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- Towards joint programming in research:
 - = Working together to tackle common challenges more effectively

Impact Assessment

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**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE
EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**TOWARDS JOINT PROGRAMMING IN RESEARCH :
Working together to tackle common challenges more effectively**

IMPACT ASSESSMENT

**{COM(2008) 468 final}
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1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Introduction

This Impact Assessment accompanies the Communication "Towards Joint Programming in Research", which is included in the Commission Legislative and Work Programme 2008¹ as one of the priority initiatives.² Towards Joint Programming (JP) is one of five policy initiatives planned by the Commission in 2008 as a follow-up to the Green Paper "The European Research Area: New Perspectives".³ It responds to the dimension "Optimising research programmes and priorities" referred to in that paper.

Conceived within the context of the revised Lisbon Strategy, JP is the process whereby Member States engage on a voluntary and à la carte basis in the definition, development and implementation of common research agendas addressing a specific field or specific topic. This can involve the coordination of existing national programmes, or the setting up of entirely new ones, putting resources together and collectively monitoring and reviewing progress. Through increasing and improving the cross-border collaboration, coordination and integration of Member States' publicly funded research programmes in a limited number of strategic areas, it aims to help Europe to boost the efficiency of public funding and to better address major societal challenges. The proposed approach is to promote JP through a high-level political process driven by the Member States, which would offer flexibility in terms of instruments, geometry, and the level of programme coordination and integration pursued. JP targets first and foremost public research programmes and thus public-public cooperation rather than public-private cooperation. However, industry may play a role in the implementation of particular JP initiatives.

1.2. Organisation and timing

Consultation with other Directorate-Generals was carried out through an inter-service group composed of DG Education, DG Energy and Transport, DG Enterprise, DG Information Society, DG Regional policy and the Secretariat-General. Set up in November 2007, the group met three times and provided contributions during the preparation of the impact assessment. In addition, bilateral contacts were taken with DG Economic and Financial Affairs, DG Environment and the Joint Research Centre.

1.3. Policy Background

For many years, the Community has made use of the various provisions of the Treaty⁴ in order to encourage greater coordination and cooperation in research in Europe. However, over the last 15 years, the political support for enhanced and better coordination of research activities in Europe has strengthened considerably, and has been reiterated many times by both the Council and the European Parliament.

¹ Commission Legislative and Work Programme 2008 COM(2007) 640 final, Brussels, 23.10.2007.

² 2008/RTD/035.

³ COM(2007) 161.

⁴ Notably, articles 165, 169 and 171 of the Treaty establishing the European Community, Official Journal C 325 of 24 December 2002

In 1993, the European Council adopted an action plan⁵ in response to the White Paper on Competitiveness, Employment and Growth⁶ which highlighted the lack of coordination of Europe's R&D activities, programmes and strategies, and recommended that measures should be taken to further effective coordination of these activities. The following year, the Corfu European Council concluded that particular emphasis should be given to reinforced coordination of research policy to give new impetus in the follow-up debate on the White Paper. It invited the Council to pursue a more systematic coordination of Community and national research policies and invited the Commission to take any useful initiatives to promote such coordination.⁷ This concern was also shared by the European Parliament, which adopted a resolution on the subject the same year.⁸

A new impetus came in the year 2000 when the Lisbon European Council in its endorsement of the Commission communication on the European Research Area (ERA)⁹ concluded that research activities at national and Union level must be better integrated and coordinated to make them as efficient and innovative as possible. They also stated that the instruments under the Treaty and all other appropriate means, including voluntary arrangements, must be fully exploited to achieve this objective in a flexible, decentralised and non-bureaucratic manner. The Lisbon European Council requested that the Council and the Commission, together with the Member States take the necessary steps as part of the establishment of a European Research Area to develop appropriate mechanisms for networking national and joint research programmes on a voluntary basis around freely chosen objectives.¹⁰ In the same year the Research Council held a debate in the light of the conclusions of the Lisbon European Council and the Commission Communication on ERA. The Ministers encouraged the networking of national and joint research programmes on a voluntary basis to take greater advantage of the concerted resources devoted to R&D in the Member States.¹¹ The Research Council also noted in the same year the importance for Member States of coordinating their R&D activities to ensure that national policies and Community policy were mutually consistent, and acknowledged the role that the Commission could play in promoting that coordination in cooperation with the Member States.¹²

In 2001, the Research Council considered that the use of Article 169 of the EC Treaty could lead to greater coherence and integration of national and Community programmes and research policies. The Council invited the Member States to identify possible specific topics for pilot programmes where the use of Article 169 would be appropriate, in close liaison, where necessary, with the Commission, and also invited the Commission to come forward by early 2002 with proposals to the Council and European Parliament for participation by the Community in any such pilot programmes.¹³ In 2002, the Competitiveness Council recognised the importance of the mutual opening of national research programmes and the need for more coordination between national research programmes, as well as between

⁵ Presidency Conclusions, European Council, Brussels, 10-11 December 1993. The Fourth Framework Programme for Research (1994-1999) was an integral part of the Action Plan.

⁶ COM(1993) 700, 5 December 1993.

⁷ Presidency Conclusions, European Council, Corfu, 24 - 25 June 1994.

⁸ COM(1994) 438 final, Brussels, 19 October 1994.

⁹ COM(2000) 6 final, Brussels, 18 January 2000.

¹⁰ Presidency Conclusions, European Council, Lisbon, 23-24 March 2000.

¹¹ 2272nd Council meeting (Research), Brussels, 15 June 2000.

¹² 2305th Council meeting (Research), Brussels, 16 November 2000.

¹³ 2380th Council meeting (Research), Luxembourg, 30 October 2001.

national and Community programmes, and indicated its support for the use of Article 169.¹⁴ As a result, CREST launched five pilot actions for the mutual opening of national programmes. These actions were subsequently transformed into ERA-NETs, but the need for a framework for further discussion on mechanisms was recognised.

In 2004, the Competitiveness Council acknowledged the widespread interest in the ERA-NET scheme and encouraged the Commission to further develop it in FP7, supplemented by a new ERA-NET Plus tool which would allow the Community to top-up Member States joint calls with EU funding. The Council also invited Member States and the Commission to identify a limited number of areas for further application of Article 169.¹⁵ In 2005, the Presidency invited Member States to set priorities together, to define which national programmes should be co-ordinated and to consider the need for developing together a European strategy.¹⁶

In 2006, the European Parliament put emphasis on better coordination of regional, national and European research programmes and policies in its proposed amendments. Their report on the FP7 proposal recognised that fragmentation was a major obstacle to the success of the European research agenda, and suggested that *"...it is vital that the Seventh Framework Programme should support the coordination of national and regional research policies and programmes"* and that in order *"to avoid fragmentation and overlapping competencies, there should be more cooperation between national and European research programmes, and between economic actors in the long-term research agenda."*¹⁷

In 2007, the Competitiveness Council invited Member States to *"encourage Research Councils and National Funding Agencies in Member States, as well as intergovernmental European Research Organisations, to expand their collaboration and to devise innovative forms of pooling together their expertise and resources on a mutual voluntary basis for joint objectives"*,¹⁸ and called on the Commission to catalyse progress whenever appropriate.¹⁹ In February 2008, the Competitiveness Council adopted a key issues paper²⁰ to be submitted to the 2008 Spring European Council encouraging the Commission and Member States *"to continue developing initiatives for joint programming of research in areas where this approach is appropriate, allowing a more strategic and better structured approach to the launch of new joint programmes and common calls for projects from the end of 2010"*, and it welcomed the Commission's intention to present a communication on JP in 2008.²¹ Again, in March 2008, the European Council urged the Member States and the Community to make swift progress on further initiatives for JP of research, mutually complementary international

¹⁴ Informal ministerial meeting of Industry and Research Ministers in Girona (Spain) in February 2002 and conclusions from the 2467th Council meeting (Competitiveness), Brussels, 26 November 2002.

¹⁵ 2605th and 2624th Council Meetings (Competitiveness), Brussels, 24 September and Brussels, 25 and 26 November 2004.

¹⁶ UK Presidency Conference, Conference on the coordination of national research and development, Manchester, 21 October 2005.

¹⁷ **Report** on the proposal for a decision of the European Parliament and of the Council concerning the seventh framework programme of the European Community for research, technological development and demonstration activities 2007 to 2013, (COM(2005) 0119 – C6-0099/2005 – 2005/0043(COD)) Committee on Industry, Research and Energy. Rapporteur: Jerzy Buzek. A6-0202/2006 (final), 1 June 2006.

¹⁸ These might include R&D infrastructures, collaboration in the creation and strengthening of pools of excellence of critical mass, the full internationalisation and/or shared approaches to research evaluation across Europe and to the encouragement of broader competition for research funding at national level.

¹⁹ 2832nd Council meeting (Competitiveness), Brussels, 22 and 23 November 2007.

²⁰ Council document 6933/08, Brussels, 26 February 2008.

²¹ 2852nd Council meeting (Competitiveness), Brussels, 25 February 2008.

S&T cooperation strategies and the strengthening of research infrastructure of pan-European interest.²²

The above list of declarations and actions demonstrates the clear and long-standing political support for the improved coordination of research activities in Europe. As will be shown in the next section, there is also a strong and sustained stakeholder support for initiatives in this direction.

1.4. External consultation and expertise

In developing the Communication and the impact assessment, the Commission services consulted stakeholders and drew upon external expertise in the following ways:

- an open consultation was carried out on the "The European Research Area: New Perspectives" Green Paper,²³ which included detailed questions relating to the optimisation of research programmes and priorities through JP type activities;
- an expert group was set up to deliver analyses and views concerning the optimising of research programmes and priorities for the development of the ERA;²⁴
- a dedicated debate on the same topic was held at the Portuguese Presidency conference "The future of Science and Technology",²⁵
- and views expressed in a variety of other public consultations and opinion surveys relating to science and technology and research policy issues were analysed and taken into account.

1.4.1. Consultation on the ERA Green Paper - Stakeholders' opinions concerning JP

The open consultation on the "The European Research Area: New Perspectives" Green Paper invited responses on a number of issues relating to optimising research programmes and priorities in Europe and the importance of JP type activities. The consultation gave stakeholders the possibility to respond in two ways - via an on-line questionnaire and via more detailed position papers (for a more detailed analysis of the findings see Annex 1).

Views expressed in the position papers

Table 1 summarises the opinions expressed in the position papers responding to the ERA-Green Paper consultation on the topics related to research coordination (see Annex 1). There was a general convergence in the opinions of the different groups of stakeholders, with some divergences on certain specific issues. All more or less agreed on the principal issues of fragmentation and the need for coordination, as well as the importance of shared principles

²² Presidency Conclusions, European Council, Brussels 13 and 14 March 2008.

²³ COM(2007) 161, Brussels, 4 April 2007.

²⁴ The work of the ERA expert group on "*Optimising public research programmes and priorities*" was carried out in 2007-2008 and relates to the core objective of JP, i.e., to ensure effective European-level coordination of national and regional research activities, programmes and policies, especially on issues of European interest.

²⁵ Held in Lisbon on the 8-10 October 2007, the conference was a key stakeholder event that brought together nearly 500 representatives of the MS, industry, academia, and civil society and was jointly organised by the Portuguese Presidency of the EU and by the EC DG-Research. One session was dedicated to the limitations and enabling factors of national research programme coordination.

for evaluation, peer review, accountability, etc of public research programmes. There was also a high level of consensus that JP should be focussed on societal issues. Foresight and participative processes or platforms - such as European Technology Platforms adapted to societal issues - were suggested as approaches for identifying the areas for JP. No particular instrument or mechanism was favoured, but flexibility, variable geometry and bottom-up processes were stressed. Some fear was expressed concerning too prescriptive models dictated by the Commission. The favoured role of the Commission was that of facilitator and soft coordinator.

Table 1 : Stakeholders' positions relative to JP

| Questions / Issues | Member States | Funding agencies | Higher Education Institutions | <i>Other publ. sector R&D performers</i> | Business organisations |
|--|--|---|--|---|--|
| Challenges & priorities | Focus on societal challenges and issues , e.g., climate change, health, food, energy and globalisation (also long-term priorities, and focus on strategic/emerging areas and own strengths.) | (long-term orientation, optimising general conditions for science) | Society driven research, e.g., ageing | (Societal issues related to the maritime world, e.g., management of natural and living resources, climate change, marine energy, ...) | Mainly societal issues with European added value ; (focus on critical mass in areas related to competitiveness) |
| Coordination / fragmentation | Need for coordination especially linked to common challenges, but with the reserve that diversity must be preserved. Fragmentation recognised as a problem in certain areas | (yes) | Little recognition of fragmentation as a problem | Coordination through selective, stepwise approach respecting subsidiarity principle , Fragmentation a real problem, but diversity also positive (protected national systems limiting competition as much a problem as fragmentation) | Fragmentation and duplications recognised as problematic |
| How? - Identification of areas/topics for JP | Engagement of civil society and "users" through foresight and other participative processes emphasised; Impact assessment and evaluation also seen as important (IPCC pointed to as model). | Stepwise ; not just foresight but also high-level workshops; mix bottom-up with top-down approach | ETP type platforms adapted for societal issues | Strong support for Foresight, Technology Platform and ESFRI inspired activities; CREST could play a role. | Further development of ETPs strongly supported, also other participative and exploratory forums; user focused research emphasised |
| How? - Common principles for peer review, quality and joint evaluation, as well as the accountability of public research funding? | Importance of shared principles through bottom-up approach and sharing of best practice but divergence on degree of centralisation . | Yes , through flexible bottom-up approach ; helps assessing the European added value and advancement of ERA | Yes : to be developed through bottom-up approach rather than top-down approach (building on ERC experience) | Yes, would provide synergies and increase competition ; better policymaking (through common indicators) | Strongly supported , to increase effectiveness and efficiency of R&D system although voluntary approach favoured |
| How? - National programmes opened to participants from other Member States? | YES: Especially for "curiosity driven"/basic research and in areas of common interest. | (Yes), through step-wise approach | (Yes, if in partnership with national research groups) | Mixed; common pots would increase competition but not always appropriate or feasible ; on voluntary basis. | YES ; through gradual approach ; (support to opening to third countries on a reciprocal basis) |
| How? - Most appropriate instruments? | Support for existing instruments (Article 169, ERA-NET, etc); need for better use and evaluation of existing ones before new ones are introduced - too many instruments risks creating fragmentation | (combination of national and European evaluation and funding); (ERA-NET scheme needs more coherence and consistency) | Divergence in preferences from public-private "Knowledge and Innovation Centres" led joint programmes to OMC | ERA-NET good but not sufficient; flexible and variable geometry schemes needed; bilateral cooperation as starting point for multi-lateral cooperation; | Development of existing instruments rather than new one, especially make ERA-NET Scheme more effective |
| How? - Role for EC/Commission? | Commission to act as a facilitator; Case- by-case approach to JP on a voluntary and variable geometry basis; importance of OMC stressed | (EC as coordinator and facilitator of European research policy; more coordination of initiatives in place) | EC should help to join identification and to agenda-setting for society-driven and coordinate national funding of research to mobilise critical mass | EC to act as facilitator and coordinator of actions and priority setting | (facilitator) The role of demand oriented policies and public procurement stressed; closer links between research and innovation needed |

() = limited number of answers. *Source: "The European Research Area: New Perspectives" Green Paper open consultation position papers.*

Position papers were also received from European institutions. The European Parliament considered that it was appropriate to implement reciprocal opening of national programs to participants from other Member States, especially in frontier research.²⁶ It also considered it a step forward to exchange information on existing national programs and to encourage evaluation of national research activities by international panels. The Parliament considered variable geometry mechanisms suitable to develop adequate flexibility in the realisation of thematic programs. It believed that actions should be taken to update existing forms and instruments of cooperation, including COST and EUREKA, and to adapt them to the ERA perspective, and that the priorities for public research funding should be based on a broad approach, incorporate long-term strategies and involve both public and private stakeholders.²⁷

The European Economic and Social Committee indicated that it was in favour of open coordination based on a bottom-up approach and rejected any far-reaching attempts to apply top-down coordination and standardisation. It also emphasised the need for a plurality of methods, approaches and choice of issues.²⁸ The Committee of the Regions put forward a similar opinion.²⁹ It emphasised the role of regional and local authorities in the coordination of research activities. The Committee endorsed the ERA-NET scheme and believed that it should be developed further, but regretted that "social platforms" were not addressed in the ERA Green Paper, which it considered "a genuine innovation [...] to formulate and implement strategic research efforts around major challenges facing European society, e.g. the environment, ageing population and integration."³⁰

Responses to the on-line questionnaire

The responses to the online questionnaire (see annex 1) confirmed the opinions provided through the position papers. The overwhelming majority respondents were in favour of increased coordination through joint research programming activities, especially as far as the identification of future research challenges and opportunities was concerned (Figure 1). Although both small and large company respondents strongly supported the coordination of programming activities (88% and 82% respectively), small firms were much less favourable to a structured dialogue at the EU-level, which might be explained by their more limited capacities to participate in such dialogues. Governmental bodies were also highly supportive

²⁶ European Parliament, Committee on Industry, Research and Energy. Draft Report on Commission Green Paper "The European Research Area – New Perspectives", 26 August 2007.

²⁷ *"This New Deal would involve a more ambitious approach towards the realisation of the ERA. Unlike the original initiative, it does not simply promote the establishment of links between existing European S&T players, each with their own existing roles and responsibilities. [...] It could mean an expansion of national or regional activities in some areas or it could lead to an increase in EU-level actions in others. It may even result in a need to build new, common European S&T institutions, looking at organizations like CERN and ESA, good examples of success stories. The New Deal would mean preparing these decisions together based on solid, shared evidence, and bravely facing the changes. The EU ability to do so could herald a new phase for European research."* Ibid, p. 12.

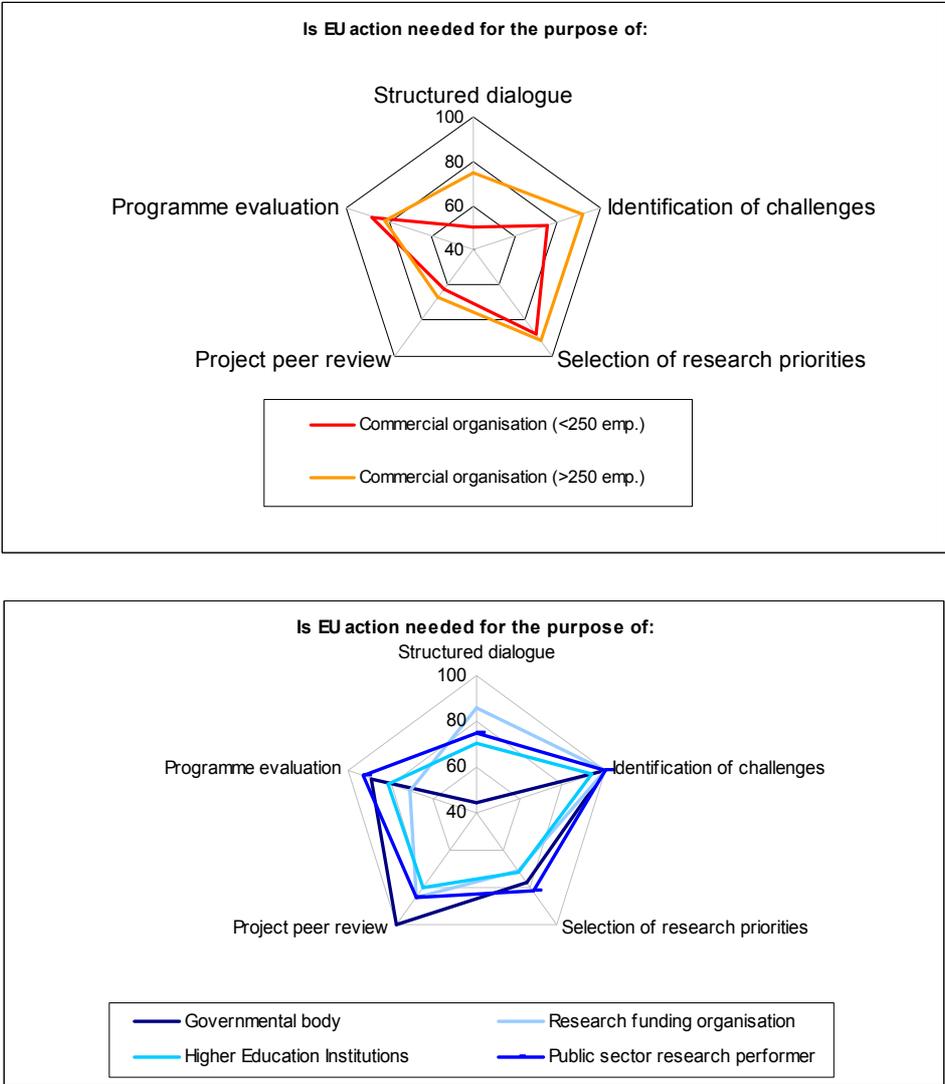
²⁸ Opinion of the European Economic and Social Committee on the Green Paper "The European Research Area – New Perspectives", INT/358, Brussels, 24 October 2007.

²⁹ The Committee of the Regions stated that "the EU should only legislate where this appears indispensable to the creation of a European Research Area and where coordinating measures, inter alia under the open method of coordination, are not sufficient. Beyond this, the Committee continues to reject any centralised planning at European level; supports the idea of coordination of regional and national research programmes and priorities". Opinion of the Committee of the Regions on Commission Green Paper "The European Research Area – New Perspectives", EDUC-IV-011, 10-11 October 2007.

³⁰ Ibid, p. 7.

of stronger coordination action, especially in basic research, favouring a more bottom-up approach.

