



Optimising research programmes and priorities

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**Optimising research
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Optimising research programmes and priorities

Report of the ERA Expert Group

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This is the Final Report of one of the seven Expert Groups set up by DG Research of the European Commission in the context of the follow-up to the Green Paper "The European Research Area: New Perspectives" adopted by the Commission on 04 April 2007.

Expert Groups were set up for each of the six ERA dimensions identified in the Green Paper, and one on the overall vision and rationales for ERA.

The list of Expert Groups is as follows:

- EG 1: Realising a single labour market for researchers
- EG 2: Developing world-class research infrastructures
- EG 3: Strengthening research institutions
- EG 4: Sharing knowledge
- EG 5: Optimising research programmes and priorities
- EG 6: Opening to the world: international cooperation in S&T
- EG 7: Rationales for ERA

The overall objective of each of the Expert Groups EG 1 to EG 6 was to identify and define possible measures and actions concerning the relevant ERA dimension, taking into account existing expertise, available evidence and the major elements stemming from the debate launched by the Green Paper. Expert group EG 7 was tasked with developing and expanding rationales for ERA and refining or suggesting a reformulation of the ERA vision proposed in the Green Paper, based on an analysis of the main issues and factors affecting the efficiency, effectiveness and attractiveness of the European research system.

More information on the ERA Green Paper debate, public consultation and follow-up can be found at: <http://ec.europa.eu/research/era>

Preface

The European Research Area is a pillar of Europe's Lisbon ambition to become a global knowledge player and in order to fulfil that ambition it is necessary, whilst respecting fully the principle of subsidiarity, to look to the Member States to bring the optimal coherence and co-ordination to their research programmes, and to the private sector to increase its innovation performance.

Commissioner Potočnik has made it clear that the Commission does not wish to impose the ERA. A genuine European Research Area will only be created if the European Commission, the EU Member States and other stakeholders work together in partnership, each accepting their responsibility to ensure coherence and co-ordination where necessary. Bolstering these efforts, the Reform Treaty of the European Union contains a significant amendment to Article 163 on research. It will provide an explicit legal basis for the establishment of the ERA.

Cohesion Policy has already contributed to the development of RTDI in the EU. Between 2000-2006, some €10.5 billion of Structural Funds was allocated to regions for RTD and infrastructure. This has played a role in strengthening the places where research takes place, the skills of the people who carry it out and linking with the businesses who can exploit it. However, the link between the Framework Programme and Cohesion Policy could and should still be stronger because it is in Europe's interest to have effective links between the biggest EU public funds. The National Reform Plans all emphasise the key role R&D will play in reaching the Lisbon targets and, in respect of innovation and the realisation of our Lisbon ambition, now is the time to move from a phase of 'joined-up' thinking to a phase of **'joined-up' doing**.

I wish to thank the members of the Group who worked consistently through the last 8 months and gave generously of their expertise and experience. I wish to acknowledge in particular the hard work of the two Rapporteurs, Effie Amanatidou and Patrix Boekholt, who distilled the inputs, analysed relevant reports and evaluations and also the results of the EU-wide public consultation to produce this report.

Helena Acheson
(Chairperson)

Executive Summary

This report is written by the European Research Area Expert Group Optimising Research programmes and priorities. The Green Paper on “The European Research Area: New Perspectives” (April 2007) spells out that a core objective of the European Research Area has been to ensure the coherence of European, national and regional research programmes and priorities on issues of European interest. It observes that since 2000 not enough progress has been made on this matter. The Expert Group has discussed these issues, examined the evidence available and developed policy options for the future.

There are many **drivers** for the optimisation of the European research area. Many stem from increased globalisation and internationalisation of research and development. Science and industry are already far ahead in thinking and working across borders, European research policy has been slow to catch up. Today’s fragmented and sub-critical research efforts need an **optimised framework for the funding and execution of research**. Although the architecture of such an optimised framework can be outlined, it needs further debate at a high political level, such as the EU Competitiveness Council, to endorse real improvements in the current legal and political arrangements for research policy.

The **European Research Area** initiatives have stimulated debates and considerations at national and regional level, and between member states, on the role European and international dimensions in national and regional policies and programmes, and on the opportunities offered by trans-border coordination and cooperation between regional and national programmes in Europe. 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. Even though the ERA Green Paper observes that not enough progress has been made on ERA, there is evidence from existing experience that trans-national collaboration has many benefits. Despite the **potential benefits** and **enabling factors**, a variety of **obstacles** need to be removed, some of which will require decisions at the highest political level.

There are multiple trans-national collaboration mechanisms available already; these are portrayed in Chapter 3. However, there has never been a thorough high-level debate or analysis to show how the **portfolio of all these trans-national research mechanisms** contributes to the European challenges and the achievement of the Lisbon goals. Nor have they ever been examined in terms of the way they contribute to or hinder the establishment of an optimal framework for intra-European research coordination. In addition, there is still room for improved coordination of existing programmes and initiatives that are currently operated at the national or regional level only.

A key element of the rationale for more joint actions is to tackle the fragmentation in the research efforts in Europe. However there is still little empirical evidence as to what **fragmentation** and **critical mass** mean for different research domains; which level of fragmentation is counterproductive (being inefficient on a European scale and not providing an adequate level of competition to ensure excellence) and what level of fragmentation is necessary to maintain diversity and competition in the system, ensuring that alternative routes are explored to tackle a problem or to find opportunities. This issue needs to be analysed for different domains, types of research and from a global perspective.

A first and difficult step to take in developing trans-national collaboration is the identification of **joint visions, common goals and priorities** on a European level that ask for a European approach. Only then can common agendas be set about what joint research programmes should be launched or maintained. At the moment there is **not an evident place or platform** to conduct the trans-national debate at a sufficiently high level and which will address the entire portfolio of mechanisms. Existing tools are in use in Europe that could help with such processes such as Foresights, Technology roadmaps and other interactive processes for stakeholder involvement. A differentiated approach to different types of research (frontier, applied, societal research) is also important.

To take the debate a significant step further and to make the overall picture transparent to all stakeholders in Europe, the Expert Group has proposed in Chapter 5 to base the existing portfolio of trans-national research mechanisms more transparently on four pillars and to elaborate an **ERA-Frame** to develop common guiding principles for future trans-national collaborations, particularly in the form of ERA-NET mechanisms, but also for other new joint programmes.

The full portfolio of mechanisms for the implementation of European, national and regional research policies can by and large be considered to consist of **four pillars**:

1. **The European Framework Programmes for Research (FP)**, which focus on the main global research challenges, where projects have a substantial size and many stakeholders should be involved, such as in large collaborative projects with research and business partners. The FP can also cover cutting-edge technologies, where only a few new technology companies and research institutions are involved, and which are not yet organized at a large scale;
2. An **ERA-Frame**, which could be established to encompass all programme coordination activities such as ERA-NETs, JTIs, Article 169 measures and potentially new joint programmes where cross-border research and innovation activities create added value. The ERA-Frame would require a **new Council Decision to establish a common set of principles and operative guidelines to optimise the implementation of this particular pillar**;
3. The **Inter-governmental Agreements for Research** which include existing inter-governmental bilateral and multilateral programmes such as COST, EUREKA and EIROForum as well as potential new ones; their legal basis is set in various frameworks, on a case by case basis. [The common guidelines outlined above could, in some cases, be relevant for these mechanisms as well];
4. **National and regional programmes**, which focus on the development of national and regional research and innovation systems, (where cross-border activities are not a first priority), where research contains logical and strategic national priorities (e.g. military research) or where research is very close to the market and therefore very competitive. However **such programmes could be opened** to non-residents on a voluntary basis, with the careful management of the aforementioned problems.

For pillar two, there is now a need at European level to develop **common guiding principles, rules and criteria** – or a so-called **ERA-Frame** for trans-national collaboration – particularly for the ERA-NET mechanisms, but also for new joint programmes. This is an issue that should be addressed and agreed by the **Council** and has in part already been recommended by the 2006 ERA-NET Review.

The introduction of the ERA-Frame would also present a starting point for **strategic discussions, at both the European and national levels**, on which research problems should be tackled at which level, which instruments are the most appropriate and how more coordination can be stimulated. Preparing such an ERA-Frame at the European level also requires the development of **national and regional strategies and criteria** for the launching of and participation in joint programmes. Clearly defined added value for the different actors has to be ensured. In addition, the extent to which programmes should coordinate and cooperate with programmes from, or be open to, third countries should also be defined. In the interest of the research communities, it will be most important for the future development of the European research and innovation system to reduce the overall complexity of the policy mechanisms. Improved joint programming involving existing and new programmes asks for clearer **frameworks, principles and guidelines** to overcome the existing barriers. In all this the **perspective of the users of research programmes** should prevail.

The Expert Group advises that,

under the aegis of the EU Competitiveness Council, the Member States should:

1. Develop a **common vision** with priorities for **trans-national** research, encompassing regional, national, intra-European and Community funding;
2. Establish an ERA-Frame: a set of common principles and operative guidelines to optimise the implementation of existing and new ERA structuring mechanisms;
3. Implement more **strategic, sustainable and efficient trans-national programming and coordination** of national research programmes and between national funding organisations to fulfil the vision, using **differentiated** approaches for frontier science, applied research and societal research;

4. **Eliminate legal barriers** and **administrative obstacles** for collaboration in trans-national programmes and initiatives;
5. Ensure the **involvement** of programme owners, programme managers and research actors in the whole policy design and implementation process.

The European Commission should:

6. **Evaluate** all ERA mechanisms **individually** and systemically to support the development of a common

framework of principles and operative guidelines (ERA-Frame);

7. Together with Member States and stakeholders, provide **common guidance** and **tools** for the implementation of each of the different ERA mechanisms;
8. Develop material to demonstrate and share, inter alia in an interactive mode, **good practices** and results from trans-national coordination and joint programming.

Table of Contents

Preface	5
Executive summary	7
1. Introduction	13
1.1. The ERA Green Paper and the Expert Group mandate.....	13
1.2. The Expert Group's working method and focus.....	14
2. Optimised research programmes and priorities: the rationale	16
2.1. What are the main drivers and motives for optimisation?	16
2.2. A way to think about Optimisation	17
2.3. Motivations and anticipated benefits from trans-national collaboration	19
2.4. Obstacles and limits to more trans-national collaboration	20
3. The contribution of existing mechanisms to optimised prioritisation and programming.....	22
3.1. A portfolio of different mechanisms to support the European Research Area	22
3.2. Multi-lateral intergovernmental research initiatives and organisations	24
3.3. Bilateral collaborations	25
3.4. Policy coordination in variable geometry arrangements: Open Method of Coordination (OMC), ERA-NETs and Article 169.....	25
3.5. Opening up of national and regional programmes.....	26
4. Coordination in vision building, prioritisation and agenda setting at European level	28
4.1. Developing a common vision and prioritisation for the European research agenda.....	28
4.2. Optimisation in different types of research.....	31
5. Optimising European programme implementation and policy learning.....	34
5.1. Optimising joint programme design and implementation	34
5.2. Optimised policy learning in the ERA: learning from experiences	37
6. Conclusions and Recommendations	40
6.1. Conclusions	40
6.2. Recommendations	41
Annex 1 – Composition of the Expert Group	43
Endnotes.....	44

1. Introduction

Competition is global and world-wide interdependence is growing at an increasing rate. At the same time, we face daunting, world-wide challenges which require concerted action to overcome. Water, food and food safety, demographic changes, security, energy and climate change are just some examples.

