities

- Sufficient volume of high quality proposals from national applicants
- The programme does not have any explicit criteria that encourage transnational activities
- The legal constitution explicitly forbids the transfer of funds to non-residents

Relative Importance by Programme Type

In the following table, we analyse the relative importance of barriers by the four types of programme (basic research, applied research, training/mobility and SME R&D). The figures show the percentages of respondents agreeing with the barrier statement. Dark shading highlights a majority agreeing with the barrier statement, light or no shading indicating a minority.

BARRIERS	Basic research	Applied research	Training & Mobility	SME R&D
Policy level	**67**	**99**	**39**	**68**
The legal constitution for public funding of my research programme explicitly forbids the transfer of funds to non-resident organisations or individuals	41%	45%	38%	49%
The administration of international science and technology activities is controlled by another department or agency	29%	30%	21%	29%
Our national activities related to international science and technology transfer cooperation are primarily focussed on non-EU countries	12%	12%	14%	9%
The relative inequality of national investment in science & technology makes it impractical to design joint research or technology transfer programmes within ERA	22%	25%	26%	30%
Our national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities	63%	64%	61%	63%
Decision makers believe that national research programmes do not need to involve transnational collaboration as this is sufficiently achieved by other programmes	16%	17%	9%	17%
I have not detected any significant change in national policy to encourage more transnational activities within national research, and related, programmes	20%	26%	20%	24%
Programme level features				
The source of funding for my programme does not allow, or encourage, the use of programme funds for transnational activities	31%	35%	18%	28%
The programme objectives are based on seeking international leadership and would be diluted by sharing the activities or results with other countries	14%	21%	19%	23%
The issues that the programme is designed to address are specific to our country	29%	41%	24%	39%
My knowledge of similar national programmes in other countries is not sufficient to engage in transnational cooperation	29%	29%	21%	26%
The different national programme investment rules and funding cycles make it impractical to collaborate with related programmes in other countries	36%	39%	32%	37%
Our financial administration systems are not designed to cope with non-national contracts and/or other currencies	34%	35%	22%	33%
I have limited experience of pan-European collaborative programmes	36%	37%	24%	38%
There are no appropriate European structures that could coordinate transnational cooperation in the area of our programme	17%	22%	18%	26%
The diversity of European languages and cultures makes it impractical to achieve the theoretical benefits of collaboration and mutual opening of national programmes	12%	14%	11%	18%
We receive a sufficient volume of high quality project proposals from national research applicants to meet the programme objectives	59%	60%	57%	61%
The programme does not have any explicit selection criteria that encourages transnational activities	41%	50%	35%	49%
Project level				
The administration costs of transnational projects outweigh the benefits	20%	22%	21%	25%
There is no demand from national research applicants for inclusion of foreign partners in the national programme	26%	26%	15%	26%
Our national researchers would not encourage us to allocate more of the programme budget to participate in transnational projects or related activities	36%	36%	31%	35%

Figure 22. Analysis of barriers by programme type

Overall, there is little difference between the four types of programme, although considerable differences between basic and applied/industrial research were expected. We can attribute at least some of this to the prevalence of multi-type programmes. For example, it is fairly common for basic and applied research projects to be funded by certain programmes. Also, mobility projects are quite common in basic research programmes. Just over one third of the surveyed programmes focus on single types of project as shown below.

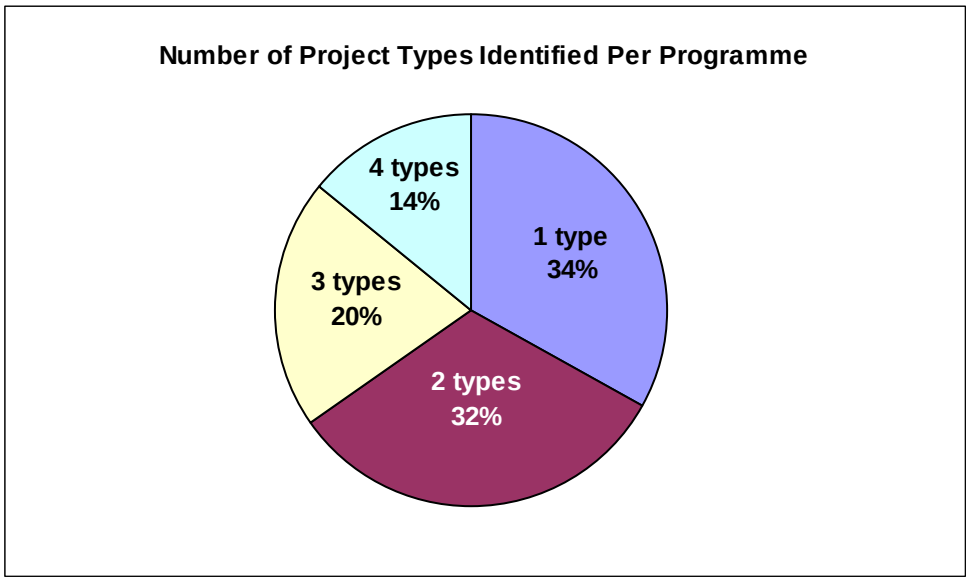

Figure 23. Prevalence of multi-type programmes

It is interesting to note here that the differences between types of programmes are more obvious in the analysis of enablers (Appendix J).