Figure 1: Responses of R&D Actors to the question "Do we need to work together, more closely, at EU level"

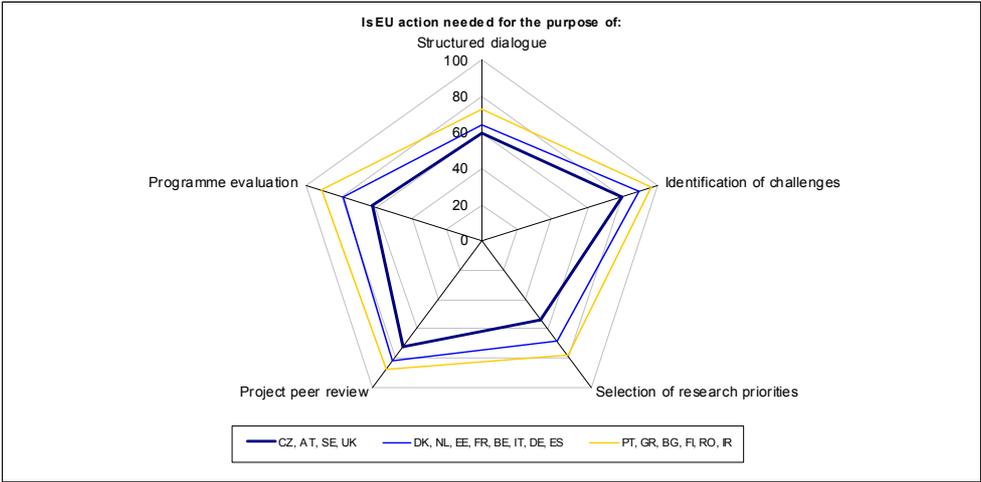


Source: "The European Research Area: New Perspectives" Green Paper open consultation on-line responses.

An analysis by nationality of respondents also revealed some interesting differences. Respondents from a cluster of large member states (Germany, France, Italy, Spain and Poland) together with Belgium, the Netherlands, Denmark and Estonia showed a marked support for several aspects of JP. In particular, the need for EU action in the field of the identification of challenges was supported by almost 90% of the respondents in this cluster. There was very strong support for EU action in the field of project peer review (82%) and programme evaluation (79%). The selection of the research priorities and the structured dialogue also received significant support (69% and 65% respectively). Respondents from a second cluster of small and medium-sized member countries (Portugal, Greece, Finland, Ireland, Bulgaria and Romania) indicated a strong support for JP. Over 96% considered that EU action is needed in the identification of challenges. Project peer review and programme evaluation also scored very high (88 and 91% respectively). Finally, the support for increased

cooperation was less marked amongst respondents from a third group of countries consisting of Sweden, the UK, Austria and the Czech Republic. Here too, however, support for EU action in the identification of challenges (80%), Project peer review (72%) and Programme evaluation (62%) was substantial. The pattern of responses indicates that the size of the country and the relative strength in research might influence the views of the stakeholder with respect to the potential benefits from the coordination of national programmes.³¹

Figure 2 Responses of the Member States to the question "Do we need to work together, more closely, at EU level"



Source: "The European Research Area: New Perspectives" Green Paper open consultation position papers.

1.4.2. Experts' opinions on JP

The expert group on "Optimising research programmes and priorities for the development of the ERA" was set up to debate the issues related to the coordination of national research effort. It concluded that "today's fragmented and sub-critical research efforts need an optimised framework for the funding and execution of research", and that "coordination and cooperation between research and technology policies and programmes in Europe presents a huge opportunity for mobilising the research potential, capacities and capabilities across all European regions". The expert group recommended that the Member States, under the aegis of the Competitiveness Council, should develop a common vision with priorities for trans-national research; establish a common set of principles and operative guidelines, as well as eliminate legal barriers and administrative obstacles for trans-national collaboration; implement more strategic, sustainable and efficient trans-national programming and coordination of national research programmes, using differentiated approaches for frontier science, applied research and societal research; and, ensure the involvement of programme owners and managers and other research actors in the whole policy design and implementation process. The expert group also recommended that the Commission should evaluate all ERA mechanisms individually and systemically to support the development of a common set of principles and operative guidelines (in what it terms the "ERA-Frame"); that it should, together with Member States and stakeholders, provide common guidance and tools

³¹ Countries with less than 5 participants in the survey were omitted.

for the implementation of each of the different ERA mechanisms; and, that it should promote and disseminate best practices and results from trans-national coordination and JP.³²

Another important debate on the issues relating to research coordination in the ERA took place at a major conference in Lisbon organised by the Portuguese Presidency in the autumn of 2007. A session dedicated to optimising research programmes and priorities concluded that it is now up to the Member States to move, by developing a strategic policy framework. This framework should determine which policy actions should be done regionally, nationally and/or internationally. Principles such as variable geometry and subsidiarity should be an integral part of this strategy. The session also concluded that there is a need for a high level process and platform to discuss these national strategies and the European vision or long term strategy that transpires from these. Participants felt that there was no one-size-fits-all approach to JP - different types of research have different dynamics and drivers; that serious legal, administrative barriers still hamper the process of JP, opening up programmes and policy coordination, and that a lack of political will at the Member State level is preventing these forms of coordination to be taken a step further. A plethora of instruments already exists, as do successful examples of trans-national cooperation. Learning from the evidence of current mechanisms should be made before introducing new ones, and too many instruments may cause further fragmentation. There was also a general agreement of the need to move swiftly - that time is of essential importance and any process of strategy formulation and vision building should not hold up actions in the short term.³³

1.4.3. Stakeholders' opinions on the key role of research and the need for enhanced coordination

As well as examining the responses from the open consultation on the ERA Green Paper, an analysis was also made of a variety of other public consultations and opinion surveys in which citizens, policymakers and other stakeholders expressed their views on matters relating to the role of research in addressing Europe's societal challenges, and the need for enhanced coordination of public R&D in Europe (for detailed findings see Annex 2).

These sources show that citizens, policymakers and other stakeholders are of the view that the challenges requiring coordinated European action are increasingly societal and cross-border in nature. There is also a strong consensus that research can play a significant role in facing these challenges which correspond closely to the concerns of citizens.

There is also clear and general support for joint EU-level action to improve the coordination of public research efforts, and in particular the coordination of national programmes which many believe can increase the efficiency of the overall EU research system.

1.4.4. Summary of the stakeholders' opinions

Four main messages emerge from the opinions expressed by stakeholders and experts, which can be summarised as follows:

³² Expert group on "Optimising research programmes and priorities for the development of the ERA" Final Report, Brussels, 26 February 2008.

³³ Session on "*Optimising research programmes and priorities*", "*The future of Science and Technology*" Presidency Conference, Lisbon, 8-10 October 2007 (rapporteur P. Boekholt, director Technopolis Group).

- (1) There is very strong support for the identification of future research challenges and opportunities through foresight, as well as the use of "Social Platforms" (in analogy with Technology Platforms). In the areas identified as being of common interest, there is a broad consensus on the necessity of launching joint foresight and joint evaluation before launching new targeted policy initiatives.
- (2) There is a need for more efficient, effective and strategic coordination of Member States' research programmes, especially for tackling common societal challenges. Stakeholders agree that addressing resource-intensive and complex scientific challenges requires cross-border cooperation between public authorities. Reinforced coordination of national programmes and targeted joint actions are considered as a mechanism for realising the ERA.
- (3) A voluntary, bottom-up approach coupled with strategic top-down guidance is considered indispensable for ensuring flexibility and customisation to programme specificities. Stakeholders also stressed the need for a differentiated approach to coordination on a case-by-case basis respecting the principles of subsidiarity, variable geometry and real European added value. There was support for shared and transparent principles for funding and evaluation; too rigid top down EC level coordination was not favoured, as it could reduce positive competition and diversity.
- (4) A one-size-fits-all approach is rejected; a majority of the stakeholders agree that specific research areas demand specific modes of cooperation and tailored instruments. For instance, for basic/curiosity-driven research there is strong support for the opening up of national programmes. The appropriate use of existing instruments (e.g., ERA-NETs, ERA-NET Plus, Article 169, JTI, OMC, creation of new European research institutes, etc.) in specific areas is preferred to inventing new ones.

1.5. Opinion of the Impact Assessment Board

The draft Impact Assessment was submitted to the Impact Assessment Board on 14 April 2008. It issued its opinion on 14 May 2008. In addition to some technical comments, the Board made several substantial suggestions for improvement. These comments have been taken into account in the following way:

- The options section 4 has been further developed in order to make the differences between the options more distinct, including with regard to the role of the Community and the Member States, and the selection of themes and instruments under option 4.
- A more detailed explanation has been provided in sections 5.8 and 6 on how the preferred option addresses the reluctance of public bodies and other stakeholders to take forward the integration of national public research programmes.
- Further clarification has been introduced in section 2 and 6 regarding the issue of collecting information on national programme activities.

2. PROBLEM DEFINITION

2.1. Europe's societal challenges and the role of research

2.1.1. Research can contribute to tackling Europe's societal challenges

Europe will face a substantial number of major societal challenges in the coming years: from boosting economic growth and competitiveness to tackling climate change and securing its energy supply. The challenges referred to in the Commission consultation paper adopted in view of the 2008/2009 budget review include increased global competition; the transformation to a knowledge and service economy; demographic sustainability; social justice; climate change; secure, sustainable and competitive energy; migratory pressure; and security and safety.³⁴

Research has a pivotal role to play in addressing these priorities on the EU agenda in the coming decades, precisely because science and technology can help provide solutions to all of the major challenges facing the EU. For example, in the new global landscape, with emerging economies such as India and China increasingly competing not just on price but also in terms of innovative products, science, technology and innovation will be the main engines of Europe's economic growth and competitiveness. When it comes to tackling public health and other social challenges - including the consequences of an ageing population - science and technology can also help through developing new medicines and treatments, improving prevention and diagnosis, and delivering better treatments for age-related illnesses. And in finding solutions to the problems of energy supply and environmental degradation, S&T will play a key part, for example, through providing new technologies for reducing energy consumption, and through developing new energy sources.

2.1.2. The need to raise S&T performance by investing more efficiently and effectively

A pre-condition for Europe to be able to meet these societal challenges is that its research system must be capable of producing results of the highest standard. However, Europe's performance in science and technology presents a mixed picture, and in many important areas it needs to raise its level if it is to meet the major challenges it faces. To do this, it will have to adopt a two-pronged strategy: it must try to stimulate higher levels of investment in R&D, and it must try to use this investment more efficiently and effectively. The societal nature of the challenges moreover implies that the public sector must take the lead.

The first of these strategies – investing more – has proven extremely difficult in practice. Europe is currently under-investing in research compared with its main partners. Although the 3% target for R&D spending has been a major EU goal since 2002, research spending has largely stagnated over the past decade. In 2006, the EU27 spent 1.84% of GDP on Research & Development (R&D). In 2000, R&D intensity for the same EU27 countries was 1.86%³⁵. The part funded by government has also been flat over the same period, with Member States unable to expand their R&D budgets significantly owing to macro-economic pressures. At the same time, Europe's share of global R&D spending is falling, as new research-intensive

³⁴ SEC(2007) 1188 final, Brussels, 7 July 1997.

³⁵ Eurostat, Gross Expenditures on Research & Development (GERD) data.

countries emerge on the world stage. The share of EU-25 in the R&D expenditure of a set of major 20 OECD and non-OECD economies declined from 28.9% in 1995 to 25% in 2005.

If Europe cannot rapidly increase spending on research, then it must pursue with even more vigour the complementary strategy of trying to make better use of its scarce R&D resources by investing them more efficiently and effectively. In this context, the public sector has an important role to play by seeking, against the background of budgetary restraint, to increase the return on public R&D funds.

There are many ways of trying to boost the impact and efficiency of public R&D, and Member States have pursued numerous approaches in recent years. However, as the next section will show, one of the paths which has been under-exploited and which offers great potential gains relates to improving the organisation of Europe's public R&D investment through increased cross-border programme collaboration and coordination.

2.2. The need to improve the organisation of Europe's public R&D investment

2.2.1. Performance in key S&T fields is not just a matter of levels of investment

In some fields of research, under-investment in R&D compared with its global partners, may be part of the reason for Europe's weaker performance. Yet raising levels of public investment has proven difficult, as outlined above. However, in other fields Europe is investing generously by international standards, but it is still lagging when it comes to the impact of this research. In both cases – where there is under-investment and where funding is adequate – if S&T performance is weak then this will make it more difficult for Europe to tackle the challenges it faces. The solution lies in trying to get more out of the research system by improving the organisation of Europe's public R&D investment

The most obvious example of an S&T field particularly affected by public R&D underinvestment is health research, in which the US spends more than twice as much as Europe relative to GDP, and almost three times as much when measured relative to the size of the respective populations.³⁶ It is no surprise then that in these areas, Europe's S&T performance lags behind that of its main partners. For instance, while the number of European scientific publications in the field of medicine is comparable to that of the US, they receive far fewer citations.³⁷ Another field where Europe budget is far below the public funding in US is biotechnology. In 2005, the total public funding of biotechnology in all 32 European countries amounted to 4 077M PPP\$ (€3 540M) while federal public funding of biotechnology in the United States amounted to 23 200M PPP\$, which is more than five times more than Europe's funding.³⁸ Not surprisingly, at both the European and the US patent offices, the US seriously outperforms Europe in terms of biotech patents.³⁹

³⁶ Public R&D investment in the field of health amounts to 0.14 % of GDP in Europe but no less than 0.33 % of GDP in the US (European Medical Research Council White Paper 2007, European Science Foundation).

³⁷ *Science & Innovation Investment Framework 2004-2014: Next Steps*. A report by the Department of Health, the Department for Education & Skills, the DTI and HM Treasury, March 2006. *The pharmaceutical industry in figures*. A report of the European Federation of Pharmaceutical Industries and Associations (EFPIA), June 2006.

³⁸ BioPolis, Final Report, March 2007, pp. 52-53.

³⁹ European Commission, *Europe in the global research landscape*, 2007, p. 57.

However, there are counter-examples of S&T fields addressing societal challenges where the problem does not appear to be one of resources and where Europe's public sector appears to be investing (almost) as much as or even more than its main partners. In those fields, however, Europe does not appear to perform as well as or better than its partners, which given comparable or higher levels of funding one would expect.

For instance, in 2005, government budgets for environmental research ("control and care of the environment") amounted to €2.2 billion in Europe, compared with €0.5 billion in the US.⁴⁰ In the same year, government budgets for energy research overall ("production, distribution, and rational utilisation of energy") amounted to €2.2 billion in Europe, compared with €1.2 billion in the US.⁴¹ In specific energy research sub-fields as well, the public sector invests substantially more in Europe than in the US.⁴² For example, the public sector invested about 350 million Euro in hydrogen and fuel cell research in Europe, and about 240 million Euro in the US in 2005. However, in terms of performance Europe needs to do better. In hydrogen and fuel cells research, Europe is leading in terms of scientific publications in the fields of 'hydrogen production' and 'hydrogen storage', but while in the former the gap with its nearest competitor (US) is still comfortable, in the latter the gap with its nearest competitor (China) is very small. And in the field of 'fuel cells', Europe has already been overtaken by the US in terms of scientific publications. In terms of patents, Europe is seriously outperformed by the US and Japan as far as both 'conversion and utilisation' and 'hydrogen production' are concerned.⁴³ In bioenergy, the average level (from 2000 to 2004) of Europe's public RTD funding has been a third higher than that of its main competitor, US. However, while US are heavily focused on a limited number of projects such as integrated bio-refineries with greater chances of success, European research, despite some countries being very active, appears still "random" and ends up delivering fewer results in return.

Another example is in the field of nanotechnologies, where European public research funding is almost comparable to that in the US. In the period 2004-2006, European public funding in the field of nanotechnology, was even higher in Europe (4.7 billion Euro) than in the US (3.8 billion Euro) with Germany as top spender, followed by France and UK.⁴⁴ Yet, since 2002, Europe's leading position in nanotechnology publications is weakening in relation to the US,⁴⁵ and there is also clear evidence that the US is outperforming Europe in terms of nanotechnology patents.⁴⁶ For example, the top ten patenting institutions at the US Patent and

⁴⁰ Eurostat, Government Budget Appropriations or Outlays on Research & Development (GBOARD) data
⁴¹ Ibid.

⁴² In photovoltaic research, the public sector invested about 110 million euro in Europe compared with about 55 % of that amount in the US. In biomass-bioenergy research, the public sector invested about 103 million euro in Europe, or about 50 % more than in the US. The European public sector invested about 100 million euro in CO₂ capture and storage research, and the US one about 50 million euro. In wind research, Europe's public sector investment was about 57.7 million euro compared with 32.1 million euro by the US one.

⁴³ HY-CO (ERA-NET), Report on indicators of hydrogen and fuel cells research, 27 September 2006, p. 33.

⁴⁴ Angela Hullmann European Commission, DG Research, Unit "Nano S&T - Convergent Science and Technologies", November 2006.

⁴⁵ European Commission, *Europe in the global research landscape*, 2007, p. 45.

⁴⁶ Ibid, p. 46; OECD, Compendium of Patent Statistics, Paris, 2007; Masatsura Igami and Teruo Okazaki, Capturing Nanotechnology's Current State of Development via Analysis of Patents, in: *STI Working Paper 2007/4*, OECD, Paris, 2007.

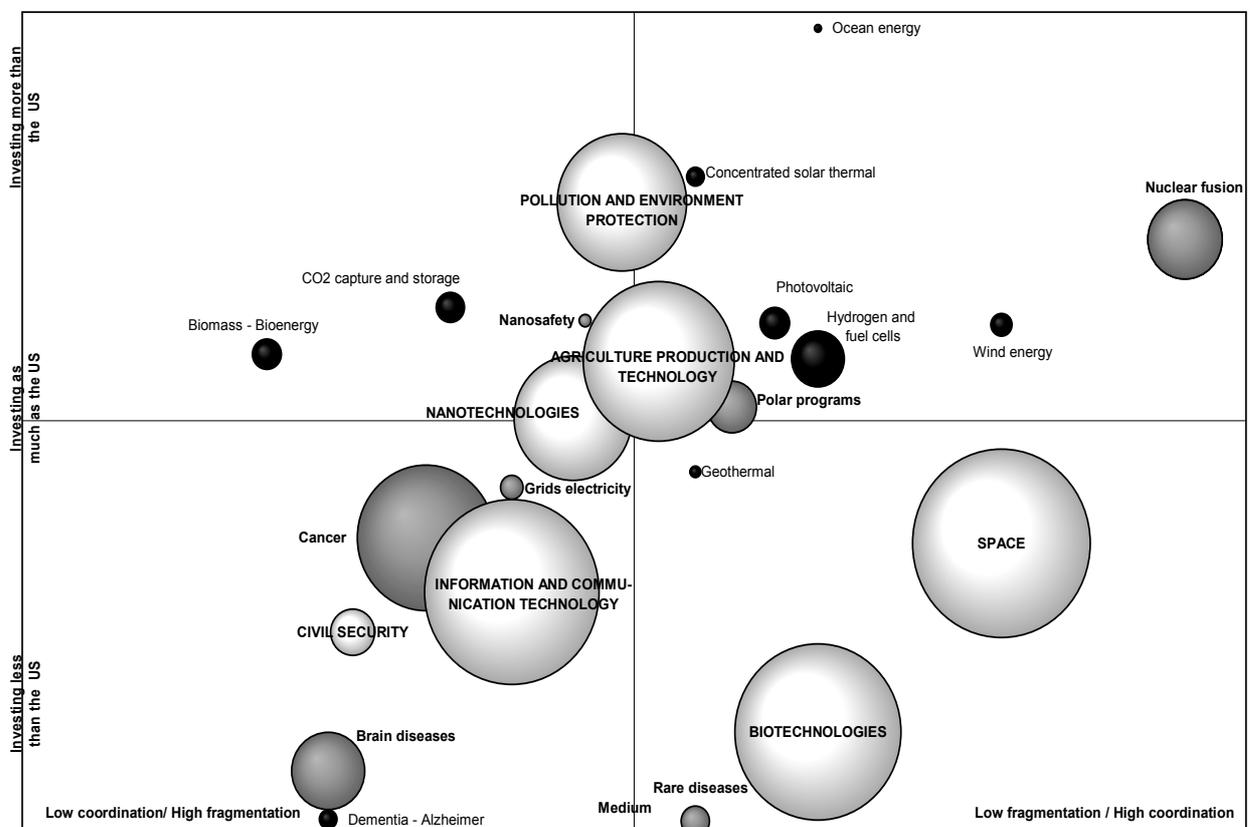
Trademark Office are all from the US, and only four of the institutions in the European Patent Office top ten are from Europe.⁴⁷

S&T fields differ hugely in terms of, for example, the amount of R&D invested, the degree of existing coordination/fragmentation and performance – and there is no straightforward linear relationship between these factors. The graph below shows the size of public funding, an assessment of the degree of coordination/fragmentation at European level, and the relative size of European public funding compared to the US for some S&T fields.

The graph below (Figure 3) is not exhaustive, but serves to illustrate that each S&T field is unique and requires its own tailored approach to Joint Programming, the development of which should be evidence-based and grounded in the strategic analysis of detailed information on respective S&T fields.

This will require the full involvement of Member States.

Figure 3 A scattered public research in the European Research Area



X-axis: This estimates the degree of coordination among Member State (MS) research programmes and of funding and institutional fragmentation, based on qualitative assessments from scientific publications, strategic reports, etc;

Y-axis: This presents the logarithmic ratio of public R&D investment in Europe (MS+European Commission (EC)) compared to US,

Size of bubbles: This is directly proportional to the amount of European public funding (MS+EC), based on New Cronos (e.g. GBAORD) and US government data as well as scientific publications

⁴⁷ Hsinchun Chen, Mihail C. Roco, Xin L. and Yiling Lin, Trends in nanotechnology patents, In: *Nature Nanotechnology*, Volume 3, March 2008.

