The EUROPEAN RESEARCH and INNOVATION AREA

1 Opening up & Article "169"

2 Eureka

3 RTD Infrastructures

4 European Research Organizations

The way forward

A contribution of the Greek Presidency for further thought

May 2003

MINISTRY OF DEVELOPMENT
GENERAL SECRETARIAT
FOR RESEARCH AND TECHNOLOGY

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TABLE OF CONTENTS

0. PREFACE 4

1. OPENING OF NATIONAL PROGRAMMES AND ARTICLE 169 8

1.1 Introduction 8

1.2 Mutual opening of national RTD programmes 8

1.2.1 Background 8

1.2.2. Issues to be explored 12

1.2.3 Summary 14

1.3. Implementation of Article 169 14

1.3.1 FP6 and the application of Article 169 14

1.3.2. Further steps needed for the application of Article 169 16

1.3.3 Summary 18

1.4 Conclusions 18

2. THE ROLE OF EUREKA IN THE EUROPEAN RESEARCH AND INNOVATION AREA 22

2.1 Introduction 22

2.2 EUREKA'S Assets 23

2.3 EUREKA and the European Research and Innovation Area 24

2.3.1 Synergies between Eureka and the EC 24

2.3.2 National Programmes and Article 169 25

2.3.3 Mobilisation of private funds 25

2.4 Conclusions 26

3. RESEARCH INFRASTRUCTURES 30

3.1 Introduction 30

3.2 Present situation 31

3.2.1 Research Infrastructures in Europe 31

3.2.2 Policy Making Issues 35

3.3. Perspectives of the European research infrastructures:
their role in the structure of the European Research and Innovation Area 41

3.3.1. Responding to new challenges 41

3.3.2. Networking of Research Infrastructures 41

3.3.3. e-Infrastructures and the concept of a "common market for computing cycles and data storage resources in Europe" - The vision and the challenge....42
3.3.4. Synergies with other EU programmes....43
3.4 Funding for research infrastructures....43
3.4.1 Present situation....43
3.4.2 EU funding....44
3.4.3. Need for new infrastructures?....44
3.4.4 Funding for new Research Infrastructures....45
4. EUROPEAN RESEARCH ORGANISATIONS....48
4.1. Introduction....48
4.2 Present Status....50
4. 2.1 Intergovernmental Research Organisations....53
4.2.2 Interagency Organisations....58
4.2.3. European Commission's Services - Joint Research Centre (JRC)....61
4. 2.4 Regional Organisations: The example of the Nordic Council....63
4.2.5. Thoughts on the proposed European Research Council- ERC....64
4.3. Proposals for the evolution of the research organisations in the European Research and Innovation Area (ERIA)....65
4.3.1 The role of the European Intergovernmental Research Institutions....66
4.3.2 The creation and evolution of "networks of excellence"....67
4.3.3 Towards a pan-European system for funding academic research....68
4. 3.4 Scenarios on the evolution of the European research institutions....70
4.4. Epilogue....71

PREFACE

Launched at the Lisbon European Council in March 2000 on the basis of a communication by the Commission two months earlier, the European Research Area (ERA) concept has come to represent, and cited as such, the central pillar of research activities in the European Union, beyond the Framework Programme.
The creation of ERA is a key component of the strategy defined at Lisbon aiming to make the European Union the most competitive knowledge-based economy in the world by the year 2010. It is envisaged as a tool to overcome Europe's main weakness compared to its competitors (mainly the USA and Japan) and namely:

- Insufficient funding since the average research effort in the E.U is only 1,9% of Europe's GDP, against 2,8% in the USA and 3% in Japan.
- The European "paradox" i.e. lack of environment to stimulate innovation and exploit results, while research laboratories perform relatively high in publications and citations
- Fragmented activities and dispersed resources

In parallel, a European innovation area is emerging and develops its dynamic concepts supporting global competitiveness. The Greek Presidency considers the two areas have to converge, if not to merge into a European Research and Innovation Area (ERIA), to achieve the desired rates of competitiveness and sustainable growth.

Against this background the objective of the European Research and Innovation Area combines three interrelated and complementary concepts:

- *Creation of an internal market in research, an area of free movement of knowledge, researchers and technology aiming to increase cooperation, to stimulate competition and to achieve better allocation of resources*
- *Re-structuring of the European research framework by improving coordination of national research activities and policies, representing the major part of research efforts carried out in Europe.*
- *Development of a European research policy that will reach beyond research activities taking into account all relevant aspects of other EU policies.*
- *Revisiting the "subsidiarity principle" in a way that the European thinking will prevail over national approaches.*

The ERIA idea was firmly supported by the Lisbon European Council calling upon the Council and the Commission to work along with Member States to take the necessary steps towards specific actions for its implementation. Since 2000, efforts for the creation of Area have figured high on the agendas of the Research and Competitiveness Councils as well as in other Council formations (e.g. education) with regular progress reports to the European Council. Furthermore, the Barcelona European Council renewed its support to the ERA process stressing its importance towards meeting the two fold 3%-2/3 RTD expenditure target.