National and Cultural Differences

The following section analyses the results of the online survey by the following national, economic, cultural and geographical factors:

- History and status of EU membership
- Size of economy
- Culture
- Region within Europe

The detailed summary of this analysis is shown in Figure 24.

BARRIERS	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe
Policy level	**127**	**103**	**94**	**12**	**6**	**32**	**82**	**13**	**32**	**28**	**16**	**50**	**48**	**10**	**19**
The legal constitution for public funding of my research programme explicitly forbids the transfer of funds to non-resident organisations or individuals	45%	45%	47%	21%	67%	50%	46%	27%	38%	57%	34%	36%	49%	30%	68%
The administration of international science and technology activities is controlled by another department or agency	29%	26%	26%	21%	58%	23%	30%	35%	20%	36%	25%	21%	31%	20%	50%
Our national activities related to international science and technology transfer cooperation are primarily focussed on non-EU countries	12%	12%	13%	3%	11%	14%	13%	3%	18%	5%	8%	17%	7%	3%	18%
The relative inequality of national investment in science & technology makes it impractical to design joint research or technology transfer programmes within ERA	24%	24%	23%	42%	22%	15%	26%	38%	26%	21%	27%	21%	24%	20%	37%
Our national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities	62%	65%	66%	58%	56%	75%	59%	56%	58%	70%	46%	64%	62%	53%	65%
Decision makers believe that national research programmes do not need to involve transnational collaboration as this is sufficiently achieved by other programmes	16%	19%	18%	19%	11%	27%	11%	21%	6%	20%	19%	14%	19%	0%	23%
I have not detected any significant change in national policy to encourage more transnational activities within national research, and related, programmes	25%	27%	27%	36%	6%	38%	20%	26%	14%	33%	17%	22%	27%	27%	26%
Programme level features															
The source of funding for my programme does not allow, or encourage, the use of programme funds for transnational activities	32%	33%	34%	25%	25%	34%	32%	23%	14%	43%	47%	17%	45%	25%	42%
The programme objectives are based on seeking international leadership and would be diluted by sharing the activities or results with other countries	19%	22%	22%	22%	6%	22%	19%	18%	19%	23%	15%	17%	20%	20%	23%
The issues that the programme is designed to address are specific to our country	38%	39%	38%	53%	39%	56%	30%	41%	15%	56%	19%	27%	42%	40%	56%
My knowledge of similar national programmes in other countries is not sufficient to engage in transnational cooperation	28%	30%	29%	36%	22%	33%	24%	33%	22%	23%	27%	25%	26%	20%	44%
The different national programme investment rules and funding cycles make it impractical to collaborate with related programmes in other countries	36%	39%	39%	42%	22%	42%	33%	41%	33%	36%	35%	34%	38%	20%	47%
Our financial administration systems are not designed to cope with non-national contracts and/or other currencies	35%	36%	36%	31%	22%	45%	34%	15%	33%	49%	23%	32%	42%	27%	28%
I have limited experience of pan-European collaborative programmes	36%	37%	37%	42%	28%	43%	34%	38%	25%	44%	33%	32%	40%	23%	46%
There are no appropriate European structures that could coordinate transnational cooperation in the area of our programme	21%	21%	22%	14%	33%	25%	20%	13%	14%	19%	19%	18%	21%	7%	35%
The diversity of European languages and cultures makes it impractical to achieve the theoretical benefits of collaboration and mutual opening of national programmes	14%	15%	15%	11%	11%	19%	13%	10%	8%	18%	17%	12%	19%	3%	12%
We receive a sufficient volume of high quality project proposals from national research applicants to meet the programme objectives	61%	64%	65%	50%	61%	64%	64%	33%	59%	68%	71%	58%	67%	50%	56%
The programme does not have any explicit selection criteria that encourages transnational activities	48%	49%	50%	47%	50%	58%	43%	46%	33%	49%	56%	43%	52%	40%	51%
Project level															
The administration costs of transnational projects outweigh the benefits	22%	24%	24%	14%	28%	29%	20%	18%	22%	23%	21%	24%	21%	3%	32%
There is no demand from national research applicants for inclusion of foreign partners in the national programme	27%	29%	30%	17%	22%	28%	27%	21%	29%	18%	35%	32%	24%	13%	26%
Our national researchers would not encourage us to allocate more of the programme budget to participate in transnational projects or related activities	36%	38%	39%	31%	22%	43%	33%	36%	29%	42%	42%	34%	42%	17%	37%

Figure 24. Analysis of barriers by country type

History and status of EU membership

Three different groups (EU15 members, 10 new EU members and the candidate countries) were used in order to analyse the impact and relevance of barriers.

EU15

EU15 countries tend to follow the EU34 average, although this is not surprising as these make up three quarters of the programmes participating.

Two barriers in particular, however, appear to be more relevant to the EU 15 countries: national policy is based on improving capacity to address national priorities and sufficient high quality proposals are received from national applicants.