There is growing consensus that we need to act together at European level and that leaves the difficult question of how best to do that? Whilst one approach would be to define and implement modalities that stimulate and reward bottom-up initiatives for more competition and more cooperation, there is also a need to define modalities for top down vision and priority setting.

Fulfilling the Lisbon Agenda for Growth and Jobs requires us to structure and enrich the environment in which European science and know-how can thrive. This means marshalling the often disjointed efforts in research. It also means capitalising on Europe's diversity and encouraging regional specialisations.

The ERA is a pillar of Europe's Lisbon ambition to become a global knowledge player and is exemplified by the €53 billion Research Framework Programme 7 (FP7) budget (2007-2013) encompassing:

- European Research Council
- 30 Technology Platforms
- 70 ERA-NETs (networks of national research programmes)
- 4 Initiatives for integrating Community and national research programmes under Art.169 of the Treaty
- 4 Joint Technology Initiatives launched (public-private partnerships)

The **impact** of the aforementioned initiatives depends crucially on the support and contributions of the Member States and their regions. It is there that the greatest efforts in public research are made and where the vast bulk of public resources lie.

The €53 billion which will be channelled through FP7 between 2007 and 2013 represents a small fraction of the EU public research effort. To date, some 85 % of the public funds for research in Europe has been spent through national and regional programmes with still too little or no cross border cooperation and coordination. The limited number of experiments which have taken place in the field of joint programming, involving the national ministries and funding bodies, have been taken in the context of the Framework Programmes through the ERA-NET scheme and the first Article 169 initiative. Although the first assessments of these actions have been positive, amongst the weaknesses observed is a lack of commitment at the higher management level within the organisations involved. The experience of the national research councils in the field of joint programming has also been limited to date. Although the EUROCORES and EURYI schemes were successful, from a financial point of view, they involved a fraction of the €30 billion which these organisations spent on research on an annual basis.

1.1. The ERA Green Paper and the Expert Group mandate

This report is written by the European Research Area Expert Group Optimising Research programmes and priorities. The Expert Group was set up by DG Research of the European Commission in the context of the follow-up to the Green Paper on "The European Research Area: New Perspectives" adopted by the Commission on 4 April 2007. The ERA Green Paper spells out that a core objective of the European Research Area has been to ensure the coherence of European national and regional research programmes and priorities on issues of European interest. It observes that since 2000 not enough progress has been made on this matter. The Expert Group has been brought together to discuss these issues and develop policy options for the future.

The overall objective of the Expert Group was to identify and define possible measures and actions concerning the dimension "Optimising research programmes and priorities", for the development of the European Research Area (ERA), as spelt out in the Green paper. This

dimension is elaborated in paragraph 3.5 of the Green Paper, where the following questions are put forward:

- Should common principles be developed and used for peer review, quality assurance and joint evaluation of European, national and regional programmes?
- Should these programmes be opened to participants from other Member States, and how?
- Is there a need for shared principles of accountability of public research funding, which would enhance simplification of rules and procedures and increase its effectiveness and efficiency?
- What participative processes need to be put in place to enable public authorities to jointly identify and decide upon major societal issues requiring a pooling of resources and capacities?
- On such societal issues of European or global dimension, how could principles and modalities be established and tested for joint programming of research, involving all stakeholders (research institutions, business, civil society, etc.) and bringing together funding from the EU, national, regional, business and philanthropic sources?
- Should the European Commission seek membership of intergovernmental research organisations?

The specific tasks of the Expert Group were to:

- Review and assess the current situation regarding the programming and the structure of research programmes in the European Union, providing an overview of recent initiatives, current challenges and existing trends;
- Identify issues at stake which may require new policy initiatives;
- Identify and develop a number of policy options to address these issues, as well as evidence justifying the need for such measures;

- Further develop building elements which could be used in constituting an *ex ante* **impact assessment** of actions planned for the follow up of the Green Paper process;
- Develop the concepts and methodological approaches for **further in-depth studies** (for instance, studies by sector/ field of research) allowing notably to address unresolved issues encountered in the previous tasks.

1.2. The Expert Group's working method and focus

The Expert Group has written this report on the basis of the individual expertise of its members, as well as on collective debate and brainstorming. Individual inputs were made by the experts in the form of written contributions on a specific topic of expertise. The joint inputs were developed in the debates during the five meetings of the Expert Group in the period of June 2007 to January 2008. In addition, in order to base the report as much as possible on evidence, existing studies and experiences that underpin the report were taken into account as far as possible including an analysis of the results of the public consultation on ERA. The results from the Green Paper consultation process have provided the Expert Group with the views from different organisations and research communities in Europe, which have been incorporated in the report. The conference The Future of Science and Technology held in Lisbon on 8-10 October 2007 gave the Expert Group the opportunity to discuss the topic with a wider audience and this provided useful ideas on which the report has built further. The final report reflects the results of all these inputs.

The Expert Group started its task with an open view on the subject of trans-national collaboration of national and regional programmes and the further implementation of ERA. The feasibility to increase European collaboration and integration is not taken for granted and the Group has critically looked at its success factors as well as its limitations. This included a further discussion of what 'optimisation' does and could mean in policy practice, not only from the perspective of Europe, but also from

the point of view of the Member States. The Expert Group, has chosen to adopt a focused 'working definition' of optimisation: methods, instruments, policies and framework conditions that increase the impacts – in terms of progressing the Lisbon agenda - of the resources invested in RTDI, at EU, national and regional levels

The Expert Group started with identifying those elements of the discussion on optimising research programmes and priorities, where it could have a particular added value in the public debate (Chapter 2). The Expert Group

has taken a wide view on the topic while at the same time aiming to produce a report that is both pragmatic and possible to implement. Chapter 3 discusses current mechanisms for trans-national coordination. Chapter 4 and 5 discuss options for optimisation and prioritisation of actions in different phases of the policy cycle: respectively the vision building and agenda setting activities and secondly the programme design, management and policy learning. The report finishes with conclusions and a set of recommendations to the key stakeholders involved.

2. Optimised research programmes and priorities: the rationale

2.1. What are the main drivers and motives for optimisation?

What drives the need to make Europe's research policy more effective, more 'optimal' in terms of reaching the Lisbon or challenges and developments that amplify the need to use Europe's research resources in an optimal manner:

- Increased global economic competition, where knowledge has become a crucial factor to create added value and to remain competitive. While rising global competition was for a long time conceived as the threat of 'low cost' countries, increasingly these low cost countries are investing in research and technology. While the EU has for years identified an R&D gap with the United States and Japan, the fast emergence of countries such as China, Singapore and India in science, technology and engineering poses another threat to its competitive position;
- Increased internationalisation of R&D where, on the one hand, research talent is becoming a scarce resource and at the same time more and more mobile. On the other hand, globally operating firms are seeking opportunities to work with the most excellent research hubs regardless of their geographical location. The greatest benefits will accrue to those countries that can most efficiently access, adopt and exploit new technologies developed at whatever geographical scale, also world-wide;
- Societal problems that run across national borders and which have to be tackled trans-nationally in some cases globally (e.g. climate change, energy sources).

The challenge in addressing these global developments is to arrive at an **optimised** research and innovation policy framework, at the European, national and regional level. Why is today's research policy not perceived as optimised? First – with the exception of some of the European programmes and large national programmes - public **funding** for research is **fragmented** into many small regional and national programmes and funds for research institutions. Therefore research issues that are dependent on critical mass, do not

receive the appropriate dedicated funding on a European scale. Coordinating or joining up now separate programme activities are options that would help increase critical mass, in terms of **scale and scope**. Critical mass in turn can help support global **excellence** as well as the **economic and societal relevance** of European research.

Second, as research programmes are not coordinated sufficiently between regions and member states, a **duplication of research execution** occurs. A certain degree of diversity, duplication and competition is healthy for a dynamic research system but given the scarcity of resources for R&D this needs to be within reasonable boundaries. In tandem with the fragmentation of research funding is the fragmentation of research performers (universities, research organisations, research groups centres etc), not able to reach the scale and scope necessary for achievements of global excellence.

The ERA Expert Group dealing with the Rationale for ERA¹ has elaborated the question of fragmentation extensively and has found enough evidence to support the need to increase coordination efforts.²

It is an important assumption of the ERA philosophy that the unfavourable aspects of fragmentation could be overcome if better coordination and collaboration takes place of science and research in Europe. More specifically this would imply:

1. A better coordination of research policies and priorities;
2. A better coordination of funding of research by public authorities, funding agencies and research councils (programme owners and programme managers);
3. More trans-national collaboration between (public and private) research performers, including increased mobility of human resources (partly through better funding mechanisms);
4. Greater accessibility to research facilities and funding for all research performers in Europe (partly through better funding mechanisms).

By reducing the fragmentation of public funding schemes for research on a European scale, a restructuring effect is expected to take place in the research communities, who use these public research funds. What are the motivations and anticipated benefits to engage in enhanced coordination and collaboration of regional and national policies and what inhibiting factors have meant that little progress has been made? There is still **little empirical evidence** to identify what critical mass means for different research domains, what fragmentation is inefficient on a European scale and what level of fragmentation is necessary to maintain sufficient competition in the system to ensure excellence and that alternative routes are explored to tackle a problem or to find opportunities.

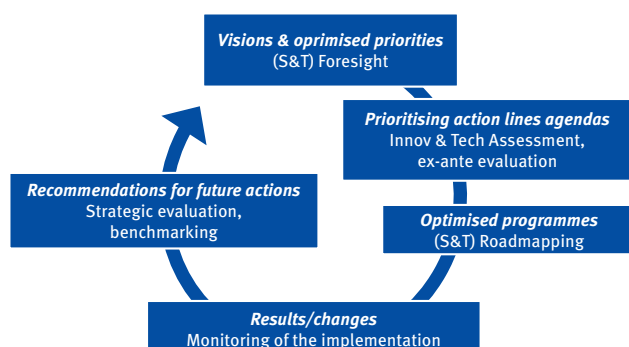
2.2. A way to think about Optimisation

The Expert Group has found it useful to structure discussions around the following simplified concept of the policy life-cycle in order to have a more holistic and systematic approach to the questions raised in the ERA Green Paper regarding the Optimising of Research Programmes and Priorities, previously referred to in section 1.1 of this Report.

The figure below indicates the key phases of the policy life-cycle as well as the main strategic policy intelligence tools applied in each phase. The Group also considered what optimisation might mean for the different phases (Chapters 4 to 5 of this Report).

FIGURE 1

From Vision to Action to new Futures



Source: adapted from Clar G. et al. (2008).