In this context and following the publication of the first communication launching ERA[1], several Commission documents further specified the concept and defined broad guidelines for its implementation[2]. In particular, with a document published in October 2002, the Commission provided a first assessment of the progress achieved in the 30 months from the launch of the ERA idea and moved forward to identify more specific actions needed to give ERA new momentum and more effective means for implementation[3].

As emphasised in the above-mentioned communication, it is clear that some progress has been made since the concept was first launched; the concept developed further and several of its fields were translated to specific

actions. First of all, the new Framework Programme has been adopted and is already underway, with new instruments specifically designed to build-up critical mass of resources, to strengthen actions in fields such as infrastructures and mobility of researchers and with new schemes for networking national activities and provisions for the implementation of Article 169 of the Treaty. Furthermore, other activities initiated by relevant Commission papers, are already underway on a variety of ERIA related subjects such as benchmarking of research policies, mapping of excellence, networking of national programmes along with issues related to science and society. Moreover, various contact fora have been set, covering both private and public research players and aiming to improve coordination of national activities in several fields such as research infrastructures (High Level Strategy Forum), aeronautical research (ACARE), the environment (EPBRS), clean technologies etc.

However, results from ERA and FP6 monitoring exercises and reports from various advisory boards (such as the EURAB) show a mixed picture for the progress. As identified in recent Commission communications most of the barriers arise from the low overall level of Member State involvement, from the dependence to other E.U. policies as well as to FP6 funds.

The present document confirms the commitment of the Greek E.U. Presidency to the ERIA process and aims to further investigate selected issues that are strongly related to the implementation of the European Research & Innovation Area. The document, building on papers and contributions from the Commission and previous presidencies and, trying to be complementary to them, aims to further stimulate discussion on the following issues:

i Opening –up of national programmes and implementation of article 169 of the Treaty – Issues to be explored for their successful application.
ii The role of EUREKA in the implementation of the ERIA
iii Research Infrastructures and
iv European Research Organizations: their potential contribution to the implementation of the ERIA.

The document is structured in four main sections corresponding to the topics mentioned above (Opening-up of national programmes and article 169, Infrastructures, EUREKA and European Organizations). Each section provides a brief review of previous contributions and discussion papers and a detailed description of the present situation. The discussion then focuses on the identification of specific actions needed to optimise the contribution of the above-mentioned instruments, programmes and initiatives to the implementation of ERIA.

Finaly, this document also aims to contribute to the discussion in the frame of the Convention and the eventual revision of the Treaty articles related to research and technology.

[1] European Commission communication "Towards a European Research Area, COM(2000)6, 18.01.2000

[2] European Commission Communication "Guidelines for the implementation of European research activities", COM(2000)612 , 4.10.2000
European Commission Communication "The international dimension of the European Research Area", COM(2001)346, 26.6.2001
European Commission Communication "A Mobility strategy for the European Research Area", COM(2001) 331, 20.6.2001

[3] European Commission Communication "The European Research Area : Providing New Momentum – Strengthening- Re-orienting – Opening –up new perspectives", COM(2002)565

OPENING UP & ARTICLE “169”

The way forward

1

OPENING OF NATIONAL PROGRAMMES AND ARTICLE 169

Issues to be explored for their successful application and further development of the European Research and Innovation Area[4]

1.1

Introduction

Over 80% of public sector research in Europe is conducted at national level, mainly under national or regional research programmes. The Union's Framework Programme for research activities along with other arrangements that support collaboration between national teams add a European dimension to a large proportion of the research conducted in Europe, when it comes to project implementation.

However, little has been done to develop links among the national research programmes themselves and between the national and European Union programmes. National research policies and Union policy often overlap without creating and exploiting complementarities. The synergies among national research policies, as they are expressed through the implementation of the national RTD programmes, are limited because national policies are designed and implemented independently. This impedes the optimum utilization of human resources and infrastructures and, consequently, the maximization of the outcome of research efforts at a European level. Closer coordination of these instruments would allow better overall allocation of the resources made available for research in Europe and will pave the way for a European research policy to emerge in fields of common interest.

In this section, we concentrate on two ways to enhance cooperation among national research programmes: the mutual opening of national RTD programmes and the application of Article 169 of the Treaty.

1.2

Mutual opening of national RTD programmes

1.2.1 Background

Previous presidencies and Commission documents identified the general principles that should govern the mutual opening of national R&D projects. These were set to be the following:

- Voluntary application of the opening process
- Reciprocity among Member States
- Progressive implementation
- Neutrality in funding
- Addressing all priority areas and instruments of each national programme.

[4] We are highly indebted to Prof. T. Sellis, National Technical University of Athens (NTUA), President of the National Council of Research and Technology, Greece, to Ms D. Tomadaki, NTUA and to Prof. N. Konstantelou, University of Aegean for their substantial contribution to this paper.