2.2.2. Europe's S&T performance can be improved by better organising public R&D investment

The above examples indicate that raising levels of public investment should not be the only solution to improving Europe's performance in S&T. In those fields where R&D is generously provided for, but where Europe's performance shows cause for concern, there is reason to explore how these funds can be spent more efficiently and effectively. This is even more the case in those low-performing areas where public research investment is too modest by international standards, and where it is difficult for governments to radically increase funding.

There are of course many factors that Europe could try to tackle to boost its performance in certain areas, and which it might try to tackle. These include, for example, problems related to the transformation of research results into marketable products and services, or to the governance of research institutions, notably universities, and their systems for managing research. However, a glaring weakness relates to the way it organises its public R&D investment, and more specifically the lack of cross-border programme collaboration and coordination. Today, barely 15 % of European publicly financed civil R&D, and less than 6% of total R&D investment is financed in partnership and coordinated at European level (see Figure 4). This is done mainly through the Framework Programme (FP) and other Intergovernmental schemes (see Annex 3). Additional coordination of industry financed R&D takes place through exclusively private joint ventures as well as through the newly introduced Joint Technology Initiatives. In addition, the Framework Programme indirectly coordinates part of the industry financed R&D through its leverage effect, by requesting that private companies co-finance publicly supported research projects.⁴⁸ JP nevertheless targets that 85% of government financed R&D which is currently programmed, financed, monitored and evaluated in a nationally fragmented landscape.

As seen in Section 1, key stakeholders have identified this lack of collaboration and coordination of public R&D investment as one of the most important problems currently affecting Europe's capability to address societal challenges. Within the context, of the ERA Green Paper stakeholder consultation, for instance, 80% of respondents agreed that addressing resource-intensive and complex scientific challenges requires cross-border cooperation between public authorities.

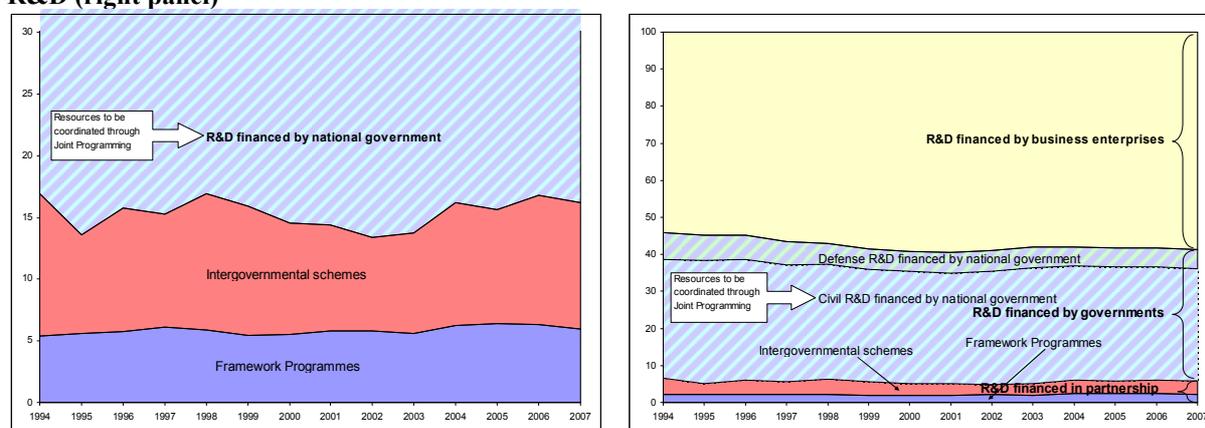
And in fact, when one looks at particular S&T fields, there is substantial evidence of institutional, programme, procedural and other kinds of diversity and a lack of joint agenda setting and coordination. While diversity can be considered an asset, research practitioners have identified the lack of coordination as a problem in a wide range of S&T fields. For example, it has been noted that research into ageing "*seems to be well established though not nationally coordinated [...] and there is an urgent need to plan and coordinate it strategically*

⁴⁸ Other schemes, such as COST, ESF also play an important coordination role, but they do not directly finance R&D investments. The Structural Funds too provide a significant amount of funding to RTD related activities: 13 billion euro in the period 2000-2006 and 50 billion euro for the period 2007-2013 (roughly as much as the 7th Framework programme). The bulk of the funding has a strict geographical distribution and is non-coordinated between Member States. However, a smaller part, is dedicated to regional cooperation activities - many linked to different aspects of the programming cycle; 292 million euro in the period 2000-2006, which will increase to 842 million in the period 2007-2013, i.e., an average of 120 million per year. Since these funds are transferred and administrated by national/regional authorities, however, they are included in the public financed civil R&D. Additional information on the statistical sources and methodology to construct the above estimates is provided in Annex 3.

at the national as well as the European level".⁴⁹ Similarly in the area of hydrogen and fuel cells it has been observed that "the EU25+ is spending too much on research into stationary applications, and not enough on research into hydrogen production, storage and distribution and portable applications. [...] cooperation between small research programmes in different countries can deliver benefits to the EU25+ as a whole by efficiently allocating resources according to which areas require further research"⁵⁰. As highlighted in the previous chapters, coordination problems have been found in numerous other research fields, for instance in cancer, Alzheimer, rare diseases, biodiversity, climate change assessment and adoption, marine pollution, bioenergy, organic food & farming, industrial technology, security and transport. In cancer research, for example, two agencies in the US (NCI and NIH) provide 85% of total public funding (equal to 4.5 billion dollars) whereas Europe has many governmental agencies as funders, each providing on average 30-35 million euros. In the field of Alzheimer, the National Institute of Ageing funds a large part of public research in the US, whereas in Europe there is no similar institutional driving force.⁵¹

This lack of pan-European cross-border programme collaboration and coordination is giving rise to a number of serious problems. From a pan-European perspective, European research efforts often unnecessarily duplicate each other and/or they lack the required programme scope (some topics are not researched at all) and scale or depth (insufficient resources are allocated to the research on each issue). The multitude of national procedures makes it difficult for cross-border projects and multinational actors (e.g. MNEs) to access research funding. The resulting lack of cross-border project collaboration makes it difficult to address common challenges jointly. It complicates the necessary pooling of scattered data and expertise, cross-border human resources training and mobility, and the rapid dissemination of research results. And it hampers pan-European public-private strategic research agenda setting and horizontal policy coordination.

Figure 4 : R&D financed in partnership as a share of public financed civil R&D (left panel) and total R&D (right panel)



Source: DG RTD estimates, for details on statistical sources and methodology see annex 3.

⁴⁹ ERA-AGE (ERA-NET): Summary recommendations from the report of the first meeting of the European forum, 16 and 17 February 2005, p. 2.

⁵⁰ HY-CO (ERA-NET): Report on indicators of hydrogen and fuel cells research, 27 September 2006, p.19 and p.35.

⁵¹ France is making Alzheimer's disease and other dementias (AD+) a priority under the French Presidency of the EU (second semester 2008) and setting up a national plan for fighting AD+. For more information, cfr: Menard Joël, *Rapport au Président de la République*, Commission Nationale chargée de l'élaboration de propositions pour un plan national concernant la maladie d'Alzheimer et les maladies apparentées, 8 Novembre 2007, pp. 118.

2.3. European cooperation in public R&D – impressive history, but progress is slow

2.3.1. Europe has developed a variety of transnational cooperation activities

The role of R&D cooperation in producing more efficient and effective research has long been recognised, and this is why numerous efforts have been made over the years by European countries to co-invest in research.

The main complementary funding schemes designed to promote trans-national R&D cooperation are the EU Framework Programme, and the inter-governmental schemes COST and EUREKA. In addition, there are the various inter-governmental research organisations which have emerged over the last fifty years, such as CERN, the European Molecular Biology Organisation, the European Space Agency and the European Science Foundation. The result of this process is a landscape of different mechanisms for collaboration and coordination, each with its own rationale, advantages and disadvantages. (Annex 3 gives a more detailed analysis of these various cooperation schemes.)

The European cooperative research landscape also includes the various bilateral R&D agreements that have been established between EU Member States. A study in 2001 identified over 800 bilateral agreements in Europe.⁵² For example, the Nordic countries have been very active in promoting bilateral cooperation involving Nordic research institutions, fixed-term research programmes, Nordic Centres of Excellence (NCoE), grant schemes and the co-ordination and planning of major infrastructure investments, with the recently created Nordic Research Board (NordForsk) as a central actor

Despite these efforts, the share of intergovernmental and Community actions for trans-national R&D cooperation in total government financed civil R&D has stagnated over the past 10 years between 16 and 14%. Thus, despite the political consensus over the last 15 years that more needs to be done to coordinate national programmes (section 1), the situation on the ground has evolved at a very slow pace.

Some recent initiatives have also tried to tackle the coordination of national programmes, but as will be seen below these have been very modest and limited in their impact.

2.3.2. Recent steps by the Community to enhance coordination – useful effects, but modest impact

Recognising that more coordination was needed, the Community has tried to reinforce its efforts to address this issue. The Open Method of Coordination was introduced in 2000 and has been applied to research policies. In addition, under the 6th and 7th Framework Programmes new instruments were introduced to enhance the coordination of national programmes – ERA-NETs and Article 169 initiatives (see Annex 4 for a more detailed presentation of these efforts). They have been widely welcomed and first results are promising. However, these instruments remain extremely modest in volume compared with total EU public R&D spending. Moreover, as will be seen below, all these new measures have their limitations.

⁵² Bilateral International R&D Cooperation Policies of the EU Member States, 2 volumes, Report for the European Commission, DG Research, 2001

Open Method of Coordination

The Open Method of Coordination was introduced by the European Council of Lisbon (March 2000) as an instrument to help Member States progress jointly towards the common goals of the Lisbon strategy, particularly in the domains – like research - where policy competence lies mainly with the Member States. The OMC is a soft governance tool, based on benchmarking, policy learning, and identification of best practice.

OMC established a structured discussion amongst national policy makers about certain topics, and there are indications that it may have had some effect on the way Member States construct their national policy mixes.

Nevertheless, it is designed consciously as a soft tool of coordination. It is a voluntary and non-committing process relying on goodwill, openness and peer pressure. As there are no means for ensuring a follow-up, progress is likely to be slow in materialising. OMC has also suffered from limited visibility and follow-up at the higher political levels.

Crucially, OMC has focused on policy coordination and not programme coordination as such, in other words on the non-funding related aspects of research policy.

ERA-NETs

ERA-NETs were conceived under the 6th Framework Programme as a bottom up approach for bringing together managers and owners of national research programmes in fields they identified as needing more coordination. 71 ERA-NETs were launched under FP6, which have resulted in about 85 joint calls totalling over 800 million euros. ERA-NETs have been widely welcomed by the research funding bodies, who appreciate their bottom-up nature, and their variable geometry. The mid-term review found that they fulfilled a real need and helped to overcome barriers to coordination.

ERA-NETs have been successful in creating a European networked "community" of programme owners and managers. However, their impact in financial terms is limited to a very small proportion of the total national research budget in the EU. Moreover, they suffer from certain weaknesses. Administrative and legal barriers to cross-border funding have hindered their expansion. There is still a reluctance to open up programmes and funding to foreign participants. Also, ERA-NETs have been initiated in a bottom-up way, which meant they were not always well embedded in national research strategies.⁵³

Article 169 initiatives

Article 169 is another instrument of coordinated programming launched under FP6 and FP7. The main objective of an Article 169 initiative is to go beyond the mere coordination of national programmes to achieve the real integration of different national and regional programmes into a single joint programme. An Article 169 initiative is implemented jointly, and funded through integrated financial support.

Unlike an ERA-NET, in an Article 169 initiative the Community does not just support the simple coordination of the national programmes undertaken by Member States but rather participates actively including a Community financial contribution for research. While some

⁵³ Report of the ERA Expert Group on Optimising Research Programmes and Priorities, 2008

new 169s have just been launched, so far real experience has been limited to a single pilot initiative: the European & Developing Countries Clinical Trials Partnership (EDCTP). The main drawback found in the application of this instrument in the case of EDCTP has been the difficulty in identifying the relevant national programmes and in achieving a full integration of these programmes through a "common pot" of funding. A limitation in scope is, that the Article 169 instrument is restricted to the topics covered by the Framework Programme. Accordingly, its applicability and effectiveness could be enhanced by making it part of a coherent framework that would provide a higher level strategic focus.

Nevertheless, it is evident that ERA-NETs and Article 169 initiatives, while promising, are still the tip of the iceberg, at least in financial terms. It is also evident that these instruments have their limitations, that cannot be resolved by minor adjustments. Nor is it possible to exploit the other inter-governmental mechanisms described earlier in order to rapidly strengthen the coordination of national programmes. These various schemes and bodies accomplish their different goals, but they are not appropriate instruments for achieving large scale coordination of national programmes. In short, the existing modes of cooperation have proven to be insufficient for rapidly advancing the structural coordination of national public R&D programmes.

2.4. Why Europe needs a new process for joint strategic agenda setting and coordination of public R&D

What is needed is a new, more strategic approach for the coordination of public R&D programmes in Europe, focussed on those areas that can contribute solutions to Europe's pressing societal challenges, and where coordination can deliver gains in the efficiency and impact of research. Over the last 15 years a series of steps (outlined in section 1) have been taken at EU level in an effort to stimulate greater coordination of national public R&D programmes. Yet little progress has been made. Since 2000 some innovative instruments have been added to existing arrangements in order to further encourage this trend towards more coordination, but these are not enough (section 2.3).

Past efforts to promote improved collaboration and coordination have clearly been hampered by a lack of high-level Member State political commitment, by a lack of sufficient and credible data on and insights into the particular structure and organisation of respective S&T fields, and by instrument rigidity.

Now, however, is a good time to launch a new initiative. There are two basic reasons for this. Firstly, the wider policy context has changed as commonly faced major societal challenges (climate change, energy security, etc.) have moved decisively to the top of the policy agenda in each Member State and at Community level, and Member States are now well aware of the costs of non-coordination and the benefits of more coordination at both S&T and societal level.

Secondly, in this supportive context, there is now a unique opportunity to learn from and build upon the valuable recent experience with coordination instruments by setting up a properly structured policy process based firmly on the principles of Better Regulation: working closely with the Member States in a transparent manner; respecting the principles of subsidiary, European added value and proportionality; preparing and launching concrete initiatives on the basis of an extensive, credible evidence-base; and ensuring the accountability and transparency of the process via proper monitoring and evaluations systems.

2.4.1. Benefits of cross-border programme collaboration and coordination

In general, an R&D programme is characterised by clearly defined objectives, a set budget with often fixed duration, a usually targeted set of research actors, a system of selecting proposals, and rules for participation. R&D programmes have a number of well-documented advantages in relation to more institutional forms of funding: they provide targeted and transparent objectives, they induce healthy competition between research groups and promote research excellence, they offer flexibility and adaptability of design and goals, and they facilitate monitoring and evaluation.

However, the societal returns to public research programmes can be increased by improving the organisation of European public R&D via more and better cross-border programme collaboration and coordination. This is because carrying out research through trans-national cooperation can increase its impact and bring other important benefits such as addressing common challenges jointly and developing common solutions, overcoming barriers to entry such as high start-up and operating costs in certain S&T fields, pooling data and expertise, achieving higher scientific, technological and innovation impacts, eliminating cross-European programme duplication, increasing programme depth, and reducing programme management costs. Concrete examples of the tangible benefits for S&T, the economy and society are given in sections 5.5, 5.6 and 5.7. The costs to Europe of non-coordination can therefore be viewed as the non-realisation of these significant benefits.

2.4.2. Subsidiarity and European added value

It is of course important to establish a clear basis and rationale for Community action in this area. The right for the Community to act in this field is set out in several articles of the Treaty which make provisions for research coordination and cooperation between Member States and the Community. Article 165 stipulates that "*the Community and the Member States shall coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent*". It also allows the Commission, in close cooperation with the Member States, to "*take any useful initiative*" to promote such coordination. As already mentioned, Article 169 allows the Community to make "*provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes*". Article 171 allows the Community to "*set up joint undertakings or any other structure necessary for the efficient execution of Community research, technological development and demonstration programmes*".⁵⁴

In order for Community action to be justified, it is also necessary for the subsidiarity principle to be respected. This involves assessing two aspects. Firstly, it is important to be sure that the objectives of the proposed action could not be achieved sufficiently by Member States in the framework of their national constitutional system (necessity test). In the case of the proposed process for JP, purely inter-governmental actions aimed at coordination of public R&D have not expanded rapidly in recent years (section 2.3.1), and the only initiatives aimed at programme coordination have been developed within the context of Community activities

⁵⁴ Treaty establishing the European Community, Official Journal C 325 of 24 December 2002. The Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community left these articles unchanged, with the exception of article 165 (see Official Journal C 306 of 17 December 2007).

(section 2.3.2). Therefore, Member States are unlikely to be able to address these problems acting alone.

The second aspect to consider is whether and how the objectives could be better achieved by action on the part of the Community (test of EU value-added). The rationale for EU action stems partly from the trans-national nature of some of the key challenges (for example, climate change) where Member States need to act together to properly tackle the problems. But it can also be justified in terms of offering the potential for greater scale, scope and effectiveness of public R&D programmes in Europe, as set out in section 2.4.1 above.

2.4.3. Conclusion – the need for a new process

There is a growing recognition that a new strategic approach is needed to strengthen the collaboration and coordination of public R&D programmes. Despite the considerable efforts made in the EU to encourage greater coordination of public R&D, progress has been very limited and slow. Some of this lack of progress can doubtless be attributed to the inherent complexity of setting up mechanisms for transnational cooperation. However, Europe must also learn from its past experience. A repeated theme in the evaluation of measures implemented so far is that a significant obstacle to real JP – especially when it involves the creation of a "common pot" of funds – is the innate inertia of public bodies in the Member States due to legislation, conflicting policy objectives, different traditions and procedures, etc.

This may partly explain why soft approaches like OMC and ERA-NETs have been popular. Nevertheless, as outlined in section 2.3, they are recognised as having a limited effect when it comes to encouraging JP. The Article 169 instrument has also been a positive innovation, but has had its problems. While these are being addressed in the new wave of 169 initiatives, the volume of such actions (and of the ERA-NETs) in relation to total public R&D in Europe is miniscule.

There is a need for a new approach. Experience shows that JP will not take off rapidly under the present system. What is needed is a process involving the concerned parties coming together to discuss and plan what can be done. The proposed initiative on JP is a response to this need. JP is a process whereby Member States engage on a voluntary and à la carte basis in the definition, development and implementation of research agendas addressing a specific field or specific topic. It can involve the coordination of existing national programmes, or the setting up of entirely new ones, putting resources together and collectively monitoring and reviewing progress. The new initiative should be shaped by the views of stakeholders and by the experiences of the past.

Clearly, such a process must involve the Member States. National programmes belong to them, and they must decide what is in their best interest. No progress can be made without their full commitment to the process. As managers of the national programmes, they also have all the information and experience about how funds are spent in a particular field and with what coverage and effect.

For these reasons, it is important that a process for moving towards JP should not be too top-down with the Commission in the driving seat. The Commission's role should be acting as a facilitator. The process should not be too bottom-up either, because this would lead to a lack of coherent strategy and focus.

An effective process would involve Member States together identifying areas of common concern where collective action can be more effective in tackling important societal challenges. In particular, it must use suitable criteria agreed by all parties in order to determine the fields in which JP could most usefully be launched.

To make these criteria operational there must be a solid information base. However, the lack of accurate and comparable information on national and regional research programmes is one of Europe's fundamental weaknesses at the moment. Best efforts to obtain data on these programmes have provided only a partial picture of the national research landscape, and evidence of duplication, gaps and sub-optimal scale still tends to be ad-hoc (such as the examples cited by ERA-NETs, or in certain reports by research bodies). This is because they have tried to be all-embracing, including all fields of S&T for all Member States, and providing quite aggregated data and information. For JP a more focussed approach is required involving the collection of more detailed information on selected fields of interest.

This is a matter that can best be tackled through a collective process involving the Member States. Information needs to be gathered on existing national and regional programmes in various areas, their coverage, and issues of gaps, duplication or lack of scale and scope.

There is a need for an approach which allows for flexibility in terms of participating countries. Not all Member States share the same challenges in every area, especially in the expanded EU of 27. There is a need for the use of variable geometry in setting up joint programmes.

Finally, an effective process must allow for a graduated response. It should make use of lighter instruments (e.g. ERA-NETs) where there performance in a field of S&T is good, and use stronger JP mechanisms in those areas where performance is problematic.

3. OBJECTIVES

3.1. General policy objectives

The general policy objectives of the JP initiative are to enhance the EU's capacity to achieve its high level policy goals and respond to the major challenges it faces in the coming years:

- To contribute to the achievement of the objectives of the revised Lisbon Strategy.
- To help Europe respond more effectively through research to key societal challenges such as climate change, energy supply, ageing population.
- To contribute to the achievement of the European Research Area (ERA) objectives.

3.2. Specific objectives:

In order to contribute to achieving these general policy objectives, it will be necessary to improve the efficiency and effectiveness of public research programming in Europe in areas where it is facing major societal challenges. Specific objectives are:

- To strengthen the coordination of national public research programmes in Europe in areas which can provide solutions to important societal challenges and where there is evidence of an added value from adopting a joint cross-border approach.
- In this way, to increase the impact of these programmes, both S&T impacts (scientific excellence, pooling of resources, data and expertise, achievement of critical mass, facilitating programme optimisation) and economic and societal impacts.

3.3. Operational objectives:

In order to promote the above improvements in impact and efficiency, the operational objectives are:

- To provide an effective process which will promote a more strategic approach to coordinating national research programmes aimed at helping to tackle Europe's societal challenges.
- To ensure that this process and the ensuing joint public research programming initiatives enjoy a high level of stakeholder support and ownership.
- Through the process, and the use of appropriate instruments, to promote cross-border public research programme integration and structuring effects, notably the achievement of critical mass of R&D effort.
- To provide a process that allows for a graduated response in terms of Joint Programming instruments, as well as variable geometry in terms of country participation.
- To ensure that joint initiatives are based on up-to-date and accurate information on national and regional programming activities.