1. A decision-making process aims to shape the future state of and address challenges faced by the society. It starts by developing ideas and **defining visions and optimised priorities** of how the future should - and could - look, developing the recommendations on how best to realise the visions, and pointing to priorities that could be set. In order to collect inputs and to manage different options on future actions several tools can be used here: Foresight exercises and various participative processes, to involve stakeholders in prospective debates, to agree on broad priorities, to converge on choices and thus generate **the commitment to act on them**.
2. Once the preferred vision is defined, discussed and agreed upon, lines of actions have to be prioritised, the implications of adopting particular options have to be assessed, and an agenda detailing the steps to be taken to move towards the vision needs to be worked out. **Prioritised action lines and agendas** cover the process to define the policy objectives, and should be firmly based on the results of the previous (i.e. the Foresight) phase to deliver implementable outcomes. Technology and Impact Assessments, e.g., could be used here to assess:
 - Which of the possible options are feasible under the respective circumstances
 - Which impacts are to be expected for the different actors involved and affected, and how they can best be addressed to ensure an implementation for the benefit of all.
3. **Optimising programmes**, thus detailing the agenda, covers the part of the policy cycle where the issues that have got onto the policy agenda are formulated into concrete initiatives, programmes or policies to be implemented. An S&T roadmapping exercise can at this juncture be useful in detailing the concrete steps needed to operationalise the objectives of the policies, e.g. in the form of optimised programmes.
4. The **monitoring of the implementation (results and changes)** part of the policy cycle refers to the application of the policy measures developed in the previous phase. Implementation should be accompanied by ongoing monitoring activities to ensure that the process is followed-up adequately, that appropriate actions are taken and the expected outcomes are achieved.

5. Finally, the results of the process should be examined by means of strategic evaluation and benchmarking in order to make **recommendations for future actions**. This phase also includes policy learning which comprises all processes by which knowledge and understanding is generated within and fed-back into decision-making processes about:

- The underlying causes and preconditions for policies and initiatives, and
- Their effects and impacts.

To close the circle, outcomes of this phase should be used to provide new input for the future formulation of visions and the optimisation of priorities.

One aspect of 'optimisation' is the question of how far trans-national collaboration in national /regional programmes should go, and for which programmes this is applicable. That also includes the question, what actions should be taken to improve and foster the process of trans-national collaboration, e.g., joint programming, opening-up of national programmes etc. The coordination of research and innovation policies within and between member states still remains a considerable challenge. The organisational systems defining and implementing R&D policies and programmes can be complex with research programmes being managed by different ministries, research councils and agencies with most national and regional administrations still reluctant to sponsor non-residents or contribute to common budgets (common pot). And meanwhile, the agenda setting is done through different mechanisms and channels involving multi-level stakeholder groups.

The ERA challenge is to achieve greater coherence in the policy planning and implementation processes between countries. There is currently a lack of high-level, strategic action to increase the alignment/coordination and synergies of national and regional programmes in Europe and overall, there seems to be an inherent resistance to change unless there is strong political will for such change.³

Instead of prescribing what coordination should be done, this paper aims to add value by describing a **framework** for better coordination between countries in defining, designing and implementing research policies.

We could describe an **optimal framework** for intra-European research co-ordination as having the following characteristics. It should:

- Provide the conditions that make Europe an excellent place to do research;
- Support research efforts that contribute to **societal and socio-economic needs** of today and in the future and use the accumulation of knowledge as a problem solving resource;
- Respect the **subsidiarity** principle which means a political action should be executed at the lowest possible governmental level;
- Take into account the possibilities for **variable geometries of participating Member States**, i.e. involving only those countries /regions that have a genuine interest and commitment for a particular research topic;
- Be **efficient** i.e. not have multiple duplications in the research efforts that do not contribute to the development of new and relevant knowledge. This does not mean that there should be no duplication at all: supporting competing routes to achieve scientific progress, developing technological solutions or answering societal challenges remains necessary. Thus for the research performers a level of competition remains even within a context of more collaboration at the level of agenda setting and prioritisation;
- Be as **non-bureaucratic as possible** and thus provide easy access and fast decision making processes while at the same time adhering to accountability needs;
- Allow the development of **critical mass** in those domains where critical mass is a prerequisite for achieving excellence and impact;
- Takes into account the **differences** between frontier research, applied research and societal research;
- Make use of a complementary **mix of collaboration mechanisms** based on evidence of good practice, but leaving room for experimentation, and which is transparent for policy makers as well as the research community.

2.3. Motivations and anticipated benefits from trans-national collaboration

There is sufficient evidence on the motivations and anticipated benefits from trans-national collaboration. This evidence comes from experiences of existing international collaborations, joint programmes and initiatives such as the European Framework Programmes, ERA-NETs and intergovernmental collaborations. Different categories of benefits can be distinguished:⁴

Policy related benefits:

- More efficient use of scarce financial resources
- Making investments or tackling issues that would be beyond the capacity of individual countries
- Avoiding shortages in human resources for research
- Enabling policy learning between governments and agencies engaged in collaborative programmes
- Unintended duplication and redundancy are minimised

Knowledge related benefits such as:

- Accessing complementary (foreign) expertise via the formation of new partnerships and networks
- Cross-fertilisation of ideas from different groups
- The opportunity of inter-disciplinary research
- Enhancing existing knowledge bases and skills
- Developing new tools and techniques
- Encouraging mobility of researchers
- Access to unique environments (e.g. geological phenomena) or populations (e.g. genetic or disease profiles)

Benefits related to better (global) positioning:

- Ensuring critical mass of intellectual and material resources for addressing major research challenges;

- Ensuring 'first mover advantage' through critical mass
- Faster diffusion of knowledge through tight (digital) networks

Improved competitiveness and technological capabilities:

- Early involvement in the setting of norms and standards
- Enabling structural partnerships between public and private actors
- Finding partners for research, development, production and marketing
- Improving market position, launching new products onto the markets and creating or enhancing business images
- Accessing new markets for research but also for business activities
- Attracting researchers and research intensive organisations to Europe
- Spill-over of knowledge into the national/regional/sectoral /innovation systems

SOME ERA-NET EXAMPLES

The INNER ERA-NET is considered valuable also for enabling the exchange of information on national programmes, the collective design of innovative instruments, and for examining and gathering of national strengths.⁵ The BONUS ERA-NET highlights also the opportunity provided to address the lack of collaboration for coordinating research funding in a specific research and geographical area, to advance coordination and complementarity among the states involved, and establish cohesive scientific priorities and activities, and excellence in marine research, technology and innovation complemented by novel approaches in social and economic sciences.⁶ The BIODIVERSA ERA-NET points also to developing common approaches (e.g. ethics, standards), speaking with "one voice" to non-EU countries and fostering flexibility.⁷

Enabling factors for the successful development of trans-national collaborations have been political will and support, successful prior collaboration, good consultation processes involving multiple stakeholders and building trust in the design phase through clear arrangements and transparency.

Despite the many potential benefits summed up above, the progress of research policy coordination in ERA is modest due to a number of obstacles and limits that counterbalance the benefits of more collaboration.

2.4. Obstacles and limits to more trans-national collaboration

Obstacles and limits for more trans-national collaboration are twofold. Some arguments are based on the overestimation of the benefits of collaboration, others are based on the regional perspective of the member states and the limits of current legislation.

Further trans-national collaboration, including joint programming, will create additional administrative costs (travel and meeting expenses in the initial planning, design and negotiation phases, programme management costs, risk of longer and more complicated decision making processes). In this context, the discipline of cost effective approaches, normally adopted by national agencies in the disbursement of national funds, should be continued in the context of EU-funded trans-national collaborations and in the selection of appropriate partners, independent of the of the regional spread of partners.

Evidence taken from many experiences with trans-national collaborations between research programmes, shows that a number of obstacles and limitations exist. They include legal, administrative, cultural, managerial and strategic aspects.

A study⁸ for DG Research by Optimat Ltd & VDI/VDE-IT based on a survey of over 300 European RTD programmes found the following four most prevalent barriers to the inclusion of trans-national elements in national and regional programmes:

1. National or regional policy for science and innovation is based on improving national or regional scientific and technological capacity to address own priorities;

this is particularly the case in larger economies with a longer tradition of self-sufficiency;

2. Sufficient volume of high quality proposals is received from national applicants. Fear of even larger 'oversubscription' to national or regional programmes limits the enthusiasm for opening them up to non-residents;
3. Often, the (national/regional) programmes do not have any explicit criteria that encourage trans-national activities. Without these explicit incentives to involve foreign partners, users are less inclined to involve them;
4. The legal constitution for public funding of the research programme explicitly forbids the transfer of funds to non-residents. The study also points out that on this issue there seems to be a lack of understanding from programme managers whether this is genuinely a legal constitutional barrier or the consequence of governance designed by policy makers.

Apart from the above four barriers the study identified a considerable set of additional barriers, a minority on the project level, several on the policy level and the majority on the programme level. Thus the study concludes that many of the identified barriers are firmly rooted in national or regional policy strategy and programme design.

The review of the first ERA-NETs shows that despite the willingness to engage in trans-national initiatives, a number of barriers remain⁹:

- There are various administrative and legal barriers to set up joint programming, such as regulations not allowing national or regional money to be spent in a 'common pot' administered abroad, the absence of synchronisation of decision making, the insistence on using national peer review and reporting rules;
- There are national differences on how and in what time frame decisions are made and whether or not to involve stakeholders in defining research themes. This leads to problems synchronising decisions as well as finding common processes to define programmes;
- There is still a reluctance in many parts of the research policy system to open up programmes or to allocate funding to non-national research performers as well

- as giving control of programme management to external bodies. Time is needed to build trust between the partners involved;
- While the ERA mechanisms had a variable geometry philosophy, there was a tendency to involve more partners, with the thought to satisfy EU selection criteria. In hindsight, the size (e.g. too large) and composition (e.g. too diverse in commitments) of the networks hampered the effectiveness and has made some organisations more hesitant to engage in ERA-NETs again;
- There is, in most Member States, a lack of a strategic policy framework in what areas trans-national collaboration is useful and which areas are more suitable for national or regional action. This has led the Member States to engage in a plethora of these instruments, which are not embedded in their national research strategies;
- The increased overheads and transaction costs associated with trans-national endeavours;
- Concerns are expressed in the research community about an increase in competition (coming from within as well as from outside the country) and more bureaucracy in procedures wrought by trends for increased accountability of research policies.

It is a challenge for the member states to adapt their legal framework and to ensure that participation in collaborative programmes, including contributing to a common pot, will become possible. In the meantime, many member states have started to work on this issue already, e.g. Denmark has changed its law for research funding.¹⁰ The endeavours of some member states to change their national laws to admit more international collaboration in research programmes, show that the benefits of more trans-national collaboration outweigh the dangers of misallocation of public resources. To avoid the risk of misallocation of public resources the stakeholders should make enough provisions to reduce administration costs including i.a. electronic administration, virtual central administrative units and to limit the scope of further trans-national collaboration to those research areas, where added European value is obvious.

CONCLUSIONS

- Strong drivers exist for the optimisation of European research policy, in particular globalisation, the strengthening of European competitiveness and the emergence of trans-national societal issues. Today's fragmentation and duplication of research policies in Europe hamper the necessary excellence as well as the scale and scope of research efforts, to tackle these challenges adequately. An optimisation of regional, national, intra-European and Community research policies should reinforce Europe to become an excellent area for research;
- Optimisation needs to be tackled throughout the policy life-cycle from vision building, agenda setting, implementing programmes to learning for future actions;
- Although the Expert Group does not wish to prescribe what an optimal framework looks like in detail, a number of characteristics can be sketched which offer some guidelines;
- Even though the ERA Green Paper observes that not enough progress has been made on ERA, there is evidence from existing experience that trans-national collaboration has many benefits;
- Nevertheless, there are still a number of obstacles and limits that have to be encountered in order to make real progress. Many barriers and limitations are rooted in the strategic policy making process;
- However, trans-national collaboration is not a goal in itself and needs ample reflection on the potential drawbacks (e.g. transaction costs) and the conditions where it has added value.