10 new members

In general, barriers to transnational activity are lower in the 10 new member states. Legal constitutions are more permissive, administration is simpler, programmes have explicit transnational selection criteria and there is demand from national applicants for the inclusion of foreign partners.

Relatively high barriers include programmes that are designed to address local issues, managers who have limited experience of collaborative programmes, different programme investment rules and funding cycles and relative inequality in past national investment in R&D. This is probably a reflection of their feeling of exclusion from EU R&D networks. Most of the new States have ambitions to raise their scientific capacity and investment to a level that will allow them to play an active part in the European Research Area. The situation in these countries is very dynamic and relatively open to designing their national programmes for maximum coordination with other Member States.

Candidate countries

The pattern of important barriers is also very different from the average in Candidate countries. This cluster agreed that their legal constitution forbids the funding of non-residents, with a score of 67%. Also, the administration of international activities is typically controlled by another department, policies are not seen to be changing to support transnational activity, there is less indication of explicit criteria to encourage transnational activities and a lack of inclusion in European structures that could coordinate transnational activities.

Size of economy

The relative importance of barriers also varies with size of countries from the small economies (with GNP below €100 billion) to the three largest economies (France, Germany and the UK). All of the other countries were classified as medium economies.

Small economies

The dominant barrier within this group is that the source of funding does not encourage funding of non-residents. In some cases, this may be related to rather small budgets for science and innovation. In other cases, the use of EU Structural Funding within the mix of national programme funding may limit the flexibility. Operational barriers, such as

financial administration systems, lack of demand from national researchers and diversity of language/cultures, seem to be less important in the smaller countries. This is possibly due to the weaker science base in such countries and the need to access knowledge from other countries. There is clearly a conflict between the need to access high level scientific capacity and infrastructure from other countries and the inability to fund non-resident foreign researchers.

Medium economic size

The pattern of responses from this group of 17 countries is broadly in line with the ERA34 average, although this is not surprising as they make up two thirds of respondents. In most cases, the prevalence of the barriers falls between large and small economies, highlighting that barriers typically reduce with the size of the economy.

Large economic size

In almost every category, the barriers are higher than for medium and small economies. The most significant barrier is related to focusing national capacity on addressing national priorities. This is reinforced by programmes being more likely to be designed to address country-specific issues and (perhaps perceived) legal barriers to funding non-residents, possibly due to the administration of science & technology being carried out elsewhere. There is also a very significant lack of explicit selection criteria that encourage transnational activity and a limited indication of policy change.

Culture

We also examined the relative differences between three cultural groups; Nordic, Germanic and Benelux.

Nordic countries

The Nordic countries have a lower presence of barriers than the EU34 average and for medium sized countries as a whole (all except Iceland were classified as medium sized). Barriers that are less evident are lack of explicit selection criteria that encourage transnational activity, the source of funding not encouraging transnational activity and national researchers not encouraging the use of budgets for transnational activities. This relates to the close ties between Nordic countries and a history of cooperation, resulting in more of an expectation that projects will involve neighbouring countries.

Germanic

The Germanic group is quite interesting. There are significantly higher policy level barriers than the EU34 average and any other grouping. Programme barriers are also higher, particularly the focus of programmes on country-specific issues, financial administration systems and limited experience. On the other hand, there appears to be more demand from national researchers for the inclusion of foreign partners and a better knowledge of similar programmes in other countries. This suggests that the desire and conditions for cross-border collaboration exists at programme/project level but the policy level may be the main constraint. At least some of this is due to cross-border economic links within industrial supply chains.

Benelux

For the Benelux countries, the survey does not indicate a drive to increase the level of transnational activity. This is surprising as policy level barriers are generally lower in the Benelux countries, particularly national policy being less focused on building capacity, and this is confirmed by case studies. Two programme level barriers are significantly higher: the source of funding is less likely to encourage transnational activity and sufficient proposals are received from national applicants. This is also reflected in a third of programme managers stating that there is no demand from national applicants for the inclusion of foreign partners.

Location within Europe

The final group of clusters that we analysed was geographic location within Europe, including northern, central, eastern and southern.

Northern Europe

The pattern for Northern Europe is similar to Scandinavia but the inclusion of the UK and Ireland makes the pattern of barriers similar to the ERA34 average.

Central Europe

The pattern for Central Europe is similar to the average on policy barriers but generally higher than average programme level barriers, such as financial systems, sufficient volumes of proposals from national applicants and explicit selection criteria encouraging transnational activity.

Eastern Europe

Apart from the 'source of funding does not allow' barrier, this group is well below average on most barriers.

Southern Europe

The Southern European countries generally score higher than average on the more significant generic barriers. Legal barriers and sources of funding appear to be particularly important. Respondent interviews and anecdotal evidence would suggest that this is related to the conditions implicit in Structural Funds, which are commonly used within R&D programmes in Southern States.

Level of transnational activity

Analysis of barriers based on the actual programme spend on transnational activities reveals the barriers that appear most significant in preventing activity in the first place, or which restrict the levels of activity. This also highlights those barriers that may not be so significant, even if they are prevalent. Figure 25 provides a summary of the analysis.