- To promote stronger horizontal policy consistency.

3.4. Ensuring consistency with other EU policies and strategies

The objectives envisaged are consistent with other EU strategies and policies. Meeting these objectives through the initiative proposed can contribute to the overall EU strategy for Growth and Jobs, in particular its innovation strategy, aimed at strengthening EU competitiveness, which depends in part on realising the European Research Area. It can also improve the transformation of the results of research into new products and processes, and widen the access of industry and in particular SMEs to the public funding of research. In focusing coordinated efforts on major societal challenges, these objectives are also coherent with the strategy on Climate Change and Sustainable Europe, for example, with respect to the implementation of the Energy Efficiency Action Plan, the new Energy Action Plan and in particular the development of low carbon technologies. Finally, there is also a clear link with the objectives of the EU Health Strategy in the priority area Putting Citizens First, for example, by helping to tackle important societal challenges such as the aging society and related sicknesses.

4. PRESENTATION OF THE OPTIONS

We now consider a number of concrete policy options to reach the stated policy objectives. Against the background of the progress made so far in the field of European cross-border public research programme coordination and collaboration and of the lessons learned so far from the implementation of particular instruments, four policy options have been identified and developed. These are labelled as follows on the basis of their main characteristic(s):

- (1) "Business-as-usual" option;
- (2) "Article 169 maximization" option;
- (3) "Community-driven strategic" option;
- (4) "Strategic European process" option.

The difference between these four options hinges mainly on two issues: the way in which JP areas are identified, and the range of instruments considered for implementation. The main characteristics of each policy option are briefly discussed in more detail in the following subsections.

In addition to the four policy options explored in more detail below, some other policy options were considered initially but rapidly eliminated. The most important one was what can be called the "renationalisation" option. Under this option, the Community lets the ERA-NET scheme and Article 169 initiatives already operating run their course but does not launch new ones, thereby gradually scaling down its involvement in the field of JP. Instead, the promotion of JP becomes once more an exclusive responsibility of the Member States, without any Community involvement. This option responds most radically to those stakeholders concerned about subsidiarity who demand that the coordination of policies should be predominantly left to Member States. The problem with this option is that it more or less resembles the pre-ERA-NET and pre-Article 169 era. Several decades ago, useful infrastructure-centred initiatives were taken (CERN) and valuable schemes like COST and EUREKA launched, but since then very little progress has been made towards cross-border programme coordination and collaboration. That means that, under this option, the lack of strategic focus, the lack of critical mass, the coverage gaps, the wasteful duplication and unhealthy competition, etc. found in many areas with regard to pan-European research efforts would persist. Given these great drawbacks, the Community can hardly be expected to present and seriously assess such an option (see Section 2).

Another policy option eliminated at an early stage was the use of the Open Method of Coordination (OMC). Since OMC is a soft governance tool, involving benchmarking, policy learning, and identification of best practice, it is not well-adapted to the creation of joint programmes. Moreover, OMC as implemented already in the field of research focuses on policy coordination and not programme coordination as such - in other words on the non-funding related aspects of research policy.

Finally, the option of adopting an EU regulatory approach to dismantle administrative and legal barriers to programme coordination was also eliminated early on. Not only would this be unpopular in the Member States, and counterproductive to the aim of overcoming national

reluctance to dismantle obstacles, but also it would risk impinging on matters which fall under national competence.

4.1. "Business-as-usual" option

Under this option, JP topics – which do not have to coincide with those of the FP (at least in the case of ERANET) – are identified in an ad-hoc bottom-up way by a variety of Member State stakeholders (see Table 2). Implementation takes place through a limited number of instruments (essentially ERA-NET scheme and Article 169) and is loosely coordinated (no overall JP coordination mechanism has been put in place). A flexible approach is taken towards critical mass (in terms of number and relevance of partners) and towards the level of programme integration pursued.

This option is the baseline option, against which the other options are compared. It responds strongly to those stakeholders who think that, as far as JP is concerned, Member States should be in the driver seat, and who favour an approach which is bottom-up, flexible (in terms of range of possible topic proposers, possible topics, critical mass, level of programme integration pursued, horizontal policy consistency, etc.) and based solely on existing instruments.

4.2. "Article 169 maximization" option

This "light intervention" option shares some of the characteristics of the "business-as-usual" option as JP topics are identified in a bottom-up way by the Member States, and implementation takes place through a limited number of instruments (essentially ERA-NET scheme and Article 169) (see Table 2). Where this option differs from the "business-as-usual" one, however, is in proposing an approach which is both more intensive (a much larger number of initiatives would be launched) and less soft, aiming for a larger impact.⁵⁵ JP topics would have to coincide with the FP, ERANET (Plus) would be rigidly positioned as an Article 169 preparatory stage, overall horizontal policy consistency would be more systematically pursued (through the Article 169 decision-making process), and more attention would be paid to the critical mass and level of programme integration of the initiatives. Under this option stakeholders would be consulted by the Commission.

Like the "business-as-usual" option, this option responds to those stakeholders who think that Member States should be in the driver seat and favour an approach which is bottom-up and based solely on existing instruments. But it also responds to those who agree that much more needs to be done than is being done now in the field of JP and are prepared to sacrifice some of the flexibility of the "business-as-usual" option for achieving that.

4.3. "Community-driven strategic" option

The most important difference between the "Community-driven strategic" option and the two previous options is that it is strategic instead of bottom-up. The starting point is the identification of major societal challenges and the assessment of the need for and lack of a

⁵⁵ The scope for developing Article 169 beyond current activities is clearly demonstrated by the (ongoing) preparation since EDCTP of the Article 169 initiatives AAL (joint research programme on "Ambient Assisted Living"), EUROSTARs (joint research programme for research performing SMEs and their partners), EMRP (joint research programme in the field of metrology) and Bonus-169 (joint research programme in the field of Baltic Sea research).

critical mass of publicly supported research in respective S&T fields (see **Table 2**). Under this option, it is the Community which takes the lead in carrying out these strategic assessments and proposing suitable JP topics. It is also the Community which takes the lead in selecting the most appropriate instrument from among a well-defined range of already familiar Community instruments which can be implemented relatively quickly. Under this option stakeholders would be consulted by the Commission.

While it is true that this option seems to go against stakeholder concerns about too far-reaching Community intervention in the field of JP, it would appear to have some important advantages as well. It responds well to those stakeholders who agree that the cross-border coordination and integration of national public research programmes needs to be intensified and improved, especially where responding to major societal challenges is concerned. And it proposes to do so in an effective (the "governance gap" issue is solved), cost-efficient (light process) and quick (potentially high speed of implementation) manner building on existing instruments.

4.4. "Strategic European process" option

The "strategic European process" option resembles the "Community-driven strategic" option in that it too is strategic, and based on tackling major societal challenges, but it differs crucially with regard to the roles played by the Community and by the Member States. Under the "strategic European process" option, it is the Member States (not the Community) which identify topics for JP. And it is the Member States which select or develop the most appropriate instrument from among a wide range of possible instruments in order to accommodate in the best manner possible the specific circumstances of the respective S&T field (including Community instruments like ERA-NET scheme and Articles 168, 169, 170 or 171; "SET-Plan" or "security research" kinds of approaches; the creation of new European institutions and/or new kinds of Networks of Excellence;⁵⁶ ERC-kind or Euratom-type of initiatives; Structural Funds; etc.). The Commission plays the role of facilitator. It is responsible for reporting back to Council at each stage in the process, and for evaluating the process as a whole and the progress made in specific areas.

To be more specific, this option would involve the following steps:

- The Council would nominate a group of high-level representatives to identify possible areas for Joint Programming on the basis of clear criteria and stakeholder consultations. The Commission will act as secretariat of this group.
- On the basis of proposals and criteria-based justifications provided by the high-level representatives, the Commission would submit recommendations to the Council for launching Joint Programming initiatives in selected areas.
- The Council would ask ministers to nominate representatives to dedicated area-specific working groups, which have as their mandate to prepare in each area a particular Joint Programming initiative, and for which the Commission will act as secretariat.

⁵⁶ Involving the funding not just of integration activities but also of joint research.

Under this option stakeholders would be consulted by the Member States themselves. As is the case for other stakeholders, industry will be consulted so that its views can contribute towards the vision and common agenda.

Like the "Community-driven strategic option", the "strategic European process" option responds well to those stakeholders requesting the more intensive and better cross-border coordination and integration of national public research programmes to respond better to major societal challenges. But compared to the previous option, it sacrifices implementation speed and process-efficiency to obtain much greater effectiveness through greater political commitment, evidence-based policy-making, and the selection and/or development of carefully crafted instruments accommodating well the specific circumstances of the respective S&T fields.

Table 2 : ERA JP Initiative: Options

| Options | | (1) "Business-as-usual" option | (2) "Article 169 maximization" option | (3) "Community- driven strategic" option | (4) "Strategic European process" option |
|-----------------------------------|---|---|--|--|--|
| Selection of JP topics | Identification of JP topic | Bottom-up ERA-NET scheme: Calls for proposals Article 169: 'Open' call for MS ideas | Bottom-up 'Open' call for Member State ideas | Strategic Identification of challenges, Assess of need for critical mass, analysis of sub-optimality, etc. | Strategic Identification of challenges, assessment of need for critical mass, analysis of sub-optimality, etc. |
| | Relation between JP topics and FP thematic priorities | Related and unrelated ERA-NET scheme: Related or unrelated Article 169: Related | Related | Related and unrelated | Related and unrelated |
| | Identifier of JP topics | Mixed ERA-NET scheme: Regional and national programme owners and managers Article 169: Member States | Member States | Community | Member States (facilitated by the European Commission services where needed) |
| Instruments | Instruments considered for implementation | Limited number ERA-NET scheme Article 169 | Single Article 169 (Rigid positioning of ERA-NET scheme as Article 169 preparatory stage) | Broader range ERA-NET scheme Article 169 Article 168 Article 170 Article 171 | Wide range ERA-NET scheme; Article 169, Articles 168, 170, 171, "SET-plan" or "security research" kind of approaches, New European institutions, New kinds of NoE, ERC-kind of approaches, Euratom-kind of approaches, Structural Funds... |
| | Coordination mechanism | None | Article 169 decision-making process | Proposed Community-driven strategic process | Proposed strategic European process |
| | Thematic overlap between | Not pro-actively avoided | Pro-actively avoided | Pro-actively avoided | Pro-actively avoided |
| | Complementarities between different JP instruments | Not systematically pursued E.g., ERA-NET scheme: promotes mutual opening E.g., some ERA-NET scheme can result in Article 169) | Systematically pursued Rigid positioning of ERA-NET scheme as Article 169 preparatory stage | Systematically pursued | Systematically pursued |
| | Consistency between JP and other instruments | Not systematically pursued | Systematically pursued | Systematically pursued | Systematically pursued |
| Critical mass | Not systematically pursued | Systematically pursued At least in terms of network size Variable geometry remains possible | Systematically pursued Variable geometry remains possible | Systematically pursued Variable geometry remains possible | |
| Full programme integration | Not systematically pursued Even non-programmes can participate 4 integration steps (2 highest steps – i.a. joint calls – not binding) Different possibilities to fund joint calls (common pot not obligatory) | Systematically pursued Integration of clearly defined national programmes Joint calls as objective Joint financing of calls as objective (but difficult to achieve) | Systematically pursued Strategic integration of national programmes "full policy cycle" approach: full programme integration with joint foresight, planning, implementation (joint calls financed from common pot), monitoring and evaluation | Systematically pursued Maximisation of the complementarities between national programmes In some cases, a "partial policy cycle" approach: e.g. only joint foresight or joint evaluation In some cases a "full policy cycle" approach: full programme integration with joint foresight, planning, implementation (joint calls financed from a common pot), monitoring and evaluation | |

5. ASSESSMENT OF THE IMPACTS OF THE OPTIONS

In this section, the impacts of the four policy options presented in the previous section are discussed. A wide range of impacts are considered: **level of stakeholder support and 'ownership'** (inclusiveness of topic identification and instrument choice process; topic ownership; openness and participation); **strategic focus** (thematic scope; focus on societal challenges; ability to set SMART objectives); **structuring effect** (instrument flexibility; speed of implementation; programme integration; critical mass (on the input side)); **policy consistency** (overlap within JP instruments, complementarities between JP instruments; consistency between JP and other instruments; impact on ERA governance); and **societal impacts** (S&T impacts; economic impacts; social and environmental impacts).

Some important comments are in order here:

- Since the proposed policy process does not impose any regulatory administrative burden on stakeholders, this issue is not assessed here.
- The Communication, which this Impact Assessment is accompanying, proposes a process for identifying suitable topics and implementation instruments for JP. This means that these topics and instruments are not known to us at this point in time, and that no proper ex-ante evaluation can be carried out. Some of the instruments ultimately chosen may have implications for the Community budget, however. Those budgetary implications will be assessed separately in the impact assessments and ex-ante evaluations accompanying the proposals on those particular initiatives.
- In a similar vein, issues which are the specific object of other Community initiatives in follow-up to the ERA Green Paper (mobility, IPR) will not be treated in detail here.

5.1. Level of stakeholder support and 'ownership'

The level of stakeholder support for a particular option is a function of the inclusiveness of its processes for topic identification and instrument choice, and of the resulting topic ownership and instrument openness and participation. Against that background, the options with the greatest stakeholder support are the "strategic European process" and "business-as-usual" options, with their inclusive processes and high levels of stakeholder topic ownership and participation (see Table 3). They are followed by the "Article 169 maximization" option, with its more narrow participation. The "Community-driven strategic" option, with its non-inclusive process, its low level of stakeholder topic ownership, and its potentially low level of participation, comes last.

Inclusiveness of topic identification and instrument choice process

Under the "business-as-usual", "Article 169 maximization" and "strategic European process" options, outside stakeholders have, as part of an inclusive process, a great say as far as the identification and selection of, respectively, JP topics and instruments are concerned. That is much less the case under the "Community-driven strategic" option, under which the Community itself would select the JP topics and instruments.

An important question which this raises is whether, without the cooperation of the Member States, the Community disposes of a sufficiently detailed knowledge of Member State research programmes to be able to appropriately select JP topics by itself.

Topic ownership

Under the "business-as-usual" option, JP topics are defined in a bottom-up way. As a result, stakeholders have substantial 'ownership' of those topics.⁵⁷ Such stakeholder ownership can also be achieved under the "Article 169 maximization" and "strategic European process" options - under the former because JP topics are defined in a bottom-up way, and under the latter because of the joint MS-Community identification of topics for JP. It is only under the "Community-driven strategic" option that such 'ownership' cannot be ensured to the same extent as in this case it is the Community itself which, without much consultation with the Member States, identifies the topics for JP.

Openness and participation

Some of the instruments through which the "business-as-usual" option operates – in particular ERA-NET scheme – are 'open', meaning that they have low barriers to entry.⁵⁸ This has resulted in wide participation. This is reflected, for instance, in the high number of ERA-NET proposals (200+), the high number of ERA-NETs (71), and the high number of ERA-NET participants (1000+ participations by 450 different programme owners/managers).⁵⁹ Both the "Community-driven strategic" and "strategic European process" options are also marked by such openness (since they include accessible instruments such as ERA-NET), while the "Article 169 maximization" option is somewhat more restrictive. As a result, similar levels of inclusiveness and participation as under the "business-as-usual" option can be achieved under the "strategic European process" and "Community-driven strategic" options, but in the case of the latter the level of stakeholder support will be decisive. In the case of the "Article 169 maximization" option, the use of a somewhat more restrictive instrument could result in a more narrow participation pattern. It should be noted that options 3 and 4 allow in appropriate cases for the use of Article 170 initiatives which would allow the participation of non-EU countries.

5.2. Strategic focus

An option's strategic focus is a function of its thematic scope, its focus on societal challenges, and its ability to set SMART objectives. Measured against these criteria, the option with the greatest strategic focus is the "strategic European process" option, with its wide thematic scope, focus on societal challenges and ability to set SMART objectives (see Table 3). This is

⁵⁷ "The 'bottom-up' nature of the initiative was much appreciated by the main stakeholders". ERA-NET Review 2006, Report of the Expert Review Group (hereafter *Horvat Report*), Brussels, December 2006

⁵⁸ "The use of Specific Support Actions as well as Coordination Actions allowed for the possibility of initial exploratory approaches"; "The adoption of a four-step process for participants, with the latter two steps non-mandatory, was entirely suitable for this first, experimental phase of ERA-NET"; "The flexible approach to the use of different funding regimes for joint calls encouraged participants both to join in and to explore ways of overcoming some of the practical barriers to the implementation of joint actions"; "ERA-NETs were also open to participants from all eligible countries (inside and outside of Europe)"; "One of the key attractions of the scheme was the ability to adopt variable geometry configurations". *Horvat Report*, p. III.

⁵⁹ "The success of the ERA-NETs also owes much to the inclusion of a wide range of stakeholders. The inclusion of 'programme owners' as well as 'programme managers' was particularly important given the longer-term aim of altering perceptions in ministerial circles about the importance of trans-national research activities. Extending the invitation to participate to regional 'owners' and 'managers' was also astute given the importance of regional R&D governance systems in some national settings and the growing importance of the regional level in European RTD and innovation policies. The only regret here is that more did not accept the invitation" *Horvat Report*, p. III.

followed by the "Community-driven strategic" option, where, however, the ability to set SMART objectives will depend on the level of stakeholder support. The "business-as-usual" and "Article 169 maximization" options, which do not necessarily focus on important societal challenges and do not systematically involve all stakeholders in setting SMART objectives, come last.

Thematic scope

Under the "business-as-usual" option, there is no obligatory coverage of JP topics by the FP thematic priorities. As a result, the thematic scope of this option is without limit.⁶⁰ Such wide thematic scope is also achieved under the "Community-driven strategic" and "strategic European process" options since under these options as well JP topics do not have to be covered by the FP thematic priorities. It is only under the "Article 169 maximization" option that the thematic scope cannot be so wide since coverage by the FP thematic priorities is required by the Article 169 criteria.

Focus on societal challenges

Under the "business-as-usual" option, JP is pursued in a number of areas identified in a bottom-up manner. Yet the issues covered may not always respond to a societal challenge, and there may not always be a need for critical mass and evidence of sub-optimality. The same comment applies to the "Article 169 maximization" option. Under the third and fourth options, however, only S&T fields corresponding to a societal challenge, with a need for critical mass and evidence of sub-optimality will be covered.

Ability to set SMART objectives

Under the "business-as-usual" and "Article 169 maximization", the ability to achieve a wide consensus and high level commitment from all stakeholders to SMART objectives is not systematically ensured. Under the "Community-driven strategic" option, it could be greater, but depends on stakeholder support. The process envisaged under the "strategic European process" option, however, has been developed to achieve exactly that.

⁶⁰ For a list of the areas and topics addressed in each ERA-NET, see Annex 2.

Table 3 : ERA JP Initiative: Impacts

| Options | | (1) "Business-as-usual" option | (2) "Article 169 maximization" option | (3) "Community-driven strategic" option | (4) "Strategic European process" option | |
|---------------------|---|---|--|---|---|-----|
| Strategic focus | Thematic scope | + | +/- | + | + | |
| | Focus on societal challenges | - | - | + | + | |
| | Ability to set SMART objectives | - | +/- | (+) | + | |
| Stakeholder support | Inclusiveness of topic identification and instrument choice process | + | + | - | + | |
| | Topic ownership | + | + | - | + | |
| | Openness and participation | + | +/- | (+) | + | |
| Structuring effect | Instrument flexibility | +/- | - | + | + | |
| | Implementation speed | Identification topics, objectives, etc. | + | + | (+) | +/- |
| | | Launching instruments | + | +/- | (+) | + |
| | Programme integration | - | - | (+) | + | |
| | Critical mass (input side) | - | +/- | (+) | + | |
| Policy consistency | Overlap within JP instruments | - | + | + | + | |
| | Complementarities between JP instruments | +/- | + | + | + | |
| | Consistency between JP and other instruments | +/- | + | + | + | |
| | Impact on ERA governance | +/- | +/- | (+) | + | |
| Societal impact | S&T impacts | +/- | +/- | (+) | + | |
| | Economic impacts | +/- | +/- | (+) | + | |
| | Social and environmental impacts | +/- | +/- | (+) | + | |

5.3. Structuring effect

The structuring effect is a function of instrument flexibility, implementation speeds, the level of programme integration achieved and the critical mass put together on the input side. Measured against these criteria, the option with the greatest structuring effect is the "strategic European process" option, with its high level of instrument flexibility and its better guarantees for programme integration and input critical mass than the other options (see Table 3). The identification of topics, objectives, etc. may take some more time than under the other options, which calls for a well structured and well governed process. The structuring effect of the "Community-driven strategic" option is potentially large but uncertain, since it depends entirely on the level of stakeholder support. The "business-as-usual" and "Article 169 maximization" options have much smaller structuring effects, mainly because they have limited or no instrument flexibility and do not fully ensure programme integration and input critical mass.

Instrument flexibility

It is important to be able to choose the most appropriate (set of) instrument(s) given the specific circumstances in and degree of maturity of each selected JP area. Yet under the "business-as-usual" option, instrument flexibility is limited as the choice is only between the ERA-NET scheme and Article 169. That is why a December 2005 report by Optimat and VDI/VDE/IT recommended that a wider range of flexible instruments be developed.⁶¹ The possibility to choose the most appropriate instrument(s) is even more restricted under the single instrument "Article 169 maximization" option, which essentially centres on a maximalist instrument as far as programme integration is concerned and which therefore may not be suitable for less mature areas where nevertheless fruitful steps in the direction of JP can already be taken. It is only under the third and fourth options that instrument flexibility would be greatly enhanced.