3. The contribution of existing mechanisms to optimised prioritisation and programming

3.1. A portfolio of different mechanisms to support the European Research Area

Today in Europe, a wide set of modes and mechanisms for trans-national collaboration and coordination are applied:

- **Multi-lateral research** initiatives (often based on inter-governmental agreements) where membership varies from all EU and associated countries to a smaller selection of countries (see e.g. COST, EUREKA as well as intergovernmental organisations such as e.g. CERN, EMBL);
- **Bilateral research agreements** between two countries;
- **Joint Research Funds** (e.g. Nordic Council);
- **Community programmes** and particularly the Framework Programmes (FPs), Competitiveness Programme (CIP), Structural Funds and actions such as ERA-NETs and Art. 169 initiatives;
- European **public private partnerships** such as Technology Platforms and Joint Technology Initiatives started under FP6 are new models of trans-national programming. Funds from industries are combined with funds from FP, and sometimes with additional national funds (e.g. ARTEMIS, ENIAC). This type of 'cluster' approach which has many elements of stakeholder driven bottom-up programming is also mirrored in a number of Member States (e.g. France, Lithuania, Netherlands, Poland);
- **Coordinate national research policies.** Coordination of national policies can have various forms such as:
 - Aligning goals (possibly through shared diagnosis e.g. foresights)

- Structured information exchange, learning
- Harmonisation of national frameworks, common frameworks
- Joint actions (e.g through ERA-NETs, Art 169)
- **Opening up or adjusting national and regional research programmes**

Although there have been numerous studies on how each of the individual mechanisms work – with the exception of the newest type mechanisms – there has, as yet, been no attempt to look in a holistic way at the complete portfolio of mechanisms and assess their impact including, i.a., how they complement and overlap each other, how synergies can be developed and whether some instruments have become obsolete.

That there is a need to increase the synergies between existing Community funding mechanisms is also confirmed by a study for the European Parliament on how to improve coordination and synergy between three major EU instruments: the 7th Framework Programme (FP7), the Competitiveness and Innovation programme (CIP) and the Structural Funds (SF). The conclusion is that the three instruments in principle complement each other as they focus on different cycles in the 'knowledge production chain'.¹¹ Nevertheless in policy practice the coordination is not yet evident. In April 2007, CREST developed guidelines for better coordination between the Framework Programme and the Structural Funds.

The absence of a high level coordination process is also noted and the consequent need for an appropriately high level forum in which to discuss these issues. The ERA-NET experience shows in some cases, through national reviews and a consequent strategic focusing of national efforts in respect of ERA-NETs, that some member states have an interest to take greater ownership of the trans-national collaboration in national and regional programmes.

These member states would also like to develop, with the help of the European Commission, a framework of principles and guidelines for intra-European research cooperation. Notwithstanding that this might not be a unanimous perspective, it is nonetheless an issue which should be considered at the highest political level, that means by the Competitiveness Council.¹²

The discussion of mechanisms in the remainder of this chapter is not an attempt to be comprehensive

but it covers some of the main mechanisms in Europe. Each, with a different historical trajectory, its own user communities and institutional set-ups, co-exists in the European Research Area and a systematic view whether this trans-national policy mix still fits with today's needs and challenges is clearly needed. Table 1 gives an overview of these existing mechanisms, how their agenda's are set and some comments about how they impact on ERA.

FIGURE 2

Overview of trans-national collaboration and coordination mechanisms

MECHANISM	DECISION/ PRIORITISATION	COVERAGE/PARTICIPATION	EFFECT ON ERA OPTIMISATION	COMMENTS
Framework Programmes	Commission proposal, through co-decision –procedure between EP and Council;	All EU members and associates;	EU wide coverage, critical mass on programme level, prioritization effect on some MS;	Prioritisation process top-down with multiple stakeholder involvements;
Multilateral programmes (incl. EIROs)	Multiple set of intergovernmental governing bodies with large influence of member states;	Mostly wide coverage on variable geometry basis;	Different for each one; Can create critical mass on specific thematic issues or fields, provides EU level research infrastructure;	Too diverse to specify comments; EU relation (membership, funding) an issue;
Bilateral programmes	Between (ministries & agencies of two countries);	Two countries;	Allows collaboration customised to specific needs;	Important stepping stone for further collaboration in Europe, however could add to fragmentation; Limited geographical coverage;
ERA-NET schemes (ERA-NET and ERA-NET Plus actions)	Negotiation between partners in variable geometry setting;	Limited set of self-chosen partners;	Adheres to variable geometry, opens joint programming processes. Good starting point for policy learning to do joint programming;	Debate on synchronization of programmes and reducing transaction costs;
Article 169	Between several member states and Commission according to criteria set down by Treaty;	Variable geometry with EU input;	Suitable for large scale projects in variable geometry settings;	Difficult legal procedures and trust building process; common pot debates. Has to be thematically relevant to FP;
JTIs (PPPs)	Joint MS and stakeholder involvement in setting agendas;	Variable geometry, with some EU input;	Demand led programming, clear focus on competitiveness;	Contribution of funds from many actors a major bottleneck; openness and transparency;
Opening up of national /regional programmes	On programme management level;	Not many examples available;	Few examples of unilateral opening, no examples of reciprocal opening;	Can be very effective and efficient, low management costs, issue of reciprocal opening to be solved;

3.2. Multi-lateral intergovernmental research initiatives and organisations

One category of multi-lateral research programmes is underpinned by intergovernmental research initiatives to support European research activities, such as EUREKA and COST.

A review of multilateral public research programmes of 2002 showed that approximately 11% of European public RTD expenditure was committed through this whole set of multilateral programmes and initiatives, including the intergovernmental research organizations (EIROs).¹³ While many of the multilateral and inter-governmental schemes were developed in times where the urgency for collective action was clearly shared in inter-governmental ministerial meetings, today some of these mechanisms, such as EUREKA and COST, have been criticised for lacking sufficient strategic direction. More and more the balance in these programmes has shifted towards a process of bottom-up definition of research priorities and activities, in the absence of a more strategic direction provided by ministers and high level representatives of the programme's funders.

A more strategic orientation is however provided under the EUREKA clusters. These are initiated by industry, governed by multi-annual programmes and cover broad technological themes (e.g. MEDEA+ and ITEA). The national partners in EUREKA projects have to persuade their national governments to cover their share of the budget using the 'a la carte' variable geometry principle. In practice this means that some countries have dedicated budgets for EUREKA projects, while others demand that their national participants enter the EUREKA projects through competition for existing national funds (programmes).

Key factors for its success have been its bottom-up approach, flexibility in operation, simple and speedy procedures. Its success in certain countries is directly linked with and reflects the existence and dynamism of the relevant sectors in the national contexts. Notwithstanding the above, a problem EUREKA has increasingly faced in its projects and clusters is the lack of synchronisation of national decision-making regarding the funding of national participants in EUREKA projects.

In order to create a coherent set of policy mechanisms, the positioning of these inter-governmental mechanisms - vis-à-vis the more thematically structured Framework Programmes – needs rethinking, taking into account the European added value as provided by a more coordinated vision.

The recent evaluation of COST expressed the concern that today, in the European Research Area many (new) trans-national networking initiatives are in operation in parallel. Other trans-national stakeholders (EUREKA, ERC and ESF) are reconsidering their respective unique position; The evaluation recommended that COST should also rethink its position in the European Research Area.

A specific category of multilateral collaborations includes the **intergovernmental research organizations** (EIROs). A number of European EIROs have been created over the last 50 years in Europe (e.g. CERN, EFDA, EMBL, ESA, ESO, ESFR and ILL). With the strong support of their member states, these organizations have progressed and become world-leaders in their respective fields of science and thus are certainly success stories of European science and research initiatives and activities.

The ERA Green Paper acknowledges the EIROs as pillars of the European Research Area, and raises the question whether the efficiency and the coherence between the activities of the EIROs and the EU research programmes can be enhanced by having an increased role of the European Community in these organizations.

Presently, the European Community, represented by the European Commission (EC), has different levels of involvement in the EIROs. The EC is a founding member of EFDA; it has a strong relation via a Framework Agreement with ESA; it has Cooperation Agreements with CERN and EMBL (the EC has Observer Status in the former), and no formal agreements with the other EIROs.

The relations between some of the EIROs and the EC need to be strengthened for better coordination and coherence of the respective programmes of the EIROs, on the one hand, and the Framework Programmes and instruments for support of existing and new infrastructures, on the other, in particular when globalization is involved. The way to enhance the relations between the EC and the EIROs does not necessarily involve membership of the EC in the latter, since by virtue of the founding conventions of most of the EIROs, their membership is limited to European States only. The EIROs have

different legal status, needs and scope of their scientific programmes. Because of these differences, there are specific institutional options and models of closer links with the European Community, such as observership, associate status, cooperation agreements, or other kinds of partnership, which should be explored by bilateral contacts, eventually negotiations, between the EC and each intergovernmental research organization. The collaboration between the EC and the EIROs should be based on formal agreements that assign effective responsibilities to each of the parties, describe measures to improve the mutual flow of information, and possibly introduce (new) coordination mechanisms.

The enhanced coordination with the EC may result in increasing the efficiency of EU investments in the research fields of these EIROs¹⁴. In this way the strengthened relations between the EC and the intergovernmental research organizations may be beneficial to the EIROs, to their Member States, and to the European Community.

3.3. Bilateral collaborations

There are numerous bi-lateral agreements for research cooperation between member states, research funding organisations and research performing organisations and a wealth of experience of trans-national coordination and cooperation has been accumulated. There is little or rather no systematic overview available of such activities. A DG Research study conducted in 2001, identified over 800 bilateral R&D agreements in Europe where both signatories were EU Member States. They showed a great diversity in themes and motives to engage in such collaboration.¹⁵

However, existing bi-lateral cooperation schemes can form excellent bases for variable geometry arrangements in the ERA-NET scheme. This is being shown in a very convincing way by different ERA-NET actions, which have enlarged bi or tri-lateral initiatives:

- The SEE ERA.NET¹⁶ with a main focus on research cooperation between member states and Western Balkan Countries through the coordination of bilateral programmes among these countries and their extension towards multilateral approaches.¹⁷
- The ERA-PG ERA-NET action on Plant Genomics, which started from a tri-lateral De/Es/Fr intra-European cooperation, was extended to 9 other EU countries and also attracted non-EU countries.

3.4. Policy coordination in variable geometry arrangements: Open Method of Coordination (OMC), ERA-NETs and Article 169

The Open Method of Coordination has contributed to creating a policy culture more conducive to trans-national policy learning and coordination. In 2004, CREST published a report on the application of the open method of coordination in favour of the Barcelona research investment objective¹⁸. CREST found that the application of the OMC had resulted in a number of concrete benefits to many Member States as they strived to increase investment in research. These include 1) the establishment of networks of national policy-makers; 2) the collection, collation and exchange of information on national policies – providing an evidence base for future policy-making; 3) the identification, through informal peer review, of good practices – adding value to that evidence base; and finally 4) the identification of key issues and, in some instances, specific recommendations for the future.

An evaluation conducted in the IST domain (2005), where an eEurope Action Plan and joint benchmarking were initiated came to the conclusion that “in practice, OMC appears to facilitate the development of collegiate cultures between Member States, the Commission, and sub- and trans- national actors. However the Report also concluded that not much real convergence had taken place as OMC does not require or necessarily lead to specific actions.”¹⁹

While the early stage OMC processes were meant to stimulate mutual learning, sharing of information and benchmarking, the ‘second generation’ ERA instruments were more focused on taking this a step further towards joint action.