BARRIERS	0% transnational	Less than 5% transnational	More than 5% transnational
Policy level	**19**	**66**	**42**
The legal constitution for public funding of my research programme explicitly forbids the transfer of funds to non-resident organisations or individuals	71%	45%	35%
The administration of international science and technology activities is controlled by another department or agency	50%	27%	24%
Our national activities related to international science and technology transfer cooperation are primarily focussed on non-EU countries	12%	11%	14%
The relative inequality of national investment in science & technology makes it impractical to design joint research or technology transfer programmes within ERA	19%	27%	21%
Our national policy for science and innovation is based on improving national scientific and technological capacity to address national priorities	58%	66%	59%
Decision makers believe that national research programmes do not need to involve transnational collaboration as this is sufficiently achieved by other programmes	30%	16%	10%
I have not detected any significant change in national policy to encourage more transnational activities within national research, and related, programmes	32%	29%	15%
Programme level features			
The source of funding for my programme does not allow, or encourage, the use of programme funds for transnational activities	74%	29%	18%
The programme objectives are based on seeking international leadership and would be diluted by sharing the activities or results with other countries	28%	22%	11%
The issues that the programme is designed to address are specific to our country	70%	35%	27%
My knowledge of similar national programmes in other countries is not sufficient to engage in transnational cooperation	28%	29%	25%
The different national programme investment rules and funding cycles make it impractical to collaborate with related programmes in other countries	30%	41%	32%
Our financial administration systems are not designed to cope with non-national contracts and/or other currencies	42%	42%	20%
I have limited experience of pan-European collaborative programmes	44%	41%	25%
There are no appropriate European structures that could coordinate transnational cooperation in the area of our programme	19%	22%	19%
The diversity of European languages and cultures makes it impractical to achieve the theoretical benefits of collaboration and mutual opening of national programmes	16%	16%	10%
We receive a sufficient volume of high quality project proposals from national research applicants to meet the programme objectives	67%	59%	61%
The programme does not have any explicit selection criteria that encourages transnational activities	67%	59%	21%
Project level			
The administration costs of transnational projects outweigh the benefits	30%	21%	21%
There is no demand from national research applicants for inclusion of foreign partners in the national programme	26%	32%	18%
Our national researchers would not encourage us to allocate more of the programme budget to participate in transnational projects or related activities	42%	41%	25%

Figure 25. Barriers analysed by level of transnational activity

The most significant barriers that are present in the programmes with 0% spend on transnational activities and are also less prevalent in the more open programmes are:

- The source of funding does not encourage use of funds for transnational activities
- No explicit criteria that encourage transnational activities
- The programme is designed to address country-specific issues
- The legal constitution forbids payments to non-residents

APPENDIX J
Analysis of Enablers

Some national programmes have specific design features that encourage transnational activities. Others have sufficient flexibility to be adapted in response to unforeseen opportunities to add value. Many programmes, however, are much more rigid and cannot be changed during the life cycle of the approved budget.

National consultations

A wide variety of enablers, including the absence of barriers, were identified in the early stages of the research and tested in the online survey. There are 23 of these and they can be categorised into five enabler groups, as follows:

Explicit rules / instruments

1. Explicit selection criteria that encourage transnational activity
2. Participation of non-resident researchers encouraged
3. Direct payment of non-resident researchers
4. Use of evaluators from other countries
5. Funding of transnational research projects
6. Funding of cross-border technology transfer projects
7. Cross-border mobility or training of researchers

Lack of legal / political barriers

8. No legal restriction on funding non-residents
9. Financial administration systems designed to cope with non-national contracts and other currencies

External influencers

10. Links with multilateral framework programmes
11. Influential decision makers see the value in additional European collaboration in the area of research or technology transfer
12. Change in national policy to encourage more transnational activities within national research/related programmes
13. Programme funding source allows, or encourages, the use of funds for transnational activities
14. Insufficient volume of high quality project proposals from national applicants
15. Demand from national applicants for inclusion of foreign partners
16. Encouragement from national researchers to allocate more of the programme budget to transnational activities

Programme owner interest / autonomy

17. Sufficient knowledge of similar national programmes in other countries to engage in transnational cooperation

18. Experience of pan-European collaborative programmes
19. Has discretionary or delegated authority to adapt programme rules to allow the funding of foreign researchers
20. Has discretionary or delegated authority to adapt programme rules to allow the funding of national participants in transnational projects or activities
21. Has discretionary or delegated authority to adapt programme rules to set a dedicated budget for transnational activities
22. Has discretionary or delegated authority to adapt programme rules to enable co-funding of transnational activities

Positive prior experience

23. Transnational features have resulted in tangible benefits

As questions regarding enablers had yes/no answers, the percentage score represents the number of programmes with that enabler present. Figure 26 ranks the enablers ***in order of their prevalence***, ie the percentage of programme managers recognising each enabler to be present.