Speed of implementation

It is important to be able to start implementation reasonably quickly, and this to keep the political momentum going. Rapid implementation - because of both rapid identification of topics, objectives, etc. and rapid launching of instruments - is possible under the "business-as-usual" and the "Community-driven strategic" options, though under the latter the level of stakeholder support is decisive. Under the "Article 169 maximization" option, the speed of implementation is somewhat lower as it takes somewhat more time to launch instruments. The speed of implementation is also somewhat lower under the "strategic European process" option since it takes somewhat more time to identify topics, objectives, etc.

⁶¹ "[...]the transnational strategies being implemented were based on achieving national objectives or addressing national weaknesses and [...] it would be necessary to provide some incentive, perhaps from the Framework Programmes, to encourage more innovative approaches addressing both national and ERA objectives, maybe through a wider range of flexible instruments in addition to both Article 169 and ERA-NET" (Optimat – VDI/VDE/IT, Examining the Design of National Research Programmes, Study prepared for European Commission – DG Research (Directorate M2), December 2005, p. 27).

Programme integration

Under the "business-as-usual" option, full programme integration is not systematically pursued. While in Article 169 initiatives, the objective is to achieve full programme integration, in ERA-NETs this is not necessarily the case since the two highest of four steps towards full programme integration are not obligatory.

It is questionable whether the "Article 169 maximization" option can achieve a higher level of programme integration than the "business-as-usual" option. The main risk is that through a bottom-up process, areas marked by substantial barriers to programme integration could be selected for JP and that a pure instrument approach without guaranteed high level stakeholder support would be unable to eliminate these barriers (as EDCTP was unable to do). More or less the same comment applies to the "Community-driven strategic" option too, since the possible lack of high-level stakeholder support may also prevent the effective elimination of barriers to programme integration. The "strategic European process" option constitutes the best guarantee for a high level of programme integration. It ensures that high-level stakeholders are closely involved in the JP initiative, and committed to it because they have defined the strategic research agenda and identified the appropriate instruments. This means that they will have full ownership of the process and will thus should play a much more active role than in the past in adapting legal and administrative rules where needed. Moreover, linking the JP process to tackling urgent societal challenges will provide an added incentive for them to dismantle barriers. The flexible approach to choosing instruments also helps by offering alternatives in cases where some instruments may be unwieldy for a given purpose.

Critical mass (on the input side)

There are several possible approaches to the notion of critical mass. One can look at network size, network quality, or both. The Community has so far approached the notion of critical mass mainly in terms of network size. Under the "business-as-usual" option, critical mass in terms of network size is systematically pursued in Article 169, but not in ERA-NETs, even though in practice, in both schemes, a sizeable number of partners participate.⁶² Critical mass in terms of network size will be very systematically pursued under the "Article 169 maximisation" option. Under Options 3 and 4, a broader approach towards critical mass, taking account of both the number of countries involved and the expertise/relevance of those countries, will be taken. These two options also allow for the use of Article 170 initiatives (which would enable the participation of non-EU countries) where this is useful, notably for further building critical mass.

5.4. Horizontal policy consistency

Horizontal policy consistency is a function of the degree of overlap within a particular JP instrument (e.g. between different ERA-NETs); the degree of complementarities between different JP instruments (e.g. between ERA-NETs and Article 169 initiatives); the consistency between JP and other instruments (e.g. Article 169 initiatives and the FP); and the impact on overall ERA governance and horizontal policy coordination (e.g. coordination between

⁶² In EDCTP, for instance, the number of participating countries is 15. Critical mass in terms of network size is not systematically pursued in ERA-NET, however, where the minimum number of participating countries is just three. In practice, however, most ERA-NETs have a reasonable number of participating organisations, the median being 13, the average 14, and the maximum 26.

research policy on the one hand and education, innovation, ICT, energy, environmental, etc. policies on the other hand). Against this background, the highest degree of policy consistency can be achieved under the "strategic European process" option (see Table 3). The potential policy consistency of the "Community-driven strategic" option is also great but unsure since dependent on the level of stakeholder support. A somewhat lower level of policy consistency is achieved under the "Article 169 maximization" option and a very weak one under the "business-as-usual" option, since there are thematic overlaps within instruments, weak complementarities between JP instruments, weak consistency between JP and other instruments, and weak impact on ERA governance.

5.5. S&T Impacts

JP - improving the organisation of European public R&D via more and better cross-border programme coordination and collaboration - increases the societal returns to public research programmes. This is because carrying out research through trans-national cooperation can increase its impact and bring other important benefits:

- **Overcoming S&T barriers-to-entry:** JP enables Member States to pool their financial resources to overcome the high barriers-to-entry characterising some S&T fields - in particular those with high fixed start-up and operating costs depending on "big science" and large-scale research infrastructures – and thereby achieve sizeable scientific,⁶³ technological,⁶⁴ and other⁶⁵ impacts (structuring effects, impacts on human resources, on industry, and on local economies).

⁶³ Research infrastructures serve as repositories of knowledge. See the Note by Panel B, Prepared for the Conference and Incorporating Highlights of the Debate in Strasbourg on 19 September. Technological Innovation, industrial and Socio-economic Aspects of Research Infrastructures (hereafter Panel B Report). They act as hubs which bring together users from different S&T areas and promote interdisciplinary research (EC (1999), p. 3.). The use of research infrastructures helps researchers advance their scientific understanding, i.a. through the use of newly acquired methods and techniques. In a survey of external research infrastructure users, 65 % of respondents replied that their work at the facility had given them use of and insight into important new techniques, and 80 % replied that their work at the facility had advanced their scientific understanding. European Commission (1999), Training and Mobility of Researchers (1994-1998). Mid-term Review of the Access to Large-scale Facilities Activity. Panel's Mid-term Review Report (hereafter TMR 1994-1998).

⁶⁴ A not insignificant number of patents are filed based on the work carried out at research infrastructures (TMR 1994-1998, p.11). Research infrastructures also play an important role in the development of technological clusters. The ILL was an important factor in attracting the EMBL and the ESRF to Grenoble and CERN has also had some influence on inward investment to the locality both in France and Switzerland. There is now a global body of evidence which indicates that real benefits arise from agglomerations of research and higher education institutes and technology based companies (and Grenoble is a frequently cited example).

⁶⁵ Infrastructures also generate benefits for human resources. Researchers are able to learn new methods and techniques. In a survey of external research infrastructure users, 65 % of respondents replied that their work at the facility had given them use of and insight into important new techniques. Research infrastructures act as hubs bringing together users from different S&T areas, promoting interdisciplinary research, and also from different geographical areas thus creating pan-European trans-disciplinary networks. Research infrastructures have important impacts on industry. In the long run, industry is set to benefit significantly from the scientific, technological, training and structuring impacts and effects already mentioned above. Yet the more direct impacts of research infrastructures on industry are also large. Industrial researchers and technicians can receive training in technological and knowledge-related aspects, but also in the complex organisational aspects of technological innovation. At publicly supported research facilities, industrially developed materials and products are tested (TMR 1994-1998). As a result of the strict requirements of scientific projects carried out at research

- **Facilitating pan-European public research programme optimisation:** JP allows for pan-European public research programme optimisation by ensuring - within the context of scientific and technological uncertainty – that all relevant topics and approaches in a particular S&T field can be researched in parallel (optimising programme scope) and that sufficient resources are allocated to the research on each topic (by eliminating wasteful cross-European programme duplication and increasing programme depth).
- **Promoting scientific excellence:** JP promotes scientific excellence through joint calls with common funding which increase the competition for funding and the quality of research proposals – a "European Research Council"-effect is then obtained. National research programmes usually address only domestically based researchers. Where national research programmes operate in the absence of domestic expertise and where research proposals and the research carried out are of low quality, JP allows for avoiding the waste of public resources.
- **Addressing challenges jointly, developing common solutions, and speaking with one voice:** JP enables several Member States in a particular region (e.g. Baltic Sea area), or Europe as a whole, to tackle together commonly faced challenges (e.g. climate change, ageing), develop common, standardised solutions (e.g. in the area of transport), and speak with one voice in the international scene. The latter facilitates the interaction of non-European countries with Europe in the field of research.
- **Promoting cross-border project collaboration:** JP promotes cross-border project collaboration, which brings with it a multitude of benefits:
 - It facilitates the pooling of data and expertise scattered across several countries or Europe as a whole (e.g. rare diseases).
 - It promotes the rapid dissemination of research results.⁶⁶
 - It promotes cross-border human resources mobility and training.
 - And it increases the scientific, technological and innovation impacts of each Euro of public research support. International scientific collaboration and co-publishing is facilitated by international science programs, and allows countries to reinforce

infrastructures, materials and products are often newly developed or substantially improved, often with commercial potential.

⁶⁶ If results are not well disseminated, the value of carrying out research is seriously diminished. Indeed, one of the key justifications of public expenditure on R&D is to maximize the social return through ensuring the widest possible dissemination of research results. Moreover, in the context of the Lisbon objectives, research can only contribute to economic growth, to competitiveness and to job creation if the results are disseminated to the European business sector so that they can be transformed into new products, processes or services. Carrying out this dissemination at a level higher than that of a single Member State – to users, industries, firms (SMEs in particular), citizens, etc. – is more efficient and leads to a better exploitation of research, with a larger impact than would be possible at the level of a single Member State. Given the classical obstacles of language, proximity etc., when research is carried out purely at national level, it can be difficult for researchers abroad to access this new knowledge if no special incentives are provided. In addition, a country may generate important results in a particular area of science, but if it has no industrial activity corresponding to this discipline, then commercial exploitation may be severely hampered. Cross-border collaborative projects provide a powerful mechanism for disseminating results internationally.

their domestic specialisation or to compensate for domestic weaknesses.⁶⁷ International technological co-operation (i.e. between inventors with residence in different country) is even more fruitful than domestic co-operation.⁶⁸ The empirical evidence that collaboration affects innovative performance positively is substantial.^{69,70}

- **Facilitating horizontal policy coordination:** The pooling of Member State public research support efforts into highly visible, large-scale research programmes integrated cross-nationally will facilitate horizontal policy coordination, or the coordination between research policy on the one hand, and education, innovation, ICT, energy, environmental, etc. policies on the other hand.
- **Reduction of programme management costs:** It allows for the reduction of the national management cost of those national programmes which are integrated cross-nationally (and for providing more support for research).⁷¹
- **Cross-border policy-learning:** It enables cross-border policy-learning and improvements in the running of non-integrated national programmes.
- **Improved accountability and transparency:** Joint evaluation will improve accountability and the transparency of public R&D support.

Box: Positive S&T impacts of JP on industry

Some of the positive S&T impacts, JP has on industry have already been referred to above:

- **Pooling scattered data and expertise:** As already mentioned above, JP promotes cross-border project collaboration, which facilitates the pooling of data and expertise scattered across several countries or

⁶⁷ Wolfgang Glänzel, National Characteristics in International Scientific Co-Authorship Relations, In: *Scientometrics*, Vol. 51, 2001, pp. 101-2.

⁶⁸ Dominique Guellec and Bruno Van Pottelsberghe de la Potterie, The Value of Patents and Patenting Strategies: Countries and Technology Areas Patterns, In: *Economics of Innovation and New Technologies*, 2002, Vol. 11, pp. 133–148.

⁶⁹ Chang, for instance, has found that "*the success of firms, regions, sectors and nations has become increasingly dependent on how effectively they generate and use knowledge in an increasingly growing interdependent economy,*" that "*inter-organisational co-operation is positively associated with the firm's innovation performance,*" and that "*the firm's networking capability with suppliers, customers, and knowledge-creating organisations asserts a decisive influence on its innovative performance*". – Yaun Chieh Chang, Benefits of Cooperation on Innovative Performance, In: *R&D Management*, Vol. 33 2001, pp. 425-437.

⁷⁰ The European Commission found for both Germany and Finland that "*a positive impact of collaboration on the propensity to patent in both countries is...evident*" and that "*the externalities due to clients increase the innovation intensity by half a percentage point.*"- European Commission, *European Competitiveness Report 2004*, 2004, p. 79 and p. 87.

⁷¹ There are many aspects to the management of a public research programme. Priorities have to be set, work programmes developed, calls for proposals launched, proposal evaluations organised, contracts negotiated, projects managed, and ex-post evaluations carried out. This means that the management of a public research programme is quite intensive in terms of both human and financial resources. The management of public research programmes is also characterised by economies of scale. As the size of a public research programme increases, the share of resources allocated to its management decreases more than proportionally. Joint programming - under which some or all programme management activities (launching calls for proposals, organising proposal evaluations, etc.) are carried out jointly - allows Member States to save on their programme management costs and achieve economies of scale.

Europe as a whole. This enables the private sector to pursue, much more than it can now, "open innovation" strategies. According to the currently dominant "open innovation" paradigm, research and innovation are becoming increasingly costly and complex, which forces firms to search for outside knowledge, and turns networks and partners into important elements in the innovation strategy. This is especially important for SMEs, which usually are not in a position to access foreign knowledge.

- **Rapid dissemination of research results:** Innovation is often accompanied by so-called first-mover advantages. The firm which is first to bring a new product or process to the market is often the one which can occupy a large share of the market. Rapid innovation, however, depends to a large extent on the rapid domestic and cross-border dissemination of research results. JP, by promoting cross-border project collaboration, facilitates such rapid dissemination. This is especially important for SMEs, which usually are not easily included in the dissemination loop.
- **Development of common, standardised solutions:** Industry has a great interest in market predictability, which to a large extent depends on the development and acceptance of common standards and norms. JP, which facilitates the development of common, standardised solutions, contributes to such market predictability.

In addition, a number of other benefits for industry can be identified:

- **Facilitating access to public research support:** Multinational companies often carry out research in different European countries. To access public support for their research, they have to familiarise themselves with a multitude of different national and regional research programmes operating in the different European countries, each with their own objectives, application, proposal selection and management procedures, and cycles. SMEs and locally embedded universities and research institutes have difficulty accessing information on foreign research programmes. JP will significantly reduce the number of public programmes operating in Europe thereby making it easier for companies to access public research support.⁷² It will reduce the cost of information and the cost of applying for companies and have a positive effect on the crowding-in factor or leverage effect of public R&D support, resulting in higher private and overall R&D investment.
- **Facilitating the development of joint public-private strategic research agendas:** Europe's industry is well-networked and able to speak to Member States and to the Community with one voice. On the other hand, however, and as already mentioned, a multitude of different of different national and regional research programmes are operating in the different European countries, preventing the public sector from speaking with one voice to industry. JP will enable the public sector to speak with a single voice on particular research subjects and this will facilitate the interaction and strategic research coordination with the private sector (which can facilitate the development, further down the line, of joint technology initiatives). JP also facilitates the coordination of public research support programmes supporting industrial technologies (see, for instance, recent ERA-NETs (concerning construction, micro- and nano-manufacturing) supporting Technology Platforms).
- **Facilitating horizontal policy coordination:** The much higher visibility of large-scale joint programmes and their results as compared to national programmes will enable the rapid alignment of non-research policies to facilitate the take-up of those research results. It will facilitate the coordination of research policies with education and innovation policies (an explicit stakeholder demand), as well as with other policies.

It can be expected that all of the aforementioned benefits for industry will make Europe a more attractive place for business R&D investment, which will have a positive impact on Europe's R&D intensity.

⁷² According to Lena Lange, former director of Novozymes and of Nordforsk: "Whilst industry is globalising its research strategy to address global challenges, it needs to interact and depend upon myriads of decision makers for public research." In *The Future of Science and Technology in Europe*, Lisboa, 8-10 October 2007..

The extent to which these aforementioned benefits of JP will be achieved depends entirely on the extent to which a real structuring effect is attained. With these considerations in mind, it can be argued that the S&T benefits of JP are best achieved under the "strategic European process" option, which as argued above achieves the largest structuring effect (see Table 3). The S&T impact of the "Community-driven strategic" option is potentially large but uncertain, since it depends entirely on the level of stakeholder support. The "business-as-usual" and "Article 169 maximization" options have (much) smaller structuring effects and, therefore, also (much) smaller S&T impacts.

5.6. Economic impacts

The Communication, which this Impact Assessment is accompanying, proposes a process for identifying suitable topics and implementation instruments for JP. This means that these topics and instruments are not known to us at this point in time. This of course hampers the precise ex-ante estimation of societal (economic, social, environmental) impacts.

Because of the abovementioned reason, it was not possible within the scope of this Impact Assessment to engage in a precise econometric modelling exercise (as was possible and has also been done within the context of the FP7 Impact Assessment).⁷³ Nevertheless, a generic argument can be developed. Public investment in research generates important economic impacts. Economic growth, employment and international competitiveness (in terms of, for instance, import and export performance) depend to a large extent on technological innovation, which itself depends crucially on research. Modern mainstream economic theory – whether neoclassical, endogenous or evolutionary – has recognised for quite some time now that technological progress and innovation are the main engines of economic growth.⁷⁴

There is also empirical support for the contribution of S&T to economic performance. Estimates of private returns to firms' own investment in R&D still produce varying figures, but there is an emerging consensus that gross returns between 20 and 30 % are common and plausible. Microeconomic studies confirm the existence of significant spillovers of knowledge from the firms that perform the R&D to other firms and industries. Taking account of

⁷³ COM(2005) 118, Brussels, 6 April 2005.

⁷⁴ According to Baumol, innovation explains much of the extraordinary economic growth record under capitalism. The reason is that in important parts of the economy, competition is based on innovation rather than price. Firms are therefore forced by market pressure to support innovative activity systematically and substantially (William J. Baumol, *The Free-Market Innovation Machine. Analyzing the Growth Miracle of Capitalism*, Princeton, N.J. and Oxford, 2002, viii-ix). According to Romer, productivity growth is driven by innovation resulting in the creation of new though not necessarily improved product varieties (Philippe Aghion and Peter Howitt, *Appropriate Growth Policy: A Unifying Framework*, 9 August 2005, p. 2-3). And under the Schumpeterian paradigm, growth results from "quality improving innovations that render old products obsolete, and hence involves the force that Schumpeter called 'creative destruction'" (Aghion and Howitt, *Appropriate Growth Policy: A Unifying Framework*, Paper presented for the 2005 Joseph Schumpeter Lecture, Amsterdam, 25 August, 2005, p. 3). Even basic research generates several direct economic benefits. It is a source of useful new information; It creates new instrumentation and methodologies. Those engaged in basic research develop skills which yield economic benefits when individuals move from basic research carrying codified and tacit knowledge. Through participation in basic research, access is granted to networks of experts and information. Those trained in basic research may be good at solving complex technological problems. And, finally, on the basis of basic research, spin-off companies are created (Ben Martin et al., *The Relationship between Publicly Funded Basic Research and Economic Performance*, A SPRU Review, Report Prepared for HM Treasury, July 1996, p. vii.).

measured spillovers typically raises the estimated gross rate of return on business investment into the range of 30 to 40 %. Macroeconomic studies, which by definition cover all sectors of the economy, also find significantly higher returns to R&D in OECD countries, with estimates ranging from 50 % to over 100 %. A recent Austrian report found that the rise of corporate spending on R&D from 0.8 % to 1.1 % of Gross Domestic Product in the second half of the 1990s produced a boost of three tenths of a % in growth.⁷⁵ Both microeconomic and macroeconomic studies find that an important source of productivity growth in all OECD countries comes from the international diffusion of technology. A country's ability to absorb those foreign technologies is enhanced by investment in education and by investment in own R&D.

The economic literature is not conclusive on the employment effects of innovation, since process innovation (the introduction of labour-saving technologies) is likely to have a negative effect on employment at least in the short run, assuming all other factors remain constant, while product innovation creates new markets and employment opportunities.⁷⁶ But empirical evidence suggests that technological change promotes employment.⁷⁷

Within this context, what JP – which is best supported through the "strategic European process" option (see Table 3) - does (as has been demonstrated in Section 2 and at the beginning of this section), is increasing – leveraging as it were - the societal returns on Member State public research investment beyond what can be achieved at the level of a single Member State. Compared to purely national programming and funding, JP and funding enables the production of useful knowledge which otherwise could not be produced (by overcoming barriers to entry, by pooling necessary data and expertise, etc.), increases the quality of the research carried out (by increasing the competition for funding), ensures that more relevant knowledge is produced (by linking research to jointly faced challenges), and guarantees a higher societal pay-off through higher impact publications and patents, higher degrees of innovativeness, rapid dissemination and the development of standardised solutions.

5.7. Social and environmental impacts

While a generic argument can be developed for economic and employment impacts, that is not possible for social and environmental impacts since it is not yet clear in which areas JP initiatives will be developed. Defining that is exactly what the proposed JP policy process is intended to do. What is clear, though, is that whatever the social or environmental challenge to be addressed, progress will be made most quickly and efficiently under the "strategic European process" option, which is characterised by great strategic focus - that is, focus on major societal challenges - and achieves the largest structuring effect and therefore the largest S&T impact, which increases the societal returns to public R&D support (see Table 3).

⁷⁵ Federal Ministry of Education, Science and Culture, together with Federal Ministry of Transport, Innovation and Technology, and Federal Ministry of Economics and Labour, *Austrian Research and Technology Report 2004*, Vienna, 2004, p. 2.

⁷⁶ European Commission, *Employment in Europe 2004*, p. 77.

⁷⁷ Such evidence includes a recent study of the DG Employment which found that the rate of growth of total factor productivity (due to improvements in the efficiency of production or to pure technological progress) has a positive impact on the employment rate, with a one-year lag, and that both in the short- and long-term, total factor productivity and employment are positively correlated (European Commission, *Employment in Europe 2004*, p. 80).

Some examples can be provided of the way in which JP could contribute to quicker and better solutions for social and environmental problems.