To reinforce and complement the OMC application to investment in research, the Commission launched the **OMC-NET scheme**²⁰. OMC-NET offers limited groups of Member States and/or their regions the possibility to develop policy coordination activities on issues of their own interest and to obtain financial resources to implement those activities. OMC-NET is implemented through calls for proposals for Coordination and Support Actions (CSA). The target audience for these calls is mainly national and regional R&D policy makers, although the participation of other stakeholders is not excluded.

Parallel to the OMC-Net the **ERA-NET scheme** was launched in FP6. Before FP6, intra-European actions similar to ERA-NETs were rather exceptional. The existing coordination and cooperation structures like the European Science Foundation (ESF)²¹ and the EuroHORCs²² in the area of basic research set only a few initiatives in that direction except the EUROCORES²³ scheme developed by ESF and the EURYI²⁴ scheme developed by the EuroHORCs in cooperation with ESF. In addition, it should be mentioned that previous attempts to coordinate national RTD policies, e.g. in the course of FP4, were not successful.

Therefore, the adoption of the Open Method of Coordination (OMC) by the member states and the successful take up of the ERA-NET scheme by owners and managers of national and regional programmes in FP6 can certainly be seen as promising in the attempt to realise the European Research Area. However it still remains to be proven if ERA-NETs can be stable and effective structures to support trans-national research projects in a non-bureaucratic way. As some ERA-NETs have been set up as pilots, their long-term sustainability needs to be considered as soon as possible.

Analysis made by the Commission suggests that the strongest determinants of the frequency of participation in ERA-NET actions are²⁵:

1. The presence of an agency managing research programmes;
2. The presence of identified research programmes that can be shared in the ERA-NET action;
3. The ratio of public research budgets to GNP, indicating relative focus on public research in a given country.

At the end of FP6, there was a total of 71 ERA-NETs covering many thematic and horizontal research and innovation fields and involving almost 500 different organisations, mostly programme owners such as ministries or programme managing agencies, from 38 countries. This approach "allowed participants first to learn more about the potential of such activities and subsequently to experiment with different ways of designing and implementing them."²⁶ There was a very positive response by the programme owners and programme managers to the ERA-NET scheme. However, the great number of ERA-NETs also created new programme overlaps, unfruitful competition between ERA-NETs and confusion

for the users of research programmes. As the new ERA-mechanisms - alongside the existing multi-lateral schemes - were taken up - in a bottom up fashion - by policy makers at various levels of agencies and government departments, the initiative might have led to a plethora of joint calls, many of which lack the critical size and mass to make a real difference in Europe.²⁷

There is still little practical experience with **Article 169** in Europe and the general perception is that this mechanism is extremely complex to implement. The EDCTP experience shows that the ownership issues are complex and need to be clarified before a joint initiative is established. Nevertheless this example in the end has worked well. More recently launched Article 169 examples are the Ambient Assisted Living initiative (AAL²⁸) and Eurostars²⁹. EUREKA set up the Eurostars programme in collaboration with the Commission, to contribute to the realisation of the ERA by complementing existing initiatives such as CRAFT and other FP7 SME supporting measures. The complementary elements it offers is that it is totally bottom-up in terms of research priorities, and that it mainly addresses innovative SMEs interested in taking part in industrial, near-to-market research. Its advantage is that it uses the EUREKA networking proximities and its speedy processes while a possible obstacle may still be the lack of synchronization in project funding from the different national sources. However, the 'bonus' offered by the European Commission can act as an incentive for member states to earmark and secure their share for funding the Eurostars projects.

3.5. Opening up of national and regional programmes

Opening up a national or regional programme means that non-resident research institutions and companies can participate in the research projects. This opening could be executed in a "soft" way, e.g. that non-resident partners can only participate in research co-operations, but do not receive funds. Such an instrument already exists in Germany (PRO-INNO) and has turned out to be very successful due to the easy access, non-bureaucratic management and bonuses for international cooperation.

If other territories would integrate similar bonuses in their national or regional programmes, a great number of additional trans-national projects could be funded. Territories with legal limitations to funding non-resident

researchers could easily do so, since they continue to only finance their own partners.

Another form of opening-up is a way, where non-residents are allowed to obtain national funds, which means national funds cross borders. In some countries (e.g. German specific research programmes) this form exists in exceptional cases, if project partners can show, that participation of a non-resident is important to achieve excellent research results and therefore helps the German economy.

Further opening up has been discussed nationally, e.g. general opening in the way that only the project coordinator must be a resident, but all other participants can be non-residents up to a total of 30 % of the total of project funding. However this wider opening requires a general agreement of all member states to open their programmes in a reciprocal way. Otherwise, there will be an unfair imbalance between those countries, which open up their programmes and those countries which do not.

Some advantages of opening up are obvious: this instrument does not require bi- or multinational agreements, which often are difficult to achieve and management is easy due to the fact that all participants of the project deal with one agency.

Whilst opening up could be an effective means for more trans-national cooperation, it would not however contribute much to better coordination between national or regional programmes, since - in principle - these programmes are developed independently from

each other. This implies that coordination in planning and programming is needed, at least on a selected set of initiatives, but also, a common knowledge basis on actors, evaluation processes and results.

Recently, the president of the German Research Foundation DFG made a strong plea for opening up of programmes³⁰ emphasising that internationalisation of research programmes requires common standards and transparent procedures, eligibility criteria and rules for participation. Mutually open programmes would enhance quality of research and support the excellence in research through competition.

The Green paper consultation showed that institutions are in favour of opening up of programmes, but under specific conditions:

- Step-by-step approach and only where there is real added value;
- Based on a balanced reciprocity and respecting the variable geometry principle to develop adequate flexibility; and
- Following a differentiated approach according to different research types. Several institutions and member states pointed out that fundamental research, in the main funded through national research councils, may be a more appropriate research area (than industrial or applied research) for opening up national and regional programmes to participants from other Member States.

CONCLUSIONS

- Trans-national R&D collaboration is not a new phenomenon in Europe and many different mechanisms already exist for this purpose, each with its own merits and achievements as well as disadvantages;
- The European Commission has a wide set of tools and mechanisms for trans-national R&D, including the Framework Programme; the effectiveness and achievements of these schemes needs to be reviewed not only individually but also in relation to the whole set of European mechanisms;
- No systemic evaluation has been made of the complete portfolio of European mechanisms, including the ERA instruments that have been introduced relatively recently. As some ERA instruments have been set up as pilots their sustainability needs to be considered as soon as possible;
- The possibility of opening up existing national and regional programmes could be a very cost effective way of organising trans-national collaboration which needs to be explored and debated further.

4. Coordination in vision building, prioritisation and agenda setting at European level

4.1. Developing a common vision and prioritisation for the European research agenda

Chapter 2 introduced the Policy Cycle as a structuring mechanism for this report. In order to optimise European research policy the first phase that needs to be better coordinated is the development of a joint vision on the priorities that need the attention of research policy, and particularly those issues that require a European approach to achieve an optimised solution.

The joint vision should address not only high level societal needs and issues, where research and innovation can contribute to the solutions but also deal with the context in which priority setting and programming takes place by building a shared picture of, for example:

- The number of leading (public) research centres or clusters needed in specific fields - with a view to balancing the need for focus, critical mass and excellence on the one hand and on the other hand, a good distribution of knowledge centres across Europe;
- The degree of proximity between private and public R&D, through the support of cluster formation around broadly defined themes, and the extent to which this requires co-ordination of public and private sector initiatives;
- The need to ensure the sustainability of research infrastructures and key long-term research programmes without losing the flexibility necessary in the globalising research and innovation environment.

Building the vision on these and other issues that determine the context in which research programming is taking place and as part of the goals we want to achieve, the programming process may have to run parallel to the priority setting and programming processes themselves

A reduction of fragmentation, the creation of critical mass and excellence on a European level requires a process for joint prioritization. However as this process is already challenging on the regional and national levels, it will require a strong political impetus to translate this to the European level. Whereas some countries define clear thematic areas (scientific domains, technology clusters) that are strategic for the country, others choose to have only generic policies, which are completely bottom up. As we have identified the lack of a strategic policy framework for joint programming as a central weakness, the following paragraph discusses how prioritisation is done by the Member States.

The scarce literature on prioritisation processes at the national or regional level show a wide array of approaches to arrive at a prioritized agenda:

- The launch of a High Level Science, Technology and Innovation Council or Platform, (with the Finnish Science and Technology Policy Council, often cited as the most successful example), which defines the strategy and thematic priorities in a country and which develops and embodies a common vision. Experience from other countries shows that having such a body does not necessarily mean that it has the powers to coordinate and develop a country wide strategy;
- The development of a National Science, Technology and Innovation Plan, which sets out the strategy for a number of years, see for instance Austria, Czech Republic, Hungary, Ireland, Finland and Poland³¹;
- The use of strategy formulation process such as National and Regional Foresights, Technology Assessments and Roadmaps to define the strategy for particular areas. These type of exercises use different forms of stakeholder involvement to develop support.

The challenge is to elaborate how similar structures and processes could be set up at the European level.

Gassler et al (2004)³² have done an extensive study on prioritisation processes in various countries. The ways in which priority setting is carried out differs vastly from country to country, depending on the structure of the economy (e.g. with strong energy, nuclear sector, space), the political role of the country (defence /security R&D), the conceptual framework in which S&T policy operates (science push, demand pull, mission orientation, diffusion orientation etc) and the institutional setting of the STI policy system (centralised/decentralised, central/regional, strong/weak role of intermediaries). The variety of principles, structures and mechanisms in priority setting do not only reveal the diversity of political and socio-economic settings, but also reflect certain legacies and traditions in priority setting and policy-making that have long been established.

Priority setting also happens at the regional level. Since regional authorities not only run research and innovation programmes but in some countries (such as Italy and Germany) design and fund them, it is most important that the regional dimension is fully taken into account and that regions are given structured instruments and information to allow a fine-tuning of regional/local initiatives. In countries such as Spain, Germany, Italy

and Belgium regions have also considerable authority over the structuring of the university and research organisation system. In many countries regions lack a policy planning culture thus adding to the lack of strategic prioritisation. In the past the European Commission has supported the development of strategic policy planning processes in many European regions through the RIS and RITTS programmes and recently the Regions of Knowledge initiative³⁴. The European Structural Funds have contributed considerably to a programming culture in many European regions. For instance, in some New Member States structural funds facilitated the initiation of new research legislation or updates of former legislation³⁵.

In the preparation of the EU's 7th Framework Programme a complex combination of consultation tools has been applied.³⁶ Amongst others, foresight³⁷ activities and the identification of key technologies³⁸ by an Expert Group provided important input. Foresight at European level should be further developed building also on national and regional experiences. A huge body of most relevant material and experiences has accumulated and is available and that calls for further development and exploitation.

ESFRI

Europe's first generation Inter-European initiatives were mostly joint large-scale research infrastructures. Nonetheless, today a new impetus is necessary to coordinate Member States' and Community efforts in this area. The idea to develop a more coordinated approach for policy making in the field of research infrastructures in Europe emerged from the Strasbourg Conference on Research Infrastructures, jointly organised by the European Commission, the French Presidency and the European Scientific Foundation (ESF) in 2000. Commissioner Busquin in collaboration with the Member States appointed a "European Strategy Forum on Research Infrastructures" (ESFRI) with representatives from the Member States. In 2006 ESFRI presented the first Roadmap, after a period of two years work with extensive stakeholder consultation. The Roadmap identified 35 priority projects covering all fields of science and provided an initial planning and budget for their execution. This joint roadmap exercise was warmly welcomed by the Member States and several responded by developing national roadmaps and by earmarking funding for research infrastructures. Two European projects XFEL and FAIR are being built today. As for today a number of 7 out of the remaining 33 large facility projects have actually managed to secure the "green light" from at least one national minister.³³ The processes of ensuring funding for the remainder projects will be an ongoing debate.