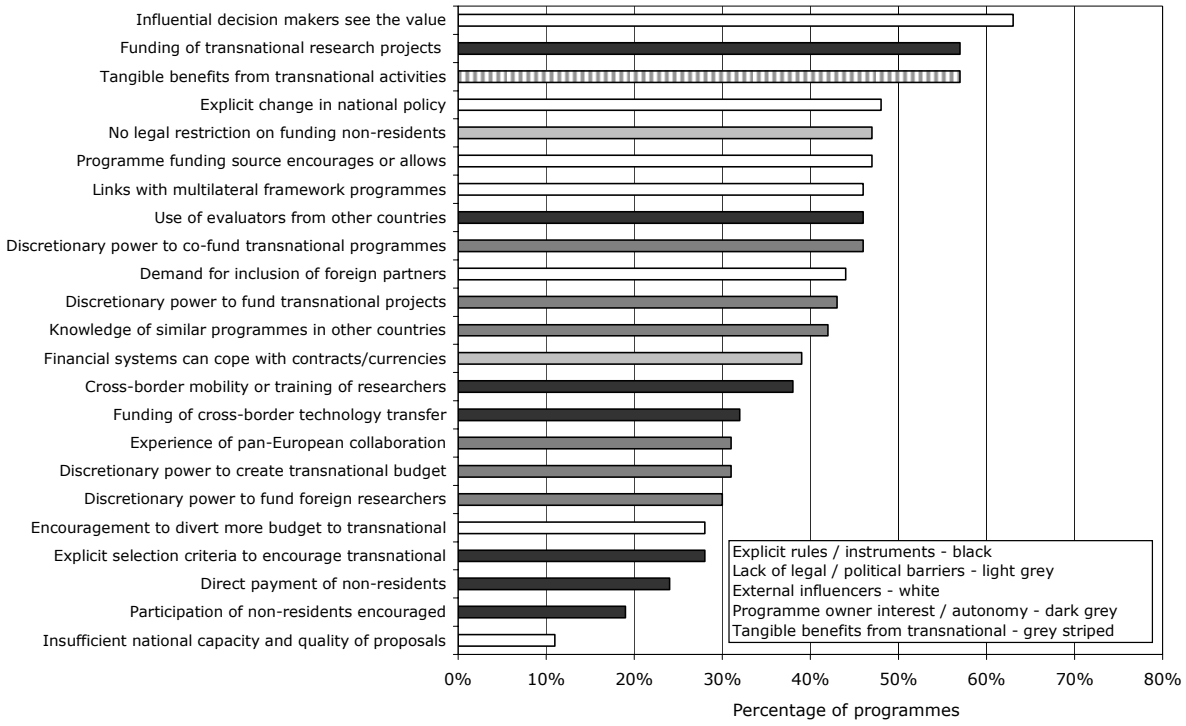

Figure 26. Relative prevalence of enablers

Again, as with the barriers, the rationale behind the enablers have been discussed with CREST members, programme owners and other experts. This has enabled us to develop a general understanding of the activities that ministries, agencies and programme owners are undertaking to open their programmes to transnational activity.

Relative importance by programme type

As discussed in Appendix I, the differences in barriers and enablers between programme types (basic research, applied/industrial research, mobility, SME R&D) is less distinct than in other areas of analysis as many programmes have two, three or even four of these elements to them. The majority of basic research programmes, for example, now have an applied research element to them and this appears to be a growing trend. Also, international mobility is mostly visible as an instrument within basic research or framework programmes. Analysis of the individual enablers by programme type is shown in Figure 27.

ENABLERS	Basic research	Applied research	Training & Mobility	SME R&D
Explicit rules / instruments	**67**	**99**	**39**	**68**
Explicit selection criteria that encourage transnational activity	31%	25%	41%	31%
Participation of non-resident researchers encouraged	18%	16%	21%	21%
Direct payment of non-resident researchers	28%	24%	31%	25%
Use of evaluators from other countries	64%	41%	59%	44%
Funding of transnational research projects	63%	59%	64%	56%
Funding of cross-border technology transfer projects	27%	31%	41%	41%
Cross-border mobility or training of researchers	52%	34%	69%	37%
Lack of legal / political barriers				
No legal restriction on funding non-residents	49%	45%	49%	40%
Financial administration systems designed to cope with non-national contracts and other currencies	42%	39%	54%	44%
External influencers				
Links with multilateral framework programmes	43%	47%	59%	47%
Influential decision makers see the value in additional European collaboration in the area of research or technology transfer	66%	62%	77%	63%
Change in national policy to encourage more transnational activities within national research/related programmes	57%	47%	56%	54%
Programme funding source allows, or encourages, the use of funds for transnational activities	49%	46%	59%	53%
Insufficient volume of high quality project proposals from national applicants	10%	11%	10%	13%
Demand from national applicants for inclusion of foreign partners	46%	42%	59%	47%
Encouragement from national researchers to allocate more of the programme budget to transnationl activities	30%	30%	36%	34%
Programme owner interest / autonomy				
Sufficient knowledge of similar national programmes in other countries to engage in transnational cooperation	43%	41%	54%	44%
Experience of pan-European collaborative programmes	28%	32%	46%	35%
Has discretionary or delegated authority to adapt programme rules to allow the funding of foreign researchers	33%	26%	41%	29%
Has authority to adapt programme rules to allow the funding of national participants in transnational projects or activities	49%	40%	46%	51%
Has discretionary or delegated authority to adapt programme rules to set a dedicated budget for transnational activities	40%	28%	41%	34%
Has discretionary or delegated authority to adapt programme rules to enable co-funding of transnational activities	49%	40%	41%	40%
Positive prior experience				
Transnational features have resulted in tangible benefits	55%	58%	67%	59%

Figure 27. Analysis of enablers by programme type

Training & mobility

Training and mobility programmes are, unsurprisingly, the most open to transnational activity, with the greatest use of enablers overall. 69% of programmes that involve training & mobility include cross border mobility with funding sources, legal systems and the research community typically supporting transnational activities.