- In the field of Cancer Clinical Practice Guidelines (CPGs) research, many CPGs address the same topic.⁷⁸ JP could facilitate pan-European public research programme optimisation by eliminating wasteful duplication.
- Risk of overlaps has also been found in the field of Organic Food Security, especially in animal production system research.⁷⁹ In this field as well JP could contribute to the optimisation of the pan-European public research effort.
- The countries surrounding the Baltic Sea are affected by common environmental problems. JP allows these countries to address the challenges they have in common jointly.⁸⁰
- Climate change is a phenomenon producing effects on a global, continental, national and regional scale. Research into the impact of climate change tends to be organised locally to focus on local problems, although some of the lessons learned could equally be applied in many regions. This is just one argument for greater co-operation between Europe's various climate research programmes.⁸¹
- The same argument is valid for research into ageing. Population ageing is another example of one of Europe's most pressing problems. In particular, ageing represents a huge challenge for health care, social services and pension systems, as well as for the medical profession. Here too it can help to carry out research jointly.⁸²
- JP and cross-border project collaboration facilitate the development of common, standardised solutions. For example, efficient transport systems are crucial to the efficient functioning of the single market, but transport research and policy are still too often seen from a national perspective. Closer co-operation between national transport research programmes can produce economies of scale and greater overall effectiveness, and also help to inform transport policy at European level.
- In some fields of research, complementary data and expertise may be dispersed across several countries, and if national research systems do not coordinate with each other then the benefits of pooling these resources will be lost. For example, when researching rare diseases at regional or national level, the difficulty to reach the necessary critical mass of

⁷⁸ See the SWOT analysis prepared by CoCanCPG, D 4.5.1, p 7.

⁷⁹ Arja Nykanem and Stefano Canali (2006), An analysis of OFF research topics in CORE Organic participating countries conducted, Core Organic Project, D4.1.a, p.19.

⁸⁰ Efforts are already underway to coordinate marine research in The Baltic Sea, Europe's largest internal body of water. Ensuring sustainable development requires regional policies based on sound scientific knowledge. The BONUS network brings together 11 organisations involved in the funding and organisation of Baltic marine science to pool their research funding and coordinate the use of infrastructures.

⁸¹ An ERA-NET project "CIRCLE" is currently preparing the ground for a coordinated information network on climate change.

⁸² The ERA-AGE project is making some efforts to bring together the national research programmes from 14 European countries to help Europe address age-related problems in a concerted way. The US, whose citizens are ageing at a slower pace than Europe, identified this major issue 30 years ago, and the 2005 budget for the National Institute of Ageing surpassed US\$ 1000 million.

patients, expertise, and facilities is one of the major obstacles. There are at least 6000 to 7000 rare diseases, which taken together affect some 20 million European citizens. Research is often hampered by a thin distribution of patients which impairs gathering of enough subjects for suitable studies, few specialised research groups, and a lack of standardisation of available data and material collections.

5.8. The preferred option and its impacts on different actors

The conclusion of the above argumentation is that the preferred policy option is the "strategic European process" option. The "business-as-usual" option is rejected mainly on the basis of its lack of strategic focus, its weak structuring effect, its negative impact on horizontal policy consistency, and its weak societal impact. Similarly, the "Article 169 maximization" option is rejected on the basis of its lack of strategic focus, its "one-size-fits-all" approach and its more limited structuring effect and societal impacts. The "Community-driven strategic" option, while its potential impact is great, is rejected on the basis of the risk it entails. It is likely that it will not be supported by stakeholders, which will negatively affect strategic focus, structuring effect, and societal impacts, and anyway it is unlikely that the Community disposes of a sufficiently detailed knowledge about Member State research programmes to suitably identify JP topics.

The "strategic European process" option enjoys the highest levels of support from stakeholders, who agree that there is a need for the definition of strategic research agendas and their implementation in a coordinated manner, especially for tackling common societal challenges; that a partnership, which couples a voluntary, bottom-up approach with strategic top-down guidance, is indispensable for ensuring flexibility and customisation to programme specificities; that the principles of subsidiarity, variable geometry and real European added value need to be respected; and that a one-size-fits-all approach cannot be pursued.

It is precisely by proposing a process in which Member States feel secure and in control that the preferred option seeks to overcome the reluctance of public bodies and other stakeholders to take forward the integration of national research: it is an entirely voluntary process, which gives full ownership to the Member States, who decide in a bottom-up way what they want to do; it is selective, allowing Member States to choose the JP initiatives they are interested in and want to be associated with, and to opt out of those they do not wish to be involved in; it is also flexible, allowing countries to choose between various instruments which can promote stronger or looser forms of coordination as appropriate and as desired by Member States.

Because of these high levels of stakeholder support and the joint programme area and instrument choice process proposed, the "strategic European process" option provides the best guarantees for obtaining the largest aggregate systemic structuring effects (by, for instance, increasing the competition for funding and providing under-performers with incentives to improve their performance, instituting common evaluation, etc.).

This in turn will allow for the full realisation of the benefits of cooperation. These include overcoming barriers to entry; pan-European programme optimisation; scientific excellence; jointly tackling commonly faced challenges, developing common, standardised solutions, and speaking with one voice; cross-border project collaboration (with its own set of benefits such as the pooling of data and expertise, rapid dissemination, cross-border human resources mobility and training, and increased scientific, technological and innovation impacts); reduced national management costs of integrated programmes; the improvement of non-

integrated programmes; and improved accountability and transparency. More specifically for industry, the benefits include 'open innovation', the rapid dissemination of research results, the development of common, standardised solutions, better access to public research support, easier development of joint public-private strategic research agendas, and quicker horizontal policy coordination. Ultimately, these S&T impacts translate into a higher societal return on public research investment, which means higher economic growth, competitiveness and employment, and quicker and better solutions for social and environmental challenges.

Under this option, Europe's citizens will benefit from higher economic growth, competitiveness and employment, and from quicker and better solutions for social and environmental problems. These will result from the important S&T benefits derived from JP and its significant structuring effects.

Europe's enterprises will benefit from a greater ability to pool scattered data and expertise and pursue open innovation strategies, from the more rapid dissemination of research results, from the development of common, standardised solutions, and from better access to public research support [through reduced information costs (concerning the existence of programmes and their procedures) and reduced administrative burden (concerning actual grant applications)]. In addition, the development of joint public-private strategic research agendas and horizontal policy coordination will be facilitated.

Europe's scientists will benefit from larger and more strategically targeted research programs, a greater ability to pool data and expertise scattered across several countries or Europe as a whole, from the more rapid dissemination of research results, from increased cross-border human resources mobility and training, and from the ability to achieve higher scientific, technological and innovation impacts. These impacts are of particular importance for scientists in regions and countries catching up in terms of research investment and performance.

Europe's research programme owners will benefit from a larger scientific, technological, innovation and societal return on their investment in public research support, as well as from reduced programme management costs (which can be disproportionately high, especially where small research programmes are concerned, given the need to launch separate calls for proposals, evaluate those proposals, etc.), cross-border policy learning (which will improve the quality of research programmes), and increased accountability and transparency (through, for instance, joint evaluation). These impacts are of particular importance for research programme owners and managers in regions and countries catching up in terms of research investment and performance.

6. RISK AND RISK MITIGATION

With the preferred "strategic European process" option are various risks associated. The various S&T and societal impacts discussed above are the impacts which can be achieved if the proposed JP policy process is implemented successfully. Yet, its full success is not guaranteed a priori. This is very clearly demonstrated by the last fifteen years' of slow progress in the field of European cross-border programme coordination and collaboration (discussed in section 1). In order for this process to be successful, a number of important boundary conditions have to be met convincingly.

The proposed JP policy process foresees that this Communication and its accompanying Impact Assessment constitute the basis for the development of a common vision on and a clear shared understanding of what JP is and what it entails in terms of funding, joint ownership, sharing of expertise, opening, etc. The careful drafting of these documents, as well as the subsequent in-depth discussions to be held on these documents at Council level and in other for a, will ensure this. Yet hitherto acquired experience from JP at various levels has shown that a sine qua non condition for success is the existence from the very outset of a strong political impulse and of a deep and sustained commitment at the highest political level in the Member States. The risk exists, however, that this required commitment will not materialise, which could result in a heavily bureaucratised "empty" and ultimately unsuccessful policy process. This is what has happened time and again over the course of the past fifteen years.

First, this risk would appear to be smaller now than it was perhaps in the past and this because of the growing recognition in the Member States of the societal challenges Europe is facing and of the S&T and societal costs of non-coordination and of the S&T and societal benefits of JP. Second, the proposed policy process has been designed specifically to mitigate this risk. A high-level political process is proposed, as different from a regular consultation approach, which rests squarely on the Member States, with the Commission services in a facilitating role. The process assigns an important and continuing role to the Council in terms of:

- Inviting Member States' and Associated Countries' research ministers to mandate personal representatives for an ad-hoc group to identify suitable JP areas.
- Mandating JP area specific high-level Member State working groups to define SMART objectives, formulate strategic research agendas, etc.
- Closely monitoring the process on an annual basis (via obligatory annual reporting by the Commission), and
- Evaluating the process after 3 years.

The proposed process is evidence-based and grounded in an in-depth strategic analysis of respective S&T fields, which will ensure that only feasible JP initiatives are taken. An accommodating approach is proposed, which is marked by instrument flexibility (a wide range of possible Community and other instruments for implementation), variable geometry, and flexibility in terms of the extent of programme integration pursued (partial cycle, full cycle).

A second risk is that of institutional inertia and "field-level" operational stakeholder resistance to, for instance, integrated, jointly funded, more competitive calls for proposals. Evaluations of past coordination measures have suggested that this inertia may be due to a number of factors: fear of losing control of programmes, non-existence of well-defined national programmes, national legislation that does not allow support to foreign institutions, lack of multi-annual budgets and requirement of yearly parliamentary approval, a desire not to lose the visibility of some key national projects.⁸³ The "strategic European process" option has important features which will help to overcome these obstacles and assuage any potential

⁸³ Optimat – VDI/VDE/IT, *Examining the Design of National Research Programmes*, Study prepared for European Commission – DG Research (Directorate M2), December 2005

concerns of Member States. Firstly, it is an entirely voluntary process which gives full ownership to the Member States who decide in a bottom-up way what they want to do. Member States have the full power to define particular JP actions and can decide to opt in or opt out of them as they wish. Where they choose to participate in a JP action, they will not lose control as such, but the form of control they have will depend upon the nature of the action. The key calculation for Member States, however, will not be about control per se, but rather about whether any perceived losses from doing JP are outweighed by the benefits to be obtained from cross-border cooperation (impact on scale, scope etc.). Secondly, the process offers flexibility in the choice of instruments, which means that new programmes could be created if desired, even where well-defined national programmes do not exist. It is also a targeted and gradual process which allows area-specific obstacles to be tackled over a reasonable period of time. And by focussing on pressing societal challenges of common concern, it provides a serious incentive to mobilize efforts and break down barriers.

A third risk is that the proposed JP policy process will lack the required evidence base. The identification of suitable JP topics, the formulation of SMART objectives and strategic research agendas, etc. will require the collection of strategic intelligence on what specific kinds of research each Member State is supporting, through which programmes and institutions, etc.

To mitigate this risk, the involvement of experts in the respective S&T fields is foreseen. They would identify the necessary information, and takes steps to ensure its collection. The approach would differ from previous efforts at information gathering which tended to cover all Member States and all fields of science, and as a result were time-consuming and produced quite aggregated results. Instead, it would focus only on the selected specific fields (probably around three in the first phase of JP) and only on the Member States that wish to participate in JP in each field. This focussed approach. would allow data to be collected more rapidly and at a much greater level of detail. Since a JP initiative in a given area would necessarily involve the key players in the field, this would also facilitate the task of gathering the information required.

This information gathering process should use data already available in the Member States and thus should impose no additional reporting obligation. Member States may decide to update the information collected over the course of time if this is useful. It is also a voluntary exercise limited to those Member States participating in a specific JP area, and it is the Member States themselves, not the Commission, who will decide upon the best method for gathering information.

In summary, it can be argued that the main risk mitigation strategy underlying the proposed process is that of learning from and building upon the valuable recent experience with coordination instruments by setting up a properly structured policy process based firmly on the principles of Better Regulation: working closely with the Member States in a transparent manner; respecting the principles of subsidiary, European added value and proportionality; preparing and launching concrete initiatives on the basis of an extensive, credible evidence-base; and ensuring the accountability and transparency of the process via proper monitoring and evaluations systems.

7. MONITORING AND EVALUATION

An important role will be played in the mitigation of risks by the creation of suitable systems for monitoring and evaluating the process proposed in this communication for the identification of topics and areas for JP, the formulation of SMART objectives, the development of strategic research agendas, the launching of specific JP initiatives, etc. Within this context, it is of key importance that sufficient human and financial resources are dedicated to monitoring and evaluation.

Regular monitoring and evaluation of progress against the SMART objectives should be ensured.

Based on expert reports, the Commission will inform the Council of progress at each stage of the process so that it can provide adequate steering and allow more interested countries to join.

The Commission together with the Member States will evaluate the Joint Programming process as a whole. This evaluation will be commenced three years after the launch of the process.

ANNEX

Annex 1

ERA Green paper open consultation: on line consultation and positioning papers.

Following the publication of the Green Paper "The European Research Area: New Perspectives" (COM(2007)161, Brussels April 4 2007), the European Commission launched a broad institutional and public debate on what needs to be done to give renewed impetus to the realisation of an open, competitive and attractive European Research Area. An on-line public consultation was opened between 1 May 2007 and 31 August 2007. 474 individuals and 211 organisations including large companies, SMEs, associations of commercial interests, governmental bodies, funding agencies, universities, etc. from across Europe and other countries responded to the consultation.⁸⁴

The following tables summarises the distribution of the responses to a selected set of questions relevant for the purpose of Joint Programming. Table IV, in particular, presents the respondents' view on the need to open the national programmes in basic research and how this should be achieved, whereas Table II presents the distribution of respondent's answers concerning the need to open applied research and on how this can best be achieved.

Table VI presents the distribution of respondents' views with respect to the perceived benefits of cooperation in different domains. These figures in particular were used for figures 1 and 2 in section 1.4.1. Note that in the figures, the percentages of respondents agreeing with the statements were presented as a percentage of non missing answers.

In the same open consultation, there were an additional 146 free-format positioning papers, from MS, NGOs, industry associations, SMEs; large companies, European bodies, etc. Table IV presents a list of the positioning papers used as input for table 1 in section 1.4.1.

⁸⁴ For further details see http://ec.europa.eu/research/era/progress-on-debate/stakeholder-consultation_en.html

Table IV: Green Paper open consultation: Opening of basic research

| | National and regional investigator driven (basic) research programmes should be opened to the participation of persons from all EU Member States. | | | | If in agreement, this can be achieved by: | | | | Full opening of programmes to applications from all (mutual opening). | | | | Limited opening of programmes to applications based on bilateral agreements | | | | The networking of research activities conducted at national or regional level, and the mutual opening of national and regional research programmes with the Commission taking a facilitating role (ERA-Net type) | | | | Unilateral opening of national and regional programmes to some or all EU Member States | | | | Total |
|---|---|-----------|------------|-----------|---|-----------|------------|-----------|---|-----------|------------|-----------|---|----------|------------|-----------|--|-----------|------------|-----------|--|--|--|--|-------|
| | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | | | | | |
| Individuals | 29 | 11 | 7 | 53 | 52 | 11 | 4 | 34 | 60 | 17 | 3 | 20 | 58 | 5 | 7 | 30 | 63 | 15 | 8 | 14 | 69 | | | | |
| Association representing commercial interests / Chamber of Commerce | 44 | 11 | 11 | 33 | 78 | 11 | 0 | 11 | 89 | 0 | 0 | 11 | 78 | 0 | 0 | 22 | 89 | 0 | 11 | 0 | 1 | | | | |
| Commercial organisation (including consultancy) fewer than 250 employees | 27 | 0 | 0 | 73 | 27 | 27 | 0 | 45 | 36 | 18 | 0 | 45 | 27 | 27 | 18 | 27 | 27 | 36 | 9 | 27 | 2 | | | | |
| Commercial organisation (including consultancy) more than 250 employees | 14 | 14 | 21 | 50 | 50 | 36 | 0 | 14 | 57 | 7 | 0 | 36 | 50 | 0 | 7 | 43 | 57 | 14 | 0 | 29 | 2 | | | | |
| Governmental body | 23 | 8 | 0 | 69 | 46 | 23 | 15 | 15 | 46 | 15 | 8 | 31 | 38 | 0 | 8 | 54 | 54 | 8 | 23 | 15 | 2 | | | | |
| Higher Education Institution (University, University College, Polytechnic etc) | 13 | 18 | 3 | 67 | 44 | 28 | 0 | 28 | 49 | 15 | 5 | 31 | 46 | 5 | 3 | 46 | 51 | 26 | 5 | 18 | 6 | | | | |
| Public sector research performer other than Higher Education Institution | 26 | 6 | 6 | 62 | 44 | 21 | 18 | 18 | 53 | 21 | 3 | 24 | 44 | 6 | 0 | 50 | 44 | 18 | 6 | 32 | 5 | | | | |
| Research funding organisation | 13 | 13 | 0 | 75 | 25 | 25 | 13 | 38 | 38 | 13 | 13 | 38 | 25 | 0 | 0 | 75 | 25 | 25 | 13 | 38 | 1 | | | | |
| Non-Governmental, not for profit, not representing commercial interest Organisation | 40 | 17 | 5 | 38 | 74 | 2 | 5 | 19 | 71 | 7 | 12 | 10 | 69 | 2 | 12 | 17 | 71 | 12 | 12 | 5 | 6 | | | | |
| Other | 29 | 12 | 12 | 46 | 56 | 29 | 2 | 12 | 54 | 15 | 5 | 27 | 56 | 5 | 0 | 39 | 56 | 27 | 5 | 12 | 6 | | | | |
| Total | 28 | 12 | 7 | 53 | 52 | 14 | 4 | 30 | 59 | 16 | 4 | 22 | 56 | 5 | 6 | 33 | 60 | 16 | 8 | 15 | 100 | | | | |

Table V: Green Paper open consultation: Opening of applied research

| | If in agreement, this can be achieved by: | | | | | | | | | | | | | | | | | | | | |
|---|---|----------|------------|-------|---|----------|------------|-------|---|----------|------------|-------|---|----------|------------|-------|--|----------|------------|-------|-------|
| | National and regional socially driven (applied) research programmes should be opened to the participation of persons from all EU Member States. | | | | Full opening of programmes to applications from all (mutual opening). | | | | Limited opening of programmes to applications based on bilateral agreements | | | | Networking of research activities done at national or regional level, and the mutual opening of national and regional research programmes with the Commission taking a facilitating role (ERA-Net type) | | | | Unilateral opening of national and regional programmes to some or all EU Member States | | | | Total |
| | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | No answers | Disagree | No opinion | Agree | |
| Individuals | 34 | 12 | 10 | 43 | 64 | 7 | 2 | 28 | 70 | 15 | 3 | 13 | 68 | 4 | 4 | 24 | 71 | 14 | 5 | 11 | 69 |
| Association representing commercial interests / Chamber of Commerce | 56 | 11 | 22 | 11 | 89 | 0 | 0 | 11 | 100 | 0 | 0 | 0 | 89 | 0 | 0 | 11 | 100 | 0 | 0 | 0 | 1 |
| Commercial organisation (including consultancy) fewer than 250 employees | 27 | 9 | 0 | 64 | 36 | 18 | 0 | 45 | 45 | 27 | 0 | 27 | 45 | 27 | 9 | 18 | 45 | 36 | 0 | 18 | 2 |
| Commercial organisation (including consultancy) more than 250 employees | 21 | 14 | 21 | 43 | 57 | 29 | 0 | 14 | 64 | 7 | 0 | 29 | 57 | 0 | 7 | 36 | 71 | 7 | 0 | 21 | 2 |
| Governmental body | 31 | 23 | 0 | 46 | 62 | 15 | 8 | 15 | 62 | 15 | 0 | 23 | 62 | 0 | 0 | 38 | 69 | 8 | 8 | 15 | 2 |
| Higher Education Institution (University, University College, Polytechnic etc) | 21 | 21 | 8 | 51 | 56 | 21 | 0 | 23 | 59 | 21 | 0 | 21 | 56 | 5 | 0 | 38 | 59 | 28 | 3 | 10 | 6 |
| Public sector research performer other than Higher Education Institution | 26 | 0 | 12 | 62 | 53 | 26 | 3 | 18 | 44 | 21 | 0 | 35 | 41 | 3 | 0 | 56 | 44 | 18 | 6 | 32 | 5 |
| Research funding organisation | 13 | 25 | 0 | 63 | 38 | 13 | 13 | 38 | 50 | 13 | 13 | 25 | 38 | 0 | 0 | 63 | 38 | 13 | 13 | 38 | 1 |
| Non-Governmental, not for profit, not representing commercial interest Organisation | 43 | 12 | 7 | 38 | 74 | 7 | 0 | 19 | 71 | 5 | 12 | 12 | 71 | 5 | 5 | 19 | 74 | 10 | 10 | 7 | 6 |
| Other | 29 | 15 | 12 | 44 | 59 | 24 | 2 | 15 | 59 | 10 | 5 | 27 | 59 | 7 | 0 | 34 | 56 | 29 | 5 | 10 | 6 |
| <i>Total</i> | 33 | 13 | 10 | 45 | 62 | 10 | 2 | 25 | 67 | 14 | 3 | 16 | 65 | 5 | 3 | 28 | 68 | 15 | 5 | 12 | 100 |

Table VI: ERA Green Paper open consultation: Distribution of responses by category of respondent.