JOINT FORESIGHTS

Joint activities in the first stages of the policy cycle (i.e. prioritisation and agenda setting) can be accommodated by joint foresight exercises. A wealth of information and analysis is gathered by the European Foresight Monitoring Network (EFMN - <http://www.efmn.eu>). From the total of 846 cases mapped in detail the trans-European ones (cases with two or more EU countries) amounted to 62. Most of the foresight exercises are done at the national and regional levels. Furthermore, joint foresight exercises in the sense of undertaking joint prioritisation or other related activities are not yet a common feature. The trans-national foresight exercises carried out till now can be grouped into three categories. First it is those exercises covering a number of regions / countries (e.g. FORETECH, <http://foretech.online.bg/index.php>) where joint efforts mainly focus in building competences in foresight methods, processes, and implementation by networking and exchanging knowledge and expertise. Secondly, there are exercises international in nature with a direct focus on a particular sector but not on specific countries (e.g. FISTERA, <http://fistera.jrc.es/>, on IST). Thirdly, there are cases of joint foresight exercises where the collaboration does go beyond networking and exchange of know-how and results in joint prioritisation and agenda-setting. Examples of such cases do exist (e.g. the Nordic Hydrogen Energy Foresight 2030, www.h2foresight.info) albeit not as often as the other cases.

The European Framework Programmes have helped to structure the research policy choices. Particularly in the New Member States the research priorities in general tend to mirror the ones in the Framework Programme. New agencies are set up also to take over the role of programme managers in ERA-NETs and ERA-NETs Plus (notably in Poland and Lithuania), formerly undertaken by programme owners (ministries). These initiatives clearly demonstrate a strong structuring effect inspired by the European agenda.

However, this approach is sometimes criticised as being more tactical than strategic, seeking alignment with European priorities in order to co-fund national or regional research policies through EU funds. This is usually the case in the absence of adequate national or regional funding and consequent ability to cover explicitly own needs and priorities. The approach is evident not only in the New Member States but also in some of the old ones relying on Structural Funds.

As long as fragmentation of policy making and funding exist at the Member State level with few processes for coordination, a co-ordinated European research policy remains ambitious. Thus, while the challenge for Europe is to develop a more common vision and strategy, the questions that need to be dealt with are what research and technology activities should be done on a European wide scale, whether they need a variable geometry approach or can be best dealt with at national or even regional level. There are examples of good practice of international strategy development (ERA-NET focussed) available already, such as e.g. from the Academy of Finland,³⁹ the Austrian Science Fund (FWF)⁴⁰ and the Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT)⁴¹.

4.2. Optimisation in different types of research

An important distinction should be made relating to **different types of research**. The Green Paper distinguishes between frontier research, applied research and societal research. These categories are not mutually exclusive as frontier research and applied research can both contribute to societal research and in many cases the boundaries between frontier research and applied research are permeable. Nevertheless these types of research appear to have different public funding models and varying drivers for internationalisation and coordination. Thus, arriving at priority setting and joint programming needs different approaches.

In most **frontier research** domains the funding organisations, research councils, science foundations and funds etc., are very much based on the principle of self-organisation by the scientific community and are enjoying a high degree of independence and autonomy from the national policy. This tradition of independence may be the reason that considerations for collaboration are scarce or in a starting phase only. In Europe, the EUROHORCS as the forum of presidents of these organisations has been meeting for many years, but ideas for substantial collaboration at the programme level were not high on the agenda before the Commission's initiatives were launched. Nevertheless, the collective Research Councils, Innovation Agencies and similar Funding Agencies in Europe represent a significant share of public research funding in Europe, collectively spending €30 billion per annum on research and thus provide an important opportunity for more trans-national collaboration.

In that area the propensity to work together with international partners has existed for many years and a multitude of collaborations have been formed through institutional cooperation agreements as well as through European and international networking programmes (EU FP, ESF, COST). The need for better coordination in this field responds to the policy aim to create more critical mass, support research quality and excellence, and to concentrate in areas of **research excellence**. The challenge is to improve the conditions for fully utilising the European capacities for the production of knowledge in a more efficient and effective way.

Thus many of the propositions for optimisation of frontier research, relate to widening the research constituency

by joint or European programmes, to improving and coordinating the selection procedures, and to pooling of efforts (scope, scale) in order to get strong pockets of excellent research. The development of the European Strategy Forum for Research Infrastructures (ESFRI) is one example where a joint prioritisation process has been started with close involvement of the Member States.

The need for optimisation in **applied research** is again different. On the one hand applied research is usually quite strongly embedded in regional and national governance structures. On the other hand applied research has been a "heavy user" and key player in existing trans-national research schemes. This apparent contradiction shows that there are other important factors influencing the opportunities for European optimisation. In addition, applied research often involves a public-private partnership where industrial partners take part actively in the research efforts, or alternatively are sponsors of research performed by a public sector or non-for profit organisation. This also changes the policy perspective: much more than in frontier research, political pressure is used to ensure that the outcomes and impacts of the subsidised research activities are absorbed by national firms, or at least that spill-overs to the regional/national community are considerable. Evaluations of programmes supporting research for and by SMEs, in particular, underline the importance of developing local capacities (technological infrastructure and human skills) and absorbing locally knowledge produced elsewhere or embedded in new equipment.

One of the main characteristics of applied research is that it, much more than frontier research, draws upon a large variety of funding sources and builds on a large variety of programming mechanisms. Every nation (and sometimes also the region) has its own diversity of research funding principles. The multi-client or membership based models are most often found in the context of a specific sector or in a specific technology domain. There are large differences between countries in Europe (e.g. countries with large public research institutions and extensive systems for fostering applied research such as Germany and Finland on the one hand, and on the other, mainly southern European countries that have traditionally focused more on university teaching and research with limited mechanisms for fostering applied research).

COMPETENCE CENTRES

Competence Centres are examples where agenda setting is mostly done through public private partnerships. One example is the Dutch Top Institutes where in principle participating companies and research institutions (universities or public research organizations) each contribute 25% of the budget and the government tops up with the other 50%. In all cases the contributing companies (the members) are the key force in defining the program and priorities of the institute. In principle, the membership of such institutes or programs is open to international participation also from research organisations. The Dutch Polymer Institute in Eindhoven is one of these Top Institutes. DPI now brings together 35 companies from around the world and some 30 research organisations, which together with the Dutch public funding account for 280 researchers. DPI now has become a major centre of polymer research in the world, whereas 10 years ago polymer research in the Netherlands was virtually extinct. However, the rapid globalisation of DPI is now leading to a slowly intensifying discussion about the share of the Dutch taxpayers in the funding of the institute. Similar examples can be shown for the Austrian competence centres programme as well as from the Austrian Christian Doppler Institutes. Other examples could be found in Italy both in convergence regions (e.g. Campania and Puglia) or in Technological Districts all around Regions (e.g. Piedmont – Torino Wireless or Emilia Romagna – Hi Mech). This shows that there is an opportunity for Europe to play a stronger role in the support of the internationalisation of this and comparable institutes.

In order to address the challenges regarding Europe's competitive position it would help to create more and stronger European nodes of industry-public research collaborations. One option is the **RTO (Research and Technology Organisations) model**. Although there are many differences between RTOs, certainly for the larger RTOs there appears to be a rule of thumb which shows a more or less equal division of funding sources of 1/3 each for longer term government funding (basic and/or strategic), competitive program funding (including the Framework Programme) and fully client funded

projects. RTOs provide a strong institutional model for fostering applied research in many countries. But RTOs are also locked in national and regional governance systems. Even when for example Fraunhofer plays a key role as the node of many European Framework Programme projects and other RTOs play similar roles in other fields, there is much to be gained by improving conditions for **internationalising the RTO-system**. One strategy follows the network model and leads to joint programming on the basis of each parties basic funding. This model is confronted with all the complexities of other networks based on voluntary collaboration. But seen from the institutional perspective there may very well appear another strategy which will ultimately take the form of alliances and take-overs⁴². An early example is the 10% share the Dutch TNO holds in the Austrian Joanneum Research. This is just enough to stimulate a growing programmatic coordination and collaboration in a few fields. Strong alliances and take-overs will certainly lead to political discussions about the role and need of national funding and may violate a proven model of research programming based on the close interaction between long term basic research and market needs.

The third category of research is **societal research**, which is often tackled through the public task model. Many countries have specialist research institutes, which fully belong to the government system and are usually governed by the specific ministry they support. Sometimes specific activities are also embedded in RTOs (e.g. Netherlands, Norway). Such institutes now face at least two drivers for change in their programming principles. The first is that their "masters" increasingly face problems, which have to be dealt with in an international context. The second is that amongst others the internet facilitates access to research results elsewhere, thus making an end to the not unusual situation where research institutes in different countries were building up the same kinds of expertise. But because this model is fully client driven the main burden is now on the client (e.g. the ministry) to improve on programming and priorities, and eventually the coordination and cooperation with organisations in other countries.

It is particularly in the areas of societal research that progress can be made on issues that go beyond the national boundaries or are shared between countries. Issues such energy resources, climate change, ageing population, health care systems and integration of

ethnic groups in society are common to all European countries. On these issues developing a common vision and then research agenda should be less complex than those research programmes that have a more direct effect on competitiveness. The current

European initiative to develop a Strategic Energy Technology Plan (SET-Plan) is one example where the Commission has facilitated a European wide agenda setting exercise on such a societal issue that also has large implications for competitiveness.

CONCLUSIONS

- To progress on trans-national collaboration and joint programming asks for the development of a joint vision for the European research agenda, encompassing regional, national, intra-European and Community funding;
- Today the policy planning practices for prioritisation are not yet fully developed across all regions and Member States, nor is there a platform at trans-national level. There is a lack of a strategic view on trans-national collaboration on all policy levels;
- Tools have been developed to help policy makers in these vision building and agenda setting phases, which should be applied more often at the trans-national level;
- Different types of research – frontier, applied research and societal research – need different processes for optimisation and priority setting;
- A stronger European Research Area also includes building more and stronger nodes between private and public research.

5. Optimising European programme implementation and policy learning

5.1. Optimising joint programme design and implementation

In the Institutional and Member States' responses to the ERA consultation, there was broad support for the adoption of participative processes to enable public authorities to jointly identify and decide upon major societal issues requiring a pooling of resources and capacities. Assuming that Europe finds better ways through **trans-national foresights** to improve joint vision building, developing common visions and selecting priorities, the next step in improved coordination is designing and implementing joint research programmes - what we propose to call **joint programming**.

We propose to use the following broad definition of joint programming: *Joint Programming is the process whereby several Member States, regions and programme owners engage themselves on a voluntary and à la carte basis in the definition, development and implementation of a "joint programme" on a specific research topic or in a specific field. This "joint programme" can either be based on the coordination and integration of existing national and regional research programmes or on the setting up of an entirely new "joint programme".*

Joint Programming allows the Member States to develop strategic activities, which have a scale and scope that cannot be achieved at the national or regional level. It facilitates tackling common problems and issues, reaching levels of excellence and making impact at a global level. It also facilitates Europe to speak with "one voice" towards third countries for international cooperation.