Basic research

Basic research programmes are less open to transnational activity (have fewer enablers) than training & mobility programmes but, due to its border-spanning and less sensitive nature, along with a history of transnational cooperation, basic research is more open than applied research and SME R&D. This manifests itself in a greater use of foreign evaluators, fewer restrictions on funding non-residents and programmes typically having the support of influential decision makers.

Applied, industrial and SME R&D

Applied, industrial and SME R&D programmes have lower levels of specific enablers, indicating that the facilitation of transnational activity is less of a strategic priority than for basic research programmes and training & mobility programmes.

National and cultural differences

Different national innovation landscapes, cultures and strategies influence the level of openness to transnational activity and the use of enablers (or reduction of barriers). Analysis of the enabler questions in the online survey is given in Figure 28, broken down by economic, cultural and geographical factors.

ENABLERS	34 Countries	EU25	EU15	10 new EU members	Candidate countries	Large economies	Medium economies	Small economies	Nordic	Germanic	Benelux	Northern Europe	Central Europe	Eastern Europe	Southern Europe
Explicit rules / instruments	**127**	**103**	**94**	**12**	**6**	**32**	**82**	**13**	**32**	**28**	**16**	**50**	**48**	**10**	**19**
Explicit selection criteria that encourage transnational activity	28%	27%	27%	25%	33%	25%	29%	31%	38%	29%	13%	32%	21%	30%	37%
Participation of non-resident researchers encouraged	19%	17%	17%	25%	0%	16%	17%	38%	19%	25%	25%	14%	25%	20%	16%
Direct payment of non-resident researchers	24%	24%	23%	42%	0%	22%	23%	38%	34%	14%	19%	34%	17%	20%	21%
Use of evaluators from other countries	46%	47%	45%	67%	0%	38%	46%	62%	50%	39%	38%	52%	40%	40%	47%
Funding of transnational research projects	57%	56%	56%	50%	67%	59%	56%	54%	63%	54%	38%	68%	48%	60%	47%
Funding of cross-border technology transfer projects	32%	32%	32%	33%	17%	25%	37%	23%	34%	29%	19%	34%	27%	40%	37%
Cross-border mobility or training of researchers	38%	35%	34%	42%	33%	22%	44%	38%	63%	21%	25%	54%	21%	50%	32%
Lack of legal / political barriers															
No legal restriction on funding non-residents	47%	49%	47%	67%	33%	47%	48%	46%	53%	39%	56%	56%	44%	60%	26%
Financial administration systems designed to cope with non-national contracts and other currencies	39%	36%	37%	33%	50%	28%	39%	62%	41%	18%	44%	44%	27%	50%	47%
External influencers															
Links with multilateral framework programmes	46%	46%	48%	17%	67%	59%	45%	23%	44%	43%	31%	56%	38%	40%	47%
Influential decision makers see the value in additional European collaboration in the area of research or technology transfer	63%	57%	57%	67%	67%	41%	71%	69%	84%	50%	44%	72%	50%	90%	58%
Change in national policy to encourage more transnational activities within national research/related programmes	48%	45%	46%	25%	83%	38%	51%	54%	69%	32%	50%	54%	42%	30%	58%
Programme funding source allows, or encourages, the use of funds for transnational activities	47%	44%	44%	58%	67%	44%	45%	69%	66%	25%	25%	66%	25%	60%	47%
Insufficient volume of high quality project proposals from national applicants	11%	9%	9%	17%	0%	13%	5%	46%	16%	4%	0%	16%	4%	10%	16%
Demand from national applicants for inclusion of foreign partners	44%	41%	40%	42%	50%	47%	43%	46%	34%	64%	25%	40%	48%	50%	42%
Encouragement from national researchers to allocate more of the programme budget to transnational activities	28%	27%	26%	42%	50%	28%	26%	46%	31%	21%	13%	30%	19%	50%	37%
Programme owner interest / autonomy															
Sufficient knowledge of similar national programmes in other countries to engage in transnational cooperation	42%	38%	39%	33%	33%	47%	39%	46%	47%	57%	19%	48%	44%	50%	16%
Experience of pan-European collaborative programmes	31%	31%	32%	17%	33%	25%	33%	31%	50%	25%	19%	42%	23%	40%	16%
Has discretionary or delegated authority to adapt programme rules to allow the funding of foreign researchers	30%	31%	31%	25%	17%	22%	35%	15%	38%	14%	31%	42%	21%	10%	32%
Has discretionary or delegated authority to adapt programme rules to allow the funding of national participants in transnational projects or activities	46%	42%	43%	25%	83%	28%	52%	46%	81%	18%	38%	74%	23%	40%	32%
Has discretionary or delegated authority to adapt programme rules to set a dedicated budget for transnational activities	31%	33%	33%	25%	0%	16%	37%	31%	53%	11%	31%	48%	19%	20%	21%
Has discretionary or delegated authority to adapt programme rules to enable co-funding of transnational activities	43%	43%	44%	25%	17%	38%	44%	46%	66%	25%	44%	60%	33%	30%	26%
Positive prior experience															
Transnational features have resulted in tangible benefits	57%	59%	60%	50%	67%	59%	56%	54%	53%	46%	50%	64%	50%	60%	53%