| Do we need to work together, more closely, at EU level for the planning of research priorities, implementation of research programmes and the evaluation and review of research? Specifically, do we need to work together on: | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------|----------|------------|---------|--|----------|------------|---------|--|----------|------------|---------|---|----------|------------|---------|---|----------|------------|---------|---|----------|------------|---------|-------|
| Participatory processes: structured dialogue between stakeholders including civil society to prepare informed decisions / opinions | | | | | Foresight: identifying future research challenges and opportunities. | | | | Programming: selecting research priorities based on measurable objectives and deadlines (programming). | | | | Project peer review: evaluation of publicly funded research proposals by peer review. | | | | Research evaluation: evaluation of ongoing publicly funded research programmes. | | | | Programme peer review and evaluation structures: European, national and regional research programmes should agree to be evaluated together in joint evaluations by similar teams of experts according to common and shared practices. | | | | |
| | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Total |
| Individuals | 40 | 14 | 11 | 35 | 59 | 7 | 3 | 31 | 44 | 16 | 7 | 32 | 56 | 7 | 5 | 32 | 51 | 11 | 5 | 32 | 49 | 10 | 6 | 35 | 69 |
| Association representing commercial interests / Chamber of Commerce | 56 | 0 | 0 | 44 | 56 | 0 | 0 | 44 | 56 | 0 | 0 | 44 | 56 | 0 | 0 | 44 | 56 | 0 | 0 | 44 | 33 | 0 | 0 | 67 | 1 |
| Commercial organisation with fewer than 250 employees | 36 | 18 | 18 | 27 | 55 | 9 | 9 | 27 | 64 | 9 | 0 | 27 | 45 | 18 | 9 | 27 | 64 | 9 | 0 | 27 | 45 | 9 | 9 | 36 | 2 |
| Commercial organisation with more than 250 employees | 64 | 7 | 14 | 14 | 79 | 0 | 7 | 14 | 79 | 0 | 7 | 14 | 57 | 14 | 14 | 14 | 64 | 7 | 7 | 21 | 36 | 36 | 14 | 14 | 2 |
| Governmental body | 31 | 23 | 15 | 31 | 69 | 0 | 0 | 31 | 54 | 15 | 0 | 31 | 69 | 0 | 0 | 31 | 62 | 0 | 8 | 31 | 62 | 0 | 8 | 31 | 2 |
| Research funding organisation | 75 | 0 | 13 | 13 | 88 | 0 | 0 | 13 | 63 | 13 | 13 | 13 | 75 | 13 | 0 | 13 | 63 | 13 | 13 | 13 | 50 | 25 | 13 | 13 | 1 |

| | Do we need to work together, more closely, at EU level for the planning of research priorities, implementation of research programmes and the evaluation and review of research? Specifically, do we need to work together on: | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------|------------|-----------|--|----------|------------|-----------|--|-----------|------------|-----------|---|-----------|------------|-----------|---|-----------|------------|-----------|---|-----------|------------|-----------|------------|
| | Participatory processes: structured dialogue between stakeholders including civil society to prepare informed decisions / opinions | | | | Foresight: identifying future research challenges and opportunities. | | | | Programming: selecting research priorities based on measurable objectives and deadlines (programming). | | | | Project peer review: evaluation of publicly funded research proposals by peer review. | | | | Research evaluation: evaluation of ongoing publicly funded research programmes. | | | | Programme peer review and evaluation structures: European, national and regional research programmes should agree to be evaluated together in joint evaluations by similar teams of experts according to common and shared practices. | | | | |
| | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Agree | Disagree | No opinion | Missing | Total |
| Higher Education Institution (University, University College, Polytechnic etc) | 62 | 23 | 3 | 13 | 79 | 5 | 0 | 15 | 59 | 21 | 3 | 18 | 64 | 13 | 3 | 21 | 67 | 13 | 3 | 18 | 59 | 21 | 8 | 13 | 6 |
| Public sector research performer other than Higher Education Institution | 62 | 18 | 3 | 18 | 82 | 0 | 0 | 18 | 68 | 15 | 0 | 18 | 71 | 12 | 0 | 18 | 74 | 3 | 3 | 21 | 41 | 15 | 26 | 18 | 5 |
| Non-Governmental, not for profit, not representing commercial interest organisation | 48 | 5 | 12 | 36 | 64 | 2 | 2 | 31 | 45 | 10 | 12 | 33 | 55 | 2 | 12 | 31 | 55 | 7 | 7 | 31 | 50 | 10 | 7 | 33 | 6 |
| Other | 59 | 17 | 2 | 22 | 73 | 7 | 0 | 20 | 44 | 29 | 5 | 22 | 59 | 22 | 0 | 20 | 59 | 20 | 2 | 20 | 54 | 15 | 12 | 20 | 6 |
| Total | 59 | 18 | 11 | 37 | 82 | 7 | 2 | 34 | 62 | 21 | 8 | 35 | 74 | 11 | 5 | 35 | 71 | 13 | 6 | 36 | 63 | 15 | 11 | 37 | 100 |

Table VII: ERA Green Paper open Consultation: free format contributions

| Member States | Higher Education Institutions | Public sector research performers other than higher education | Research funding organisations | Associations representing commercial interests |
|--|--|--|---|---|
| Austrian Ministry for Economics and Employment | A group of leading Universities | Academy of Science of the Czech Republic | Academy of Finland | Advanced R&T for Embedded Intelligence & Systems, (ARTEMISIA) |
| Belgian Science Policy, Commission for International Cooperation (CIC) | CSE-CNE | Centre National de la Recherche Scientifique (CNRS/CSIC/MPS) | Biosciences Federation (BSF) | Association of the German Chambers of Industry and Commerce (DIHK) |
| Czech Senate | Chalmers University of Technology | Commissariat d'Énergie Atomique | Cyprus Research Promotion Foundation (RPF) | BUSINESSEUROPE (The Confederation of European Business) |
| Czech Ministry of Education, Youth and Sports | Conférence des Présidents d'Université | Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) | Danish Councils for Independent Research (DCIR) | CBI - The voice of Business |
| Danish national position paper | European Law and Policy Research Group | Deutsches Elektronen Synchrotron (DESY) | European Research Council | Chambre de Commerce et d'Industrie de Paris (CCIP) |
| Danish Parliament | European University Association (EUA) | European Heads of Research Councils (EUROHORCs) | Royal Netherlands Academy of Arts and Sciences | Confederation of Netherlands Industry and Employers (VNO-NCW) |
| Ministry of Education and Research | Higher Education Researcher Development (UKHERD) | Europe's intergovernmental Research Organisations (EIROforum) | Scientific and Technological Research Council of Turkey (TUBITAK) | DRIVE for Growth |
| Finnish Ministry of Trade and Industry & Ministry of Education | Index Copernicus International S.A | Fraunhofer Gesellschaft | Scottish Funding Council | ETP Plants for the Future |
| Former Republic of Macedonia Ministry of Education and Science | League of European Research Universities (LERU) | German Aerospace Centre (DLR) - contribution | | European Association of Research and Technology Organisations (EARTO) |
| Center for Strategic Analysis (France) | National Oceanography Centre | German Aerospace Centre (DLR) - position | | European Chemical Industry Council (CEFIC) |
| German Ministry for Education and research | SHERPA – University of Nottingham | Helmholtz-Gemeinschaft | | European Confederation of Iron and Steel Industries (EUROFER) |
| Research Council (Germany) | UK HE Higher Education sector | Institut de Recherche pour le Développement (IRD) | | European Digital Technology Industry (EICTA) |
| Irish Department of Enterprise, trade and employment | University of Hertfordshire | Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) | | European Rail Research Advisory Council (ERRAC) |
| Italian Ministry for University and Research | | Institut National de la Recherche Agronomique (INRA) | | European Road Transport Research Advisory Council (ERTRAC) |
| Dutch Government | | Institut National de la Santé et de la Recherche Médicale (INSERM) | | European Steel Technology Platform (ESTEP) |
| Norwegian Ministry of Research and Higher Education | | Institut National de Recherche en Informatique et en Automatique (INRIA) | | European Technology Platform Food for Life |

| Member States | Higher Education Institutions | Public sector research performers other than higher education | Research funding organisations | Associations representing commercial interests |
|---|-------------------------------|---|--------------------------------|---|
| Poland's position | | Institut Pasteur | | European Technology Platform for Global Animal Health (ETPGAH) |
| Romanian Ministry of Education, Research and Youth | | Le Haut Conseil de la Coopération Internationale (HCCI) | | European Technology Platform Nanoelectronics (ENIAC) |
| Spanish Ministry of Education and Science | | Max-Planck-Gesellschaft / Gesamtbetriebsrat | | European Technology Platform of the Waterborne Industries (WATERBORNE) |
| Swedish Ministry of Education and Research | | Research Information network | | European Technology Platform on the Future of Manufacture (MANUFUTURE) |
| Swedish Parliament | | | | German Publishers and Booksellers Association |
| Swiss State Secretariat for Education and Research | | | | InnovaWood |
| Turkish Scientific and Technological Research Council | | | | International Association of Scientific, Technical & Medical Publishers (STM) |
| UK Government | | | | Networked European Software and Services Initiative (NESSI) |
| | | | | Syndicat National de l'Edition (SNE) |
| | | | | The Publishers Association |
| | | | | Trade Marks, Patents & Designs Federation (TMPDF) |
| | | | | Electricité de France (EDF) |
| | | | | ELSEVIER |
| | | | | ERICSSON |
| | | | | Philips Research |
| | | | | QinetiQ - leading international defence and security technology company |

Annex 2

Stakeholder opinions on the key role of research and the need for enhanced coordination

As well as examining the responses from the ERA Green Paper open consultation, this Impact Assessment exercise also considered a variety of other public consultations and opinion surveys in which citizens, policymakers and other stakeholders expressed their views with respect to:

- the role of research in addressing Europe's societal challenges, and
- the need for enhanced coordination in public R&D in Europe.

The challenges that require coordinated European action are increasingly societal and cross-border in nature (for example, ageing population, climate change, energy).⁸⁵ These challenges correspond closely to the concerns of citizens. For instance 96% of Europeans feel that protecting the environment is an important challenge. Climate change stands out clearly as one of specific the issues that citizens worry about, followed by water pollution, air pollution and man made disasters.⁸⁶

It is widely recognised - by experts, citizens and R&D actors - that research will play a key role in responding to these challenges. A European-wide network of national foresight managers carried out a mapping of S&T topics responding to pan-European societal challenges, and identified the following S&T topics as the top-ten in terms of trans-national or European interest: (1) developing new technologies for monitoring and preserving the environment; (2) developing clean and alternative energies; (3) developing converging technologies for medicine; (4) early stage detection and identification of micro organisms responsible of infectious diseases; (5) solving the energy problem for transport; (6) evaluating, anticipating the impacts of the climate change; (7) better understanding of the brain: neurology and neurobiology; (8) increasing information security; (9) exploring new applications for nano-materials and processes; (10) shifting to a hydrogen based economy.⁸⁷

Citizens too are convinced that research can play a significant role in facing Europe's challenges. 94% of EU citizens believe that medicines and new medical technologies will have a positive effect on our way of life in the next 20 years; 91% believe that solar energy will have a positive effect on society and 92% declare that energy saving measures in the home will impact society in a positive way. Citizens would appear to be confident of the advantages of new energy sources to power cars, with 90% declaring that this will have a positive effect on our way of life.⁸⁸ In the context of climate change and energy supply, the

⁸⁵ The public consultation paper on the review of the future EU budget – a review motivated by the need for Europe to better cope with its future challenges – identifies the most pressing societal challenges as: the capacity to further adjust to structural change, globalisation, the transformation to a knowledge and service economy, ageing and demography, solidarity within the EU and with the rest of the world, the impact of climate change, energy, security, etc. "Reforming the budget, changing Europe", SEC(2007) 1188 final Brussels, 12.9.2007

⁸⁶ Special Eurobarometer 295, "Attitudes of European citizens towards the environment", March 2008

⁸⁷ FORSOCIETY ERA-NET

⁸⁸ http://ec.europa.eu/public_opinion/archives/ebs/ebs_225_report_en.pdf

majority of EU citizens consider that energy related research should be a priority for the European Union.⁸⁹

In the open consultation on the Strategic Energy Technology plan, 321 individuals and 283 institutions expressed their views (between 7 March 2007 and 13 May 2007) on Europe's energy challenges. More than 95% of the respondents agreed that technology had a vital role to play, that 'business as usual' was not an option, and that the EU must act jointly and urgently. In the same consultation, around 95% of the respondents considered that there was an added value in undertaking actions at the European level to promote energy technologies, and that taking the right actions to develop and introduce in the market new energy technologies now could lead to sustainable energy in the future (see Table VIII).⁹⁰

Table VIII: SET-Plan open consultation (percentage distribution of responses)

| | Do you think that there is added value in European Union level action to promote energy technologies? | | | In the 21st century technology has a vital role to play enabling economic growth without environmental degradation, by ensuring sufficient clean and affordable energy. | | | | | | To continue developing energy technologies 'business as usual' is not an option. | | | | | | The European Union must act jointly and urgently. It will take decades to progressively transform the energy system, but we must start now. It is a process that requires strategic and coordinated action at European, national, regional and local level, pro-active planning and a comprehensive policy framework. | | | | | | Total |
|------------------------------------|---|----------|-----------|---|-------------------|-------------------|-----------|----------------|----------------|--|-------------------|-------------------|-----------|----------------|----------------|---|-------------------|-------------------|-----------|----------------|----------------|------------|
| | Do not know | No | Yes | No opinion | Strongly disagree | Somewhat disagree | Undecided | Somewhat agree | Strongly agree | No opinion | Strongly disagree | Somewhat disagree | Undecided | Somewhat agree | Strongly agree | No opinion | Strongly disagree | Somewhat disagree | Undecided | Somewhat agree | Strongly agree | |
| Individual | 3 | 2 | 94 | 0 | 0 | 1 | 1 | 19 | 78 | 0 | 1 | 2 | 2 | 22 | 73 | 0 | 0 | 1 | 3 | 10 | 85 | 53 |
| Organisation, institution, company | 1 | 1 | 98 | 0 | 0 | 1 | 0 | 19 | 80 | 0 | 0 | 1 | 4 | 27 | 68 | 1 | 0 | 1 | 1 | 16 | 81 | 47 |
| Total | 2 | 2 | 96 | 0 | 0 | 1 | 0 | 19 | 79 | 0 | 0 | 1 | 3 | 24 | 71 | 0 | 0 | 1 | 2 | 13 | 83 | 100 |

Joint EU-level action is also supported at a more general level: a large majority of European citizens thinks that decisions should be made jointly at EU level for scientific and technological research (72%),⁹¹ and a greater majority still believes that there should be more coordination of research between the member States of the European Union (83%).⁹² This view was also supported by the open consultation for the Seventh Framework programme.

⁸⁹ Special Eurobarometer 262, "Energy Technologies: Knowledge, Perception, Measures", January 2007
⁹⁰ Commission Staff Working Document *Accompanying document to "A European Strategic Energy Technology Plan (SET-Plan) COM(2007) 723 final, full impact assessment, SEC(2007) 1508, Brussels, 22.11.2007*
⁹¹ Eurobarometer 68 "Public opinion in the European Union", December 2007
⁹² Special Eurobarometer 224, "Europeans, Science and Technology", June 2005

Between 30 July and 15 October 2004, 1730 individuals and organisations including universities, large companies, SMEs, associations and government bodies responded to the consultation. 84% considered the improvement of coordination of national programmes as a very important or important objective.⁹³ More than 80% of stakeholders also believed the impact of coordination on the efficiency of the overall EU research system would be greater or substantially greater. However, there were some differences between different categories of stakeholders: for example, the percentage of SMEs, universities and of public research organisations considering the improving of coordination of national programmes as very important was higher than the percentage of large industrial companies. These differences may reflect their individual access to research funding and their ability to influence policy making at different governance level. (see Table IX).

Table IX: FP7 open consultation (percentage distribution of responses).

| | How important is the objective of improving coordination of national programmes? | | | | | If the coordination of national research programmes is improved, the impact on the efficiency of the overall EU research system compared to the current situation will be: | | | | | | Total |
|--|--|---------------|-------------|-----------|----------------|--|--------------------|------|----------|---------|-----------------------|-------|
| | Don't know | Not important | Unnecessary | Important | Very important | Don't know | Substantially less | Less | The same | Greater | Substantially greater | |
| Individual person | 5 | 8 | 4 | 40 | 43 | 9 | 1 | 4 | 8 | 47 | 32 | 31 |
| Association | 2 | 3 | 5 | 47 | 43 | 4 | 3 | 4 | 3 | 50 | 36 | 7 |
| Commercial organisation with less than 250 employees | 4 | 5 | 2 | 48 | 41 | 6 | 1 | 1 | 10 | 52 | 31 | 8 |
| Commercial organisation with more than 250 employees | 9 | 10 | 3 | 41 | 37 | 10 | 1 | 1 | 17 | 50 | 23 | 7 |
| Governmental body | 4 | 4 | 0 | 38 | 54 | 6 | 0 | 1 | 5 | 49 | 39 | 8 |
| University/higher education | 6 | 10 | 3 | 39 | 42 | 9 | 2 | 5 | 8 | 48 | 28 | 26 |
| Other | 3 | 6 | 2 | 47 | 41 | 6 | 0 | 3 | 6 | 55 | 32 | 13 |
| <i>Total</i> | 5 | 7 | 3 | 42 | 43 | 8 | 1 | 3 | 8 | 49 | 31 | 100 |

⁹³ An online consultation on the Commission Communication “Science and Technology, the key to Europe’s future – Guidelines for future European Union policy to support research”, COM(353)2004, was open to all interested organisations and individuals to participate in between 30 July and 15 October 2004. Over 1700 organisations and individuals from across Europe and other countries, and including universities, large companies, SMEs, associations and government bodies responded to the consultation.

Similar views on the need to improve the coordination of public R&D in Europe have been expressed by the R&D actors (mainly national research programme owners and funding agencies) that participate in the ERA-NET scheme.⁹⁴ They provide some striking examples of the need for more coordination in specific S&T fields. Virtually all of the 71 networks have reported that their specific areas of science and technology are fragmented or sub-optimally organised at the European level and that measures need to be taken to increase the coordination of the national public research efforts. Table X presents some of the most significant quotes extracted from ERA-NET reports.

⁹⁴ Set up in the sixth framework programme for research and technological development to support the networking of national and regional research programme owners and managers.

Table X: Evidence of fragmentation and coordination failure from ERA-NET reports.

| ERA-NET | Quotes from reports/websites |
|----------------|---|
| HY-CO | <p>The study will help to overcome the fragmentation and compartmentalisation of research efforts in the EU through better coordination and cooperation. (HY-CO, Co-ordination Action to Establish a Hydrogen and Fuel Cell ERANET, Hydrogen Co-ordination, <i>Report on analysis of data collected Work Package 2, Deliverable D2.2</i>, 10 Feb 2006, p. 11) ; "The public funding for H&FC programmes varies significantly between countries" (HY-CO, Report on indicators of hydrogen and fuel cells research, 27 Sep. 2006, p.19), "Overall, it appears that the EU25+ is spending too much on research into stationary applications, and not enough on research into hydrogen production, storage and distribution and portable applications. [...] cooperation between small research programmes in different countries can deliver benefits to the EU25+ as a whole by efficiently allocating resources according to which areas require further research" (HY-CO, <i>Report on indicators of hydrogen and fuel cells research</i>, 27 Sep. 2006, p. 35).</p> |
| PV-ERA-NET SP1 | <p>"national efforts from the European point of view are still relatively fragmented in the way that they often lack transnational coherence in terms of mutual knowledge, topics, approaches and cooperation" (PV-ERA-NET SP1, <i>A Programmers' Approach to Strengthen Europe's Position in PV Research and Technology Paper</i>, p. 1)</p> |
| BONUS | <p>"Baltic Sea research is carried out in all riparian countries in tens of research institutes and universities and through hundreds of projects and thousands of scientists." (<i>BONUS REPORT on Task 2.1 Identification of areas for cooperation in existing programmes and gaps</i>, p. 3), "A recent summary (Report of the CREST Working Group on the Mutual Opening of Member State Marine RTD Programs (Final report, October 2003) revealed that the concepts, strategies, and the scientific and technical implementation of European marine research programmes vary in general and in the Baltic Sea region in particular. The national research policies and legal and administrative procedures for funding research programmes differ for each country and, therefore, no coordination exists between these disparate approaches." BONUS Publication n. 1, <i>Baltic Sea Research benefits from funding cooperation</i>, p. 6.) "The amount of data and literature concerning the chemistry, hydrography, and fauna and flora of the Baltic Sea is abundant but often nationally scattered in numerous languages. Thus, studies synthesizing and combining the data and information sources across and between sub-regions of the Baltic Sea are generally scarce." (BONUS Publication n. 5, <i>BONUS-169 Baltic Sea Science Plan and Implementation Strategy</i> p.13)</p> |
| EUROPOLAR | <p>"There is a high diversity of organisations that manage and fund research in the Polar Regions in Europe. A key challenge in the overall system is that management strategies are not sufficiently harmonised."p.6, "The assessment indicates that direct financing models for research in Polar Regions are complex. There are a multitude of systems operating in the current polar RTD landscape." p. 10. "Another obstacle [...] is a general fragmentation of scientific activities and infrastructures which may cause overlapping and increase of costs of research in European polar regions." (European Polar Consortium, <i>The landscape of European Polar Research VOLUME I: An assessment of current strategic management, polar programme definition and processes</i>)</p> |
| BIODIVERSA | <p>"Both the European Commission and the Research Ministers of the Member States have recognized the need for improved European co-ordination specifically in Biodiversity science. While the diversity of biodiversity funding programmes poses many challenges, many Member States have fundamentally similar aims and objectives, implementation and evaluation procedures etc. BiodivERsA will address this and the priorities of the ERA, to cultivate and support Europe's biodiversity research capacity and capability."</p> <p>(http://www.eurobiodiversa.org/index.php?option=com_content&task=view&id=78&Itemid=91)</p> |