Joint Programming requires a number of prerequisites:

- Increasing the strategic and policy design capability in MS and regions (training activities, learning by common doing, support and advice in concrete exercises for 'beginners', support and reference materials);

- Common principles for evaluation, quality assurance, and benchmarking.

Paragraph 2.4 lists the obstacles that will have to be overcome when taking collaboration a step further into joint programming.

Despite the various types of barriers to trans-national collaboration mentioned above, the Expert Group has identified cases of success. One such example is the NORFACE ERA-NET (see below).

Several suggestions appear in the ERA-NET reports on the **implementation** of joint programmes, showing how they can be improved. For example:

- Establish a clear, shared understanding of why the parties want a multi-national collaboration, and its technical and sectoral scope;
- Identify differences and barriers that may affect success and define possible solutions or ways to overcome them;
- Follow a step-by-step implementation approach and test pilots for each different option (e.g. of funding);
- Ensure explicit design rules and also ensure operational flexibility;
- Effectively couple top-down planning (e.g. research problem oriented) and bottom-up input (e.g. question-driven priorities of scientists and research org);
- Trans-national cooperation instruments have to meet the existing conditions within the national/regional frameworks - funding decisions need to be at national/regional level;
- Ensure early earmarking of funds for the whole period;
- IPR should have a clear framework for regulation from the outset.

ERA-NET NORFACE

In the early planning stages of the ERA-NET proposal for NORFACE (New Opportunities for Research Funding Agency Co-operation – A Strategy for Social Science) the partners decided that a ‘common pot’ funding model would be used for the joint research funding activities. When starting to develop the common pot model, the first question was how to calculate the funding shares of the partners. Five of the partners were research councils from the Nordic countries. For some 20 years, they had been funding joint Nordic research projects using a ‘common pot’ calculated on the basis of GDP and population. The population of the Nordic countries is about the same with the exception of Iceland. In NORFACE, there were countries with large populations, Germany and UK, and small countries, e.g. Estonia and Iceland. Therefore something had to be added to the algorithm to make the shares more in proportion to the expected applications from the partner countries. The use of added parameters such as the partner’s research budgets proved very difficult to make comparable as some funding agencies have joint budgets for both humanities and social sciences and others include items that are predetermined for certain schemes. The partners noted that there is no ‘perfect’ model for calculating the shares and therefore the chosen model should be based on objective parameters, population with a factor added to modify its weight and GDP per capita. Trust is a very important element when engaging in ‘common pot’ funding. Trust can be built by involving all the partners in the planning, implementation and decision-making stages. It is also important that all stages are transparent.

In accordance with the ‘common pot’ funding model it was decided that the administration of the call, the funding and the funded projects is handled by one partner, which was the coordinating partner, the Academy of Finland. Prior to the call the partners signed a Memorandum of Understanding, which stated the funding shares of the partners, the call, evaluation and decision-making procedures, as well as which partner administered the funds and monitored the use of the grants on behalf of the other partners.

So far, optimisation has mostly been discussed with the objective of optimising research programmes; the limitation being that the trans-national co-ordination or the opening-up of (independently designed) national programmes will either be time-and resource-intensive, inefficient or sometimes practically impossible.

Therefore, from many perspectives, a construct, agreed on an EU-wide basis and then implemented by third parties (as in the current EU Framework Programme for RTDI) presents the best prospect of a convincing and workable solution. The Framework Programme for RTDI and the Article 169 projects have shown that an EU-wide, ‘one-size-fits-all’ approach can sometimes create high bureaucratic and opportunity costs at the EU-level, and even more at the national and regional levels. From an overall EU macro-economic perspective, and at the end a true European Research and Innovation Area (ERIA) perspective, this represents a suboptimal allocation of resources.

The objective now should be to establish a construct wherein EU-decided/third-party types of programmes can be implemented, e.g. ERA-NET type activities, with, from programme-period to programme-period, variable geometry of participation and focus. However, once the decision has been taken, there should be clear rules and a definitive budget without sole reliance on the good-will or the influence of individual participants.

The full complement of mechanisms for the implementation of European, national and regional research policies can by and large be considered to consist of **four pillars**:

1. The **European Framework Programmes for Research**, (FP) which focus on the main global research challenges, where projects have a substantial size and many stakeholders should be involved, such as in large collaborative projects with research and business partners. The FP can also cover cutting-edge technologies, where only a few new technology companies and research institutions are involved, and which are not yet organized at a large scale;
2. An **ERA-Frame**, which could be established to encompass all programme coordination activities such as ERA-NETs, JTIs, Article 169 measures and potentially new joint programmes where cross-

border research and innovation activities create added value. The ERA-Frame would require a **new Council Decision to establish a common set of principles and operative guidelines to optimise the implementation of this particular pillar;**

3. The **Inter-governmental Agreements for Research** which include existing inter-governmental bilateral and multilateral programmes such as COST, EUREKA and EIROForum as well as potential new ones; their legal basis is set in various frameworks, on a case by case basis. [The common guidelines outlined above could, in some cases, be relevant for these mechanisms as well];
4. **National and regional programmes**, which focus on the development of national and regional research and innovation systems, (where cross-border activities are not a first priority), where research contains logical and strategic national priorities (e.g. military research) or where research is very close to the market and therefore very competitive. However such programmes could be opened to non-residents on a voluntary basis, with the careful management of the aforementioned problems.

For pillar two, there is now a need at European level to develop **common guiding principles, rules and criteria** – or a so-called **ERA-Frame** for trans-national collaboration – particularly for the ERA-NET mechanisms, but also for new joint programmes. This is an issue that should be addressed and agreed by the **Council** and has in part already been recommended by the 2006 ERA-NET Review⁴³.

Until the new 'ERA-Frame' is in place, which would automatically avoid the difficulties and inefficiencies arising from 'virtual' and 'mixed pots', certain common rules for future ERA-NETs but possibly also for other inter-European schemes, should be introduced to improve the current practice:

1. **Participants** of an ERA-Net should be programme agencies and programme owners of the participating programmes. Countries participate on a voluntary basis (variable geometry). There should be a minimum of three participating countries. Projects should be open for additional participation;
2. **Administration** (costs of launching trans-national calls and selecting projects) should be centralised. The European Commission could support the administration costs while member States ensure the necessary number and quality of staff;
3. **Project application** should follow common rules and should be as unbureaucratic as possible;
4. **Project selection** should follow an international peer review approach and should follow commonly agreed evaluation criteria according to general principles and guidelines for the ERA-NET scheme. Member States should accept the international evaluation to avoid double evaluation. Also the needs of SMEs and small research organisations should be considered;
5. **Project funding** should in the main be provided by the Member States and, as appropriate, stimulated or supplemented by the European Commission;
6. Only if no other possibility exists, Member states could earmark those funds they are willing to spend for transnational projects ("**virtual common pot**"), and guarantee that they will fund successful partners from their country for the agreed period. Each Member State finances the partner located in its country. A better solution could be, if Member States and regions could agree, in putting all designated own money into one basket ("**real common pot**") or alternatively use '**mixed pots**'. In this case Member States have to agree on a common rule of the share of funds to be paid in the "common pot" (see example of NORFACE). However this solution should be voluntary, as "real" common pot solutions are a major obstacle for many Member States, sometimes not possible by national law in their countries;
7. **Programme monitoring and evaluation** should be a rule for all participating programmes. Programme evaluation means ex ante (results of foresight exercises) and ex post evaluation. In addition the process of combining different national and regional programmes to foster more international projects should be evaluated.

In exceptional cases where further integration and joint European and national funding creates added value, Art.

169 measures or Joint Technology Initiatives should be established or be further developed. In these cases further integration should be tried, preferably “real” common pot solutions. All participating stakeholders: industry, Member States, Regions **and** the Commission should provide substantial resources for the common projects.

This will not be so easy to achieve – at least not to the extent to make the ERA a reality. Therefore, the suggestion

is to also rely more and more systematically on participative processes, for assessing what has been achieved in the past and what is going on currently, as well as what would be desirable for the future. **Common principles for evaluation and quality assurance**, as well as **common approaches and inputs to foresight and technology assessment exercises** can ensure the build-up of a politically and economically valuable knowledge stock.

ERA-NET EXAMPLE

The European Metrology Research Programme (EMRP) is a result of the ERA-NET project iMERA. The EMRP’s aim is to improve the accuracy and precision of measurement procedures and to investigate new measurement techniques for e.g. nanotechnology, energy technique, or medicine physics. It is essential for the population in Europe, for innovative enterprises and especially for industries like manufacturing, processing, telecommunication and transport. Participants in the project are 19 National Metrology Institutes (NMI) of the EU member countries and the JRC Institute for Reference Materials and Measurements (IRMM).

With the ERA-NET funds, EURAMET launched a common call for the eligible metrology institutes. The member states agreed on common evaluation criteria based on excellence only and an international evaluation committee, which consists of external experts in the field of metrology. They agreed to accept the decisions of the international committee to avoid double evaluation by an international evaluation body and a national evaluation body, and they earmarked their planned financial contribution in their budgets. The earmarked funds are larger than the required funds so there will be enough flexibility to finance all selected projects. Therefore the selection procedure of the launched call was quick and efficient. The member states only need to provide resources for the research packages which are executed in their countries. So national money need not cross borders, which would be an obstacle for various countries.

The main success factors of EMRP are:

- Similar structures of the national metrology research;
- Long lasting trust based relationships between the involved institutes;
- A stable institutional frame, which allows quick decision making without forcing the member states to pay national money in a “real common pot”;
- Enough flexibility to finance all selected projects no matter in which institute these projects are executed.

5.2. Optimised policy learning in the ERA: learning from experiences

The aforementioned Open Method of Co-ordination (OMC) has provided for the development of a collegiate culture between Member States. The CREST 'Policy Mix' reviews in nine European countries, for instance, was an exercise where panels of policy makers from other countries, facilitated by a (foreign) consultant, reviewed the policy mixes in the reviewed countries in relation to their specific challenges. A common methodological framework was used and in addition to the nine country reviews a synthesis report drew lessons from all nine exercises. This process was organised in a bottom-up manner – countries volunteered to be reviewed and selected the experts from other countries – and was facilitated by the European Commission. The uptake of the recommendations made was the responsibility of each reviewed country. This common sharing of experience and good practices could be elaborated much further and include the evaluation and benchmarking of (joint) research programmes.

Very little has been done yet to conduct joint cross-border evaluations of programmes. There are several practical (synchronisation – the timing of an evaluation is dependent on the life-cycle of programmes and the legal requirements for evaluation in some countries) and methodological difficulties (e.g. dealing with non-similar objectives, different target groups and budgets thus limiting the comparability of distinct programmes) to such an approach, which can be overcome in cases where programmes have been jointly designed from the start. Examples of trans-border evaluations mostly consist of programmes that have been *a priori* trans-border in design (e.g. the evaluation of the Öresund contracts and the Swedish-Finnish Wood Material Science and Engineering Research Programme⁴⁴).

As a minimum more efforts could be made to invite international members in to evaluation and expert groups as a matter of principle. In the area of frontier and applied research the invitation of international peers **in programme evaluations** is already quite common in many countries. More could be done to develop common principles and criteria for selection with research excellence as a key element.