Figure 28. Analysis of enablers by economic, cultural and geographical factors

History and status of EU membership

EU15

As the EU15 members (typically) have well developed research infrastructures, transnational activity is not a pressing necessity. As a consequence, they have fewer explicit rules and instruments supporting transnational activity than the 10 new EU members. National researchers are also less encouraging on the allocation of budget to transnational activities.

There is a long history of bilateral or multilateral cooperation between certain EU15 members and, consequently, many have structures in place to support transnational activity. This includes using evaluators from other countries, the removal of legal restrictions to funding non-residents and links to multilateral programmes. Programme owners also have a greater degree of autonomy, particularly to fund national participants in transnational projects.

10 new EU members

The ten new EU members are in the process of building their research infrastructures up to EU standards and are reliant on existing members for support and guidance. It is not surprising, therefore, that they have the highest level of explicit rules and instruments.

As the necessary expertise may not exist in these countries, however, they have fewer links to multilateral programmes. Surprisingly, they are also not seen to be changing policy to allow encourage more transnational research activities.

Candidate countries

The survey results confirm the view from the research landscapes that the candidate countries are going through a transformation process. National policy is changing to encourage more transnational activities but there are few explicit rules and instruments to support transnational activities and there are still legal restrictions in place. The main route to openness appears to be via participation in multilateral framework programmes.

Size of economy

Large economies

Large economies appear to see less need for transnational activity, having most of the infrastructure and expertise available nationally. The survey shows that, although they are less likely to have legal restrictions and have the highest level of participation in multilateral framework programmes, programmes in large countries are indeed the most insular. Influential decision makers are not seen to value transnational activity and there is little encouragement to allocate more of the budget in this area. Managers have little authority to adapt the rules to set dedicated budgets for transnational activities. Large country programmes are least likely to have explicit rules or instruments supporting transnational activity, or financial systems designed to cope with non-national contracts or currencies.

Medium economies

Medium sized countries are more likely than small countries to have well developed research infrastructures and expertise, although these will not be comprehensive. This makes them both receptive to transnational activity and able to participate in it as an equal partner. The survey shows that programmes in medium size countries are particularly supportive of mobility/training and technology transfer activities. Decision makers here are most likely to see the value of transnational activity and allow the use of funds to support it.

Small economies (less than $100bn GDP)

Small countries are obviously the least likely to have well developed and comprehensive research infrastructures. Hence there is typically an openness to working transnationally to compensate for the shortfalls. In some cases, however, the level of infrastructure and expertise is too low to allow them to participate in joint activities with more developed countries. The results of the online survey show that decision makers see the value of transnational activity and programme managers are seeing changes to encourage this, including allowing/encouraging the use of funds to support it. Financial systems are well set up to cope with non-national contracts or currencies.

Culture

Nordic countries

Nordic countries are the most open to transnational cooperation, particularly within the Nordic region itself, thanks to existing cultural links, networks and institutions. These cooperative networks compensate for missing resources and expertise in the individual countries and create larger markets for the technologies that are developed.

Nordic countries make the greatest use (both overall and a broader spread) of explicit rules and instruments and are significantly stronger on the use of explicit selection criteria to encourage transnational activity and cross-border mobility/training.

Nordic decision makers appear to see the value in European cooperation and funding sources typically allowing the use of funds for transnational activities. Nordic programme managers also have the greatest level of authority to adapt rules to allow the funding of national participants in transnational projects.

Germanic countries

Germanic countries appear to be relatively closed to the use of enablers to support transnational activities. They are comparatively weak in the use of explicit rules & instruments, on the lack of legal/political barriers, on the presence external influencers and on positive prior experience. Programme funding sources are much less likely to allow the use of funds for transnational activities. Despite this, programme managers from Germanic countries are more likely to have knowledge of similar national programmes in other countries.

Benelux

As with the Germanic countries, the Benelux countries have a relatively low level of transnational activity enablers, with the lowest level of programmes including funding for transnational research projects. In general, decision makers do not appear to see the value in European cooperation (although we know that this is not the case for Belgium in particular) and the programme funding source is not likely to encourage the use of funds for transnational activities. Possibly as a consequence, programme managers have little knowledge or experience of transnational cooperation. National policy is changing, however, to allow more transnational activities.

Location within Europe

Northern Europe

Northern Europe is most open to transnational activity overall. There is a high degree of encouragement for the use of funds for transnational activities and programme managers have a higher level of authority than the rest of Europe to enable this to take place. The region has fewer legal restrictions, greater participation in framework programmes and more programmes that include transnational research projects or mobility.