| | |
|-----------------|---|
| | |
| CIRCLE | <p>"Before the CIRCLE SSA: The EU has many excellent Climate Impact Assessment and Adaptation related research units in different countries focussing especially on the topics relevant for their distinct geo-climatic situation. Research projects are carried out either nationally or in European consortia within the Commission's Framework Programme. Cooperation on a regular basis between the national programmes is almost impossible. Links between the national programmes and the Framework Programme are very weak. There are almost no pertinent research funding activities in the candidate or new Member States". (CIRCLE, <i>Continuously Open Call Coordination Action (Ca) Proposal, Part B</i>, 2005, p. 18)</p> |
| CRUE | <p>"The collation of information from CRUE partners yielded a remarkable result: 33 FRM-linked research programmes, about 180 research projects, 57 principal FRM funding bodies, 92 national "think-tanks" regarding FRM research, and 27 national and international FRM research networks have been identified." (CRUE, Main Report, 2007, p. 4) "In recent years, Europe has suffered a number of severe river and coastal floods [...] National governments have responded with research into flood risk management and mitigation, but there has been little coordination of their programmes." "Sometimes within a single country, several organisations, such as agricultural and environmental agencies, research councils and water boards, may carry out uncoordinated programmes. One of the aims of CRUE ERA-NET is to reduce this fragmentation by synthesising information on Europe's flood risk management research programmes and enabling partners to share insights into flood risk management. Flood processes and mitigation measures often apply to similar situations in different countries and a given flooding event can cross a frontier in seconds. Co-operation within and between national programmes – on research, prevention and mitigation – should therefore greatly increase the effectiveness of flood management." http://www.crue-eranet.net/about_CRUE.asp?more=1</p> |
| NETBIOME | <p>"the European Biodiversity research is highly fragmented within and between the Member States. [...] This fragmented situation is amplified in the overseas regions and territories. Several critical barriers hinder cooperation of the overseas regions and territories between themselves, with continental Europe and with third countries, among which very long distances, isolation and time differences between these regions spread over the world, deficiency of resources and critical mass, lack of timely access to facilities, lack of awareness and difficult access to information.</p> <p>Thus, both cooperation and coordination of research programmes on these issues are poorly done, between the regions themselves and between them and continental EU countries and funding is scattered. [...] There is a specific need of better coordination at regional levels of these different tropical and subtropical regions and to improve relationships within different levels of R&D governance: EU, national, territorial/regional. This would avoid this fragmentation and dispersion of resources and would allow implementing a durable co-operation between the different regional funding agencies and those acting at the national and EU levels, and even international." (Source: NETBIOME, <i>Annex I – « Description of Work », 30 11 2006</i>)</p> |

| | |
|-----------------------|--|
| SNOWMAN | "more than half of Europe has no special funding programme related to contaminated soil and groundwater and those countries which have, have no coordination what so ever among them " ("A SNOWMAN's Navigator through Research Funding Programmes across Europe"; http://www.snowman-era.net/downloads/Navigator.pdf .p.3) |
| ERA-AGE | "Ageing research in all ERA-AGE partner countries seems to be well established though not nationally coordinated . [...] Ageing research on the European landscape is fragmented and there is an urgent need to plan and coordinate it strategically at the national as well as the European level." (Summary Recommendations From The Report Of The First Meeting Of The European Forum, 16th and 17th February 2005, p. 2) |
| NEURON | "while the cooperation level among research institutions in the various European countries appears satisfactory, clear deficiencies are present with regard to the coordination of respective research funding . Funding activities are fragmented and scattered at national and regional levels, and only few approaches have been undertaken to phase them. Thus, the coordination of national and regional funding programs can improve efficient use of high but still limited resources , and increase their impact. Coordinated funding activities can avoid redundancy, fill gaps, and use synergies." (source: http://www.neuron-eranet.eu/en/118.php) |
| CoCanCPG Life Science | "The analysis of this survey shows that the management and funding of Cancer CPG research is very fragmented . In some countries and regions, such as France, Netherlands and Spain, there are specific organisations responsible for these programmes. In other countries, the cancer clinical practice guidelines research programmes are integrated in programmes that cover other medical specialties, in some cases, and in programmes that have a much wider scope than clinical practice guidelines in other cases. This research domain is at the intersection between health services research (e.g. quality of care, accreditation, evaluation) and medical specialties research. There are also spectacular differences in the level of funding available for these research programmes ." CoCanCPG, Final report on survey of organisations, 2004, p. 7) |
| PathoGenoMics | "In contrast to human or plant genome research with long-lasting and well-cooperating national programmes in several European countries, the present programmatic situation concerning genome research on human-pathogenic micro-organisms (in the following termed as "pathogenomics") is rather dispersed and non transparent . Specifically matching programmes are rare (at present only in DE, formerly in the UK), whereas the most funding activities are spread into more general programmes for biotechnology, genomics, or general microbiology (as e.g. specific action lines, priority thematic areas, or sub-programmes)." (COORDINATION ACTION (CA) PROPOSAL PART B "PathoGenoMics p.7) |
| E-RARE | Research needed to tackle rare diseases is "hampered due to their special idiosyncrasy: complex phenotypes, thin distribution of patients (which impairs gathering of enough subjects for suitable studies), isolation and low number of specialized research groups for each specific disease, fragmentation and lack of standardisation of available data and material collections ." http://asso.orpha.net/ERANET/cgi-bin/articles.php?lng=en&pg=17 |
| HESCUAEP | "the overall objective of HESCUAEP is to coordinate the National/Regional Research Programmes in the field of the management of medical emergencies, thus overcoming their current fragmentation, and creating a sustainable long term cooperation , in order to improve their overall management, and improve the overall European EMS.p.7 [...] Research programmes are scattered, inhomogeneous, very often not related to a EMS specialty, but linked with other transversal topics, such as cardiology or traumatology." p. 10 (HESCUAEP, Speakers Presentations, <i>European EMS: the HESCUAEP project</i> , March 2005) |

Main inter-governmental and Community actions for trans-national R&D cooperation

A variety of schemes and institutions have evolved in Europe over the last fifty years which involve trans-national research cooperation.

The first important steps in European scientific cooperation were made in the 1950s in the form of CERN and Euratom, which emerged from the post-war political environment of cooperation-building Europe. During the 1960s and 1970s more institutions were created – including the European Southern Observatory (ESO, funded in 1962), the European Molecular Biology Organisation (EMBO, funded in 1964), the Institut Laue-Langevin (ILL, funded in 1967), the European Space Agency (ESA, funded in 1974), the European Molecular Biology Laboratory (EMBL, funded in 1974) and, more recently, the European Synchrotron Radiation Facility (ESRF, funded in 1988). The 70s also witnessed the creation of the European Science Foundation – and a multi-sector cooperation scheme COST was established. By the 1980s Europe was increasingly concerned with a growing technology gap vis-à-vis its global competitors, and this period saw the arrival of two important multi-sector programmes: the EU RTD Framework Programme and EUREKA, which became major elements of the European cooperative research landscape.

CERN, in particular, is the world's largest particle physics centre. Its main mission is to perform fundamental research in particle physics and provide the necessary infrastructure and facilities. It also defines, coordinates and follows up the strategy for development of Europe-wide programme in particle physics.

EMBL is one of the leading research organizations in molecular biology in Europe. Its missions are to perform basic research in molecular biology, scientific service provision, advanced training, development of new technologies and instrumentation and technology transfer.

ESA promotes cooperation among European States in space research and technology for scientific purposes and for operational space applications systems in terms of national and European space policy, elaboration and implementation of space activities and programmes, coordination of European and national space programmes, and by elaboration and implementation of a coherent industrial policy. The MS funding channelled through ESA is predominantly based on the principle of geographic *juste-retour*. The domain of space stands out in that the area is highly coordinated at European level through ESA (representing some 65% of the total funding in Europe) whilst the R&D is carried out individually at national level. The area is also somewhat apart in that the funding is predominantly industry oriented and passed via procurements.

These inter-governmental organisations – along with the others – have become world leaders in their fields. Moreover, they offer benefits of pooling resources to share the costs of developing large-scale and expansive research facilities, and they promote a greater coherence and effectiveness of research activity

However, inter-governmental organisations have certain limitations. For example, it has been remarked that the time taken to establish and raise funding is frequently very long; that they have a certain conservatism resulting from their fixed orientation towards specific disciplines (although over time, many are able to evolve to meet the needs of different sets of users or are upgraded to meet the evolving needs of the original scientific community); and that they have difficulty in growing sufficiently in areas of extremely rapid scientific or technological development (requirement for additional resources which cannot be generated easily by shifting priorities amongst compartmentalised institutions).⁹⁵ The main complementary funding schemes which exist which encourage trans-national R&D cooperation are the EU Framework Programme, COST and EUREKA.

The EU Framework Programme for Research and Technological Development is a Community instrument. It has proven to be a very effective mechanism over the last two decades for promoting trans-national cooperative R&D in Europe, and has been able to provide an increasing source of funding in recent years. Because it operates as a fixed-length multi-annual programme, it has been able to re-shape itself and innovate over the years. The 7th Framework Programme launched in 2007 introduced two major new cooperative initiatives: the European Research Council – a competitive funding scheme at a European level for investigator-driven frontier research – and the ITER project a world-leading international collaborative project with the goal of taking the next major step in the development of fusion energy.

COST is an inter-governmental scheme which facilitates and funds coordination and exchanges between nationally funded researchers across Europe, in a variety of research fields. It is bottom-up and wholly financed by the FP. COST has received strong support from stakeholders, and is more open to new areas and has wider geographical coverage than the FP. However, its complicated governance structure is not well embedded in the national and European research policy strategy processes.⁹⁶

EUREKA promotes collaborative industrially and market oriented research projects. It generates bottom-up “innovative” projects, as well as "Clusters" and "Umbrellas". EUREKA has a strong networking capability, a flexible bottom-up approach particularly geared towards SMEs. However, some shortcomings of EUREKA have also been the subject of debate,⁹⁷ for example the lack of central evaluation, project monitoring and decision-making capacity, leading to asynchronic funding of different partners in a given project. It has also been suggested that the predominantly bottom-up character of EUREKA leads to a lack in focus

⁹⁵ Note of panel F of the Conference on research infrastructures of 19-20 September 2000 in Strasbourg.

⁹⁶ The COST Final Review in FP6 concludes "Of great concern to the Panel is that despite several improvements, the governance structure of COST remains extremely complicated. The review panel's main concern is that there is little clarity on the roles and decision-making powers of each of the different actors, in the overall governance picture and for the final responsibilities for COST activities in particular. The current governance arrangement does not provide sufficient impetus particularly concerning the strategy formulation and positioning of COST.... The Panel makes the observation that overall the Committee of Senior Officials is not well embedded in the research policy strategy process in their member States nor in wider EU research policies. The strategic development of COST remains relatively isolated from research policy in their Member States, which hampers the visibility and leverage effect of COST." Final review of COST in the Sixth Framework programme, High Level Panel Chaired by Mrs Monfret, 31 May 2007. As follow up to the recommendations of the Final Review, COST has set up a small group to identify solutions to the governance issue. As a further step, COST legal status and governance is expected to be discussed at the COST Ministerial Conference in 2009.

⁹⁷ Impact Assessment of the Artemis Joint Technology Initiative (2007).

and impact of national efforts. In the Eurostars programme (a joint initiative by the EC and EUREKA, based on Article 169) these shortcomings have largely been addressed, with, amongst other things, a central evaluation mechanism and pre-defined financial commitments.

Scale of inter-governmental and Community actions for trans-national R&D cooperation – methodological note

As discussed in section 2.2.2, according to our estimates, the share of inter-governmental and Community actions for trans-national R&D cooperation in total government financed civil Gross Expenditures in R&D (GERD) has remained relatively stable over the past 15 years, oscillating between 16 and 14%.

This ratio was derived by several statistical sources. Total government financed GERD for EU27, EFTA countries, Switzerland, Turkey and Croatia comes from EUROSTAT. The disaggregation between civil and defence GERD is estimated by applying the percentage of civil and military Government Budget Outlays or Appropriations of R&D (GBOARD) in the total R&D appropriations.

The government funded R&D expenditures of intergovernmental organisations are obtained by summing up national contributions to the budget of CERN, ESO, EMBO, ILL, ESA, EMBL and ERSF. These data were kindly provided by the organisations themselves.

Estimates for the intergovernmental scheme EUREKA were obtained by adding up the total budget of Clusters and Umbrellas. Roughly 99% of these expenditures are originated within the ERA. The yearly amounts were then subtracted from the industry financed GERD (50%) and from the government financed GERD (50%) to correct for double counting. Public funding schemes within EUREKA differ significantly across member states and the 50% key was a rough estimate.

Finally the R&D expenditures financed through the FP programmes were obtained from the EU budget. 6% of the total amounts were subtracted to take into account the non R&D administrative costs necessary to manage the FPs. Consistently with the FRASCATI manual only the administrative costs of the indirect actions within the FP were deducted. The share of 6% is also consistent with the Parliament and Council decisions fixing the Commission's administrative expenditure for the management of FP7 programmes at less than 6% - apart from the ERC whose administrative expenses will be less than 5%.

An assessment of recent attempts to enhance coordination of public R&D through the Community Research Framework Programme (FP6)***ERA-NETs***

ERA-NETs were conceived under the 6th Framework Programme as a bottom up approach for bringing together managers and owners of national research programmes in fields they identified as needing more coordination. 71 ERA-NETs were launched under FP6, which have resulted to end 2007 in more than 80 joint calls totalling over 800 million euros. ERA-NETs have been widely welcomed by the research community who appreciate their bottom-up nature, and their variable geometry. The mid-term review found that they fulfilled a real need and helped to overcome barriers to coordination, by creating a European networked "community" of programme owners and managers.

The ERA-NETs' inclusion of 'programme owners' as well as 'programme managers' has been an important aspect of their success, given the longer-term aim of altering perceptions in ministerial circles about the importance of trans-national research activities. Extending the invitation to participate to regional 'owners' and 'managers' was also seen as astute given the importance of regional R&D governance systems in some national settings and the growing importance of the regional level in European RTD and innovation policies.⁹⁸

A report by OPTIMAT⁹⁹ concluded in 2005 that the bottom-up ERA-NET Coordination Actions have significantly increased networking activity across all types of programmes, but there is still a lack of high-level, strategic action to increase the alignment and coordination of national programmes. ERA-NETs suffer indeed from certain structural weaknesses: administrative and legal barriers to cross-border funding have hindered the setting up of joint programmes and there is still a reluctance to open up programmes and funding to foreign participants. More specifically, ERA-NETs have been initiated in a bottom-up way, but without being embedded in national research strategies. Also, the bottom up nature sometimes resulted in fragmented coordination of a given research field, where a "larger topic" might have resulted in more critical mass, strategic focus or national commitment. Whilst the ERA-NET scheme is only 4 years old, only in a few cases have national programmes been modified as a result of ERA-NET actions.¹⁰⁰

More in detail, the mid-term review of ERA-NET concluded that:

- (1) The ERA-NET experience was positive for networks of national/regional programmes willing to set up a central monitoring facility and information resource, as far as the programme owners were sufficiently involved and committed, and where a long-term approach was taken and intelligence shared.
- (2) The experience was less positive in cases where the levels of decision-making were not well connected, where ring-fenced budgets to support joint activities were not

⁹⁸ ERA-NET Review 2006 (2006).

⁹⁹ Examining the Design of National Research Programmes - Optimat Ltd and VDI/VDE-IT GmbH (European Commission, DG Research, Directorate M2) - December 2005

¹⁰⁰ Report of the ERA Expert Group on Optimising Research Programmes and Priorities, 2008

available, where the strategic positioning was insufficient with respect to both home-based activities and Framework Programme activities, and where efforts to build case history were not strong enough.

- (3) A major drawback was the lack of information on respective programmes, activities and governance modes. Implementation of common, transparent information and learning platform is urgently needed.
- (4) The success of integrated programmes managed jointly requires the prior commitment of participating countries, the common understanding with regard to expectations, and a more accurate design phase to ensure that joint activities and pre-existing national assets enhance each other.

In ERA-NETs full programme integration is not obligatory (although it is a target in the later steps in the process), and has not really been achieved so far. Through ERANET, some progress has been made towards cross-border programme integration. The Optimat report¹⁰¹ concluded that "*bottom-up ERA-NET Coordination Actions had significantly increased networking activity across all types of programme*". There have been examples of systematic exchange of information and good practices on existing programmes, as well as the development of joint activities between national or regional programmes and the implementation of joint transnational research activities.¹⁰²

Yet ERA-NETs are unable to fully overcome the many persisting Member State domestic barriers to cross-border programme integration and achieve full programme integration. In some cases countries, do not have clearly identified pre-existing national programmes which can be integrated into a cross-border programme. In certain cases, national legislation makes it impossible to contribute to a multi-annual common pot financing joint calls. And sometimes there is a lack of political commitment to cross-border programme integration (because of fear of loss of control, loss of visibility, etc.).

In conclusion, despite the increasing number of joint calls it appears that there still is a lack of high-level, strategic action to increase the alignment and coordination of national programmes, and that anecdotal evidence suggested that a lack of political will was holding back progress towards Joint Programming in many ERA-NET projects. The report also detected a high degree of resistance within the ERA-NET community to contributions to multilateral programmes with a central budget because of the loss of financial control that it would entail, and the Optimat report concluded that ERA-NETs could create more alignment if they could influence policy at the critical design or evaluation milestones in programme life cycles.

¹⁰¹ Examining the Design of National Research Programmes - Optimat Ltd and VDI/VDE-IT GmbH (European Commission, DG Research, Directorate M2) - December 2005.

¹⁰² Including the adoption of standard operation procedures (ERASYSBIO); the development of common evaluation procedures (Safefoodera); the development of an electronic project proposal submission system and project management web tool (Acenet); the exchange of evaluators between programmes (MATERA); the exchange of programme managers (Norface); and the development of multinational evaluation procedures, common programme monitoring and evaluation, personnel exchange at programme manager level (Bioenergy).

European & Developing Countries Clinical Trials Partnership (EDCTP)

Article 169 is another instrument of coordinated programming launched under FP6 and FP7. The main objective of an Article 169 initiative is to go beyond the mere coordination of national programmes to achieve the real integration of different national and regional programmes into a single joint programme. An Article 169 initiative is implemented jointly, and funded through integrated financial support.

Unlike an ERA-NET, in an Article 169 initiative the Union does not just support the simple coordination of the national programmes undertaken by Member States but rather participates actively including a Community financial contribution for research. While some new 169s are currently being launched, so far experience has been limited to the first one EDCDP. The main drawback found has been the difficulty in identifying the relevant national programmes and in achieving a full integration of these programmes through a "common pot" of funding. The Article 169 instrument is also limited to the themes of the Framework Programme. It also arguably lacks a higher level strategic focus.

Experience from the first Article 169 initiative, EDCTP, has been useful in learning lessons for the future. Full programme integration remains a long-term objective. Indeed, most Member States signing up to EDCTP were not aware of the implications of Article 169 in terms of fresh funding, joint ownership and sharing of expertise.¹⁰³ In most countries, research activities were not integrated into a credible national programme, which made it difficult to integrate national programmes into a Community programme.¹⁰⁴ In some Member States, legislation does not allow for providing public financial support to foreign institutions. In others, annual parliamentary approval is required for such support. Some did not really wish to abandon their national programme. For instance, Member States with a high political profile in Africa did not want to lose control over or the visibility of their own national flagship projects. Several Member States were not yet ready to accept that their money could be spent on foreign research teams. As a result of all this, programme integration, while progressing, remained limited.

National activities were labelled 'EDCTP' when adjusted to EDCTP goals. "The so-called "integrated activities" referred to national activities related to EDCTP (clinical trials on the three main poverty-related diseases in sub-Saharan Africa). The concerned Member States certified the activity as of potential interest for the EDCTP and, in the case of including a minimum of 2 EDCTP participating countries (fulfilling the "European Integration" objective of Art. 169), included it as a budget contribution to the Joint Programme".¹⁰⁵ Most national agencies were not yet able or prepared to finance EDCTP activities directly. They often required separate calls and evaluations and insisted on a systematic "juste retour" for their own researchers. Such legal and administrative limitations proved an obstacle to programme integration and made the EDCTP coordination complex, bureaucratic and unattractive for industry as well as for African researchers.¹⁰⁶ The Independent External Review panel felt that Member States should accept that programme integration takes place through a single EDCTP procedure for planning, launching and evaluating calls, with no national strings

¹⁰³ Van Velzen et al. (2007), Independent External Review Report, European and Developing Countries Clinical Trials Partnership, p. 21.

¹⁰⁴ Ibid., p. 22.

¹⁰⁵ Ibid., p. 23.

¹⁰⁶ Ibid., p. 21.

attached, and should agree to contribute to a “common funding pot” according to a predetermined allocation key.¹⁰⁷

On overall, although EDCTP encountered many difficulties from 2003 to 2006, in part due to its ambitious goals, the last year has brought to EDCTP clear and promising progress, with renewed administrative structures, additional calls for proposals in all main scientific topics, and new budget contributions and commitments from participating Member States.

The lessons learned from these first experiences have been crucial in developing and improving the next generation of ERA-NETs and Article 169s .

In particular, a pre-requisite for Article 169 Initiatives under FP7 is that they should demonstrate a high level of integration at three levels: scientific, management and financial. Reflecting the EDCTP experience, financial integration is considered particularly important.

The scientific, management and financial integration represent essential boundary conditions which must be met satisfactorily before bringing forward a proposal for an Article 169 Initiative under FP7. These boundary conditions have been applied in the case of the four Article 169 initiatives relating to programmes for research performing SMEs ("Eurostars"), use of information technology for assisted living for the elderly ("AAL"), metrology ("EMRP") and research in the Baltic Sea area ("BONUS-169").

¹⁰⁷ Ibid., pp 28-29.