The ERA-NET experiences also provide practical examples of joint learning on programme management and evaluation. The NORFACE ERA-NET for instance contributed two important pieces of strategic intelligence that can be used more generically: a report on best practice in Evaluation and Peer Review and a Report on Best Practice in Programme Management. Other trans-border networks have also contributed to developing and disseminating good practice on monitoring and evaluation such as TAFTIE with their guidelines on performance indicators for evaluation and monitoring, their position on additionality and how to apply State Aid rules⁴⁵; exchanges between the Nordic agencies on developing impact measurements, and the European RTD Evaluation Network exchanging best practices amongst policy makers. The possibilities and limitations of joint cross-border evaluations need to be explored further although the choice to do this is a case by case decision.

In the Institutional and Member States' responses to the ERA consultation, common principles for peer review, quality assurance and joint evaluation were welcomed, especially for joint programmes, for a framework of opening up of national programmes, EU programmes or programmes where EU institutions have a substantial funding share. In defining such principles the role of the European Research Council was highlighted specifically for frontier research.

CONCLUSIONS

- Building on a joint vision for a European research policy at trans-national level requires appropriate programme design (based on joined foresight for example) and implementation (see below) at all governance levels that takes into account the additional trans-national dimensions;
- Joint programming could be one option to develop new trans-national joint programmes, either on the basis of integration of existing programmes or through the setting up of an entirely new 'joint programme';
- At European level, there is now a need to develop a portfolio of common guiding principles, rules and criteria for trans-national collaboration – an 'ERA-Frame' - particularly for ERA-NETs, JTI, Article 169 measures and potential, new joint programmes;
- Developing common principles and guidelines for trans-national programmes should encompass aspects such as project application and selection (e.g. common evaluation rules with international peer review), administrative procedures and funding modalities. The ERA-NETs have given useful learning opportunities how to progress on these common approaches;
- More should be done to explore the possibilities and limits of cross-border ex-ante and ex-post evaluations of programmes.

6. Conclusions and Recommendations

6.1. Conclusions

There are many **drivers** for increased optimisation of the European Research Area. Many stem from increased globalisation and internationalisation of research and development. Science and industry are already far ahead in thinking and working across borders, European research policy has been slow to catch up. Today's fragmented and sub-critical research efforts need an **optimised framework for the funding and execution of research**. Although the architecture of such an optimised framework can be outlined, it needs further debate at a high political level to endorse real improvements in the current legal and political arrangements for research policy.

The **European Research Area** initiatives have stimulated debates and considerations at national and regional level, and between member states, on the role of European and international dimensions in national and regional policies and programmes, and on the opportunities offered by trans-border coordination and cooperation between regional and national programmes in Europe. Coordination and cooperation of research and technology policies and programmes in Europe presents a huge opportunity for mobilising the research potential, capacities and capabilities across all European regions. Even though the ERA Green Paper observes that not enough progress has been made on ERA, there is evidence from existing experience that trans-national collaboration has many benefits. Despite **potential benefits** and **enabling factors**, a variety of **obstacles** need to be removed, some of which will require decisions at the highest political level, such as the European Competitiveness Council.

There are multiple trans-national collaboration mechanisms available already, as portrayed in Chapter 3. However, there has never been a thorough high-level debate or analysis to show how the **portfolio of all these trans-national research mechanisms** contributes to the European challenges and the achievement of the Lisbon goals. Nor have they ever been examined in terms of the way they contribute to or hinder the establishment of an optimal framework for intra-European research coordination. In addition, there is still room for improved coordination of existing programmes and initiatives that are currently operated at the national or regional level only.

A key element of the rationale for more joint actions is to tackle the fragmentation in the research efforts in Europe. However there is still little empirical evidence as to what **fragmentation** and **critical mass** mean for different research domains; which level of fragmentation is counterproductive (being inefficient on a European scale and not providing an adequate level of competition ensuring excellence) and what level of fragmentation is necessary to maintain diversity and competition in the system, ensuring that alternative routes are explored to tackle a problem or to find opportunities. This issue needs to be analysed for different domains, types of research and from a global perspective.

The **barriers** and **limitations** found are mainly rooted in the strategic policy making process. On the one hand this is due to the fact, that national and regional programmes have been established mainly to develop the national or regional research and industry potentials. Clearer messages should be provided to national policy makers that further European integration can, in the long run, also help national and regional economies. This can only be tackled by setting clear ambitions and targets and by jointly developing agreed strategies at the highest political levels and subsequently introducing improvements to the European programmes and the instruments of coordination. On the other hand, as a pre-condition, strategic policy visions have to be developed at regional, national and supra-national levels, as to what instruments should be applied at which level and which types and topics of research should be undertaken at supra-national level. There is a need for a strategic policy planning process at all levels and member states should become active in that direction.

A first and difficult step to take in developing trans-national collaboration is identifying **joint visions, common goals and priorities** on a European level that ask for a European approach. Only then can common agendas be set about what joint research programmes should be maintained or launched. At the moment there is **not an evident place or platform** to conduct the trans-national debate at a sufficiently high level and addressing the entire portfolio of mechanisms. Existing tools are in use in Europe that could help with processes such as Foresights, Technology Roadmaps and other interactive processes for stakeholder involvement. A differentiated approach to different types of research (frontier, applied, societal research) is also important.

To take the debate a significant step further and to make the overall picture transparent to all stakeholders in Europe, the Expert Group has proposed in Chapter 5 to make the overall portfolio of research policy implementation mechanisms, based on four pillars, more transparent and to elaborate the **ERA-Frame** for common guiding principles for future trans-national collaborations, particularly for the ERA-NETs, and also for other new joint programmes.

This can be the starting point for **strategic discussions at both the European and national level** on which research problems should be tackled at which level, which instruments are the most appropriate and how more coordination can be provided for. Preparing such a common approach at the European level also requires the development of **national and regional strategies and criteria** for the launching of and participation in joint programmes. Clearly defined added value for the different actors has to be ensured. In addition, the extent to which programmes should coordinate and cooperate with programmes from, or be open, to third countries should be defined. In the interest of the research communities, it will be most important for the future development of the European research and innovation system to reduce the overall complexity of the policy mechanisms. Improved joint programming involving existing and new programmes asks for clearer **frameworks, principles and guidelines** to overcome the existing barriers as set out in this report.

In all this the **perspective of the users of research programmes** should prevail and particularly:

- Ensuring transparency on and easy access to the programmes available at different levels;
- Reducing the administrative burden (whilst maintaining accountability) for participation, thus adhering to simplification and transparency of what programmes are available;
- Taking into account the international dynamics in which the users already operate (inter-regional, trans-national, European or global level) for instance when defining programmes and selection criteria;
- Being aware of the short time cycles that are in place in certain domains that ask for swift actions instead of lengthy strategic and visionary trajectories;
- Using more bottom-up approaches in the selection of priorities.

6.2. Recommendations

The Expert Group endorses the suggestions made in the Commission's Green Paper in relation to the development of joint foresight, involving the scientific community, society and industry, and common principles for peer review, quality assurance and joint evaluation.

The Expert Group has identified challenges and tasks at several policy levels and for different stakeholders. Therefore, our recommendations are addressed to different audiences and recipients - first the Member States (and the European Council) and secondly the European Commission.

The Expert Group advises that,

under the aegis of the EU Competitiveness Council, the Member States should:

1. Develop a **common vision** with priorities for **trans-national** research, encompassing regional, national, intra-European and Community funding;
2. Establish an ERA-Frame: a common set of principles and operative guidelines to optimise the implementation of existing and new ERA structuring mechanisms;
3. Implement more **strategic, sustainable and efficient trans-national programming and coordination** of national research programmes and between national funding organisations to fulfil the vision, using **differentiated** approaches for frontier science, applied research and societal research;
4. **Eliminate legal barriers and administrative obstacles** for collaboration in trans-national programmes and initiatives;
5. Ensure the **involvement** of programme owners, programme managers and research actors in the whole policy design and implementation process;

the European Commission should:

6. **Evaluate** all ERA mechanisms individually and **systemically** to support the development of a common set of principles and operative guidelines (ERA-Frame);
7. Together with Member States and stakeholders, provide **common guidance** and **tools** for the implementation of each of the different ERA mechanisms;
8. Develop material to demonstrate and share, inter alia in an interactive mode, **good practices** and results from trans-national coordination and joint programming.

Annex 1–Composition of the Expert Group

Chair

Acheson, Helena – Forfás, Ireland

Rapporteurs

Amanatidou, Effie – Research & Innovation Policy Analyst, Greece

Boekholt, Patries – Technopolis Group, The Netherlands

Members of the Expert Group

Aymar, Robert – CERN, Switzerland

Clar, Günter – Steinbeis Europa Zentrum, Germany

Crasemann, Wolfgang – Ministry of Economics and Technology, Germany

Dunstan, Diana – Medical Research Council, United Kingdom

Ervelä-Myrreen, Eili – Academy of Finland, Finland

Horvat, Manfred – Vienna University of Technology, Austria

Leijten, Jos – TNO, The Netherlands

Manchin, Robert – Gallup Europe, Belgium

Oleksy, Elzbieta – University of Łódź, Poland

Silvani, Alberto – University of Milan, Italy

Endnotes

2. Optimised research programmes and priorities: the rationale

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22. EuroHORCS - European Heads of Research Councils: <http://www.eurohorcs.org>.
23. EUROCORES – European Collaborative Research: <http://www.esf.org/activities/eurocores.html>.

24. EURYI – European Young Investigators Awards: <http://www.esf.org/activities/euryi.html>.
25. For example, Austria and Finland, where research is structured in programmes managed by Agencies and Foundations have a much higher participation in ERA-NETs than in overall FP6. On the contrary, Italy possessing few programmes has a much lower participation rate (51%) in ERA-NETs than in FP6. This is not true for Life ERA-NETs, where Italian participation rate is at 90%. One of the reasons is that only in this area there are clear programmes delegated to the Italian Institute for Health.
26. ERA-NET Review 2006, p. 18.
27. The currently running ERA-NET evaluation exercise will certainly bring more very important information on the outcomes and impacts of the ERA-NET scheme in FP6 (by Ramboll Management and Matrix Research and Consultancy).
28. AAL – Ambient Assisted Living: <http://www.aal-europe.eu/>.
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30. M. Kleiner: Strengthening the Dynamics of Research in Europe. German research, The Magazine of the Deutsche Forschungsgemeinschaft, 2/2007, pp. 2-3. http://www.dfg.de/en/german_research/download/german_research_2_07.pdf.
34. See: Innovating Regions in Europe: <http://www.innovating-regions.org/network/regionalstrat/index.cfm>.
35. See for instance, very recent (September 2007) new legislation in Poland (<http://www.bip.nauka.gov.pl/>).
36. See U. Muldur, F. Corvers, H. Delanghe, J. Dratwa, D. Heimberger, B. Sloan, S. Vanslebrouck : A New Deal for an Effective European Research Policy. Springer, Dordrecht 2007. p. Fig. 5.1, p. 150.
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42. Against the background of increasing need for focus and mass a competitive “shake-out” should also be included in the scenarios, but this will only happen when the national governments who “own” the RTOs allow it to happen.

4. Coordination in vision building, prioritisation and agenda setting at European level

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43. M. Horvat, K. Guy, V. Demonte, J. Engelbrecht, R. Wilken: ERA-NET Review 2006. The Report of the Expert Review Group. Brussels, December 2006.
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