Central Europe

Central Europe has the fewest enablers supporting transnational activity and openness. It has significantly fewer explicit rules/instruments than the rest of Europe, particularly cross-border mobility/training and the use of evaluators from other countries. Programme managers have the least autonomy to adapt rules, the source of programme funding rarely encourages the use of funds for transnational activities and there is little encouragement from national researchers to allocate more funds to transnational activities. Administration systems in Central Europe are less able to cope with overseas currencies/contracts and the fewest benefits from transnational activity have been seen.

Eastern Europe

Influential decision makers in Eastern Europe are seen to support European collaboration. Despite legal restrictions on the funding of non-residents, there is a relatively high degree of funding for transnational projects and cross border training/mobility. Surprisingly, programme managers in Eastern Europe have not seen changes in national policy to encourage transnational activity. Also, few have the authority to adapt programme rules to allow funding of foreign researchers.

Southern Europe

Within Southern Europe, it appears that national and funding agency policy is changing, recognising the importance of and supporting transnational activity. This is supported by demand from national researchers for the participation of non-nationals and for more of the budget to be spent on transnational activities. Despite this, Southern European programme managers have relatively little experience of transnational activity or knowledge of national programmes in other countries. They are also the least able to adapt rules.

Relative importance by level of transnational activity

This analysis is particularly interesting as it highlights the activities undertaken by programmes that are actually involved in transnational activity and that must have overcome a number of barriers to do so.

Figure 29 analyses the enablers by the level of transnational activity, highlighting their relative importance.

ENABLERS	0% transnational	Less than 5% transnational	More than 5% transnational
Explicit rules / instruments	**19**	**66**	**42**
Explicit selection criteria that encourage transnational activity	11%	17%	55%
Participation of non-resident researchers encouraged	0%	12%	38%
Direct payment of non-resident researchers	0%	27%	31%
Use of evaluators from other countries	0%	47%	64%
Funding of transnational research projects	0%	56%	83%
Funding of cross-border technology transfer projects	0%	36%	40%
Cross-border mobility or training of researchers	0%	38%	55%
Lack of legal / political barriers			
No legal restriction on funding non-residents	26%	45%	60%
Financial administration systems designed to cope with non-national contracts and other currencies	21%	30%	60%
External influencers			
Links with multilateral framework programmes	0%	42%	43%
Influential decision makers see the value in additional European collaboration in the area of research or technology transfer	32%	64%	76%
Change in national policy to encourage more transnational activities within national research/related programmes	32%	44%	62%
Programme funding source allows, or encourages, the use of funds for transnational activities	16%	45%	64%
Insufficient volume of high quality project proposals from national applicants	0%	9%	19%
Demand from national applicants for inclusion of foreign partners	37%	33%	64%
Encouragement from national researchers to allocate more of the programme budget to transnational activities	16%	18%	50%
Programme owner interest / autonomy			
Sufficient knowledge of similar national programmes in other countries to engage in transnational cooperation	37%	36%	52%
Experience of pan-European collaborative programmes	16%	24%	48%
Has discretionary or delegated authority to adapt programme rules to allow the funding of foreign researchers	11%	30%	38%
Has discretionary or delegated authority to adapt programme rules to allow the funding of national participants in transnational projects or activities	32%	44%	55%
Has discretionary or delegated authority to adapt programme rules to set a dedicated budget for transnational activities	16%	32%	36%
Has discretionary or delegated authority to adapt programme rules to enable co-funding of transnational activities	16%	45%	50%
Positive prior experience			
Transnational features have resulted in tangible benefits	0%	61%	76%

Figure 29. Enablers analysed by level of transnational activity

This analysis clearly demonstrates that the presence of enablers is higher in every category for the more open programmes (ie those that spend more than 5% of the budget on transnational activities).

To ascertain which are the most significant enablers, we have looked at which have increased the most between those that have 0% transnational spend (closed) and those that spend more than 5% of the budget on transnational activities (open). The following enablers all show a prevalence differential of more than 50% between the open and closed programmes:

- Funding of transnational research projects
- Transnational features have resulted in tangible benefits
- Use of evaluators from other countries
- Cross border mobility or training of researchers

The following have also increased significantly, this time by between 40% and 50%:

- Programme funding source allows, or encourages, the use of funds for transnational activities
- Explicit selection criteria that encourage transnational activity
- Links with multilateral frameworks
- Influential decision makers see the value

Performance against 'best practice'

If we take the eight enablers that increase significantly within programmes that are more than 5% transnational to be good or best practice, we can compare country or country grouping performance against this. This reveals the following:

- Northern and Eastern Europe programmes have a closer match than Southern Europe programmes and particularly Central Europe, which has a low presence of enablers in the eight significant categories.
- Nordic countries have a comparatively strong performance within all categories in the 'best practice' profile.
- Germanic countries have a low presence of enablers on all eight significant categories. Benelux countries have a low presence in six of the eight categories.
- The 10 new EU members have a close match (7 out of 8). Candidate countries are weak on five out of eight.

APPENDIX K
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