These principles are a way to ensure that the mutual opening of national programmes follows a mix of bottom-up and top down approaches and are grounded on variable geometry respecting the voluntary and reciprocity principles.

In this context, the following three levels of 'opening models' were identified:

Level 1: Increasing mutual knowledge through information exchange

Information exchange on funded projects, selection of research priorities, use of instruments, budgets, and other policy factors, represent important elements towards the mutual improvement of research management. In this context, exchange of information aims at providing managers of different national programmes with the necessary information on national work-programmes (schedule, structure, content). Specific measures related to information exchange involve access to information on funded RTD projects and activities, access to planning activities and to prospective studies and analyses. Periodical meetings of managers of national programmes and the creation of a database on the "Implementation of national R&D programmes" are two specific implementation mechanisms that have been suggested as ways to increase information exchange about national research activities among countries.

The evaluation for the selection of R&D projects proposals, infrastructures or large-scale research facilities should be made on an international basis. Furthermore, setting up advisory groups of European experts, as well as accessing information regarding national evaluation systems and criteria are considered as possible measures for the creation of a credible and sound evaluation system. The creation of a European database of evaluators and periodical meetings of managers of evaluation agencies could serve as possible implementation mechanisms. Finally, a group of measures related to the exchange of best practice information has also been suggested. These measures involve for example, the exchange of information in decision-making processes, technology transfer and diffusion of R&D results as well as the definition of a set of indicators for the evaluation of trends in cross-border cooperation.

Level 2: Stimulating cross-border co-operation with contacts between funded projects in different countries

As a starting point towards cross-border cooperation, the mobility of researchers should be encouraged. Specifically, the proposed measures involve harmonisation of general conditions for PhD or post-doc grants, increase of funding for mobility and the openness of national research facilities to permanent research positions. Cross-border co-operation in the realisation of R&D projects could be enhanced through coverage funding of co-operation costs, the aposteriori clustering of thematically related projects and the higher priority given to their evaluation. Finally, it has been suggested that research groups from abroad should have better access to national large-scale research facilities. The upgrading process of scientific instruments or equipment should be made through international bids.
Other measures to enhance cross-border co-operation include the launch of small pilot exercises in different scientific and technological priority areas aiming at the mutual learning of appropriate mechanisms for the mutual opening of national programmes. The following research areas have been proposed as potential candidates for these pilot exercises: Marine Sciences, Plant Genomics, Complexity and Complex Systems, Chemistry. These areas have been proposed because (a) they cover different scientific fields, (b) are currently funded by the national RTD programmes of a large number of Member States, (c) have some running experience on bilateral agreements, (d) demonstrate added value for international cooperation and (e) allow for the implemen-

tation of different types of measures. Currently, following a CREST initiative, two clusters have been created in the areas of plant genomics and marine sciences, with the objective of serving as pilot exercises for the mutual opening of national RTD programmes.
FP6, under the key action "Strengthening the foundations of the ERA", includes a series of actions for the coordination and the cohesive development of policies and activities promoting research and innovation in Europe. Thus, it accounts for the financial support for the mutual opening of national and regional programmes, as well as for the networking of research activities that are being conducted at a national and regional level in all scientific fields and on the basis of a bottom-up approach. The principal means for FP6 to support the cooperation and coordination of research activities carried out at a national or regional level is the ERA-NET scheme. The objective of the ERA-NET is to step up cooperation and coordination of research activities carried out at a national or regional level in the Member States and Associated States through: (a) the networking of research activities conducted at a national or regional level, that is co-operation and co-ordination activities between countries without transnational flows of national funding. and (b) the mutual opening of national and regional research programmes, that is cooperation and coordination activities between different countries or regions implemented with transnational flows of national funding. In this latter case, there may be a pooling of national funds to pay for joint actions or alternatively one programme may finance research in another country under a reciprocal agreement.
The ERA-NET scheme will contribute to the ERA by improving the coherence and coordination of research programmes across Europe. It will also promote closer interaction between research performers in different countries. Both networking and mutual opening require a progressive approach. The ERA-NET scheme therefore has a long-term perspective that must also allow for the different way research is organized in different Member States. In order to obtain a significant structuring effect at the European level, the ERA-NET should involve research activities undertaken in at least five different Member States or Associated States.

As far as community contribution is concerned, ERA-NETs will be implemented as "coordination actions", which is one of the funding instruments of FP6. The financial support from the Community is limited to the costs of the additional activities undertaken to implement the ERA-NET. No support is provided for the research activities themselves, for which the members of the ERA-NET are expected to use their own resources.

Level 3: Cross-funding of open national RTD programmes

The practical measures related to the first two levels identified above, that is the networking of research activities conducted at the national or regional levels, have been discussed in the context of previous Presidencies. Level 3 has been left open to subsequent presidencies for further discussion. Thus, a step forward would be a discussion on the various ways and conditions under which Level 3 could be implemented. The various mechanisms for the opening up of national programmes and the possible funding mechanisms are summarized in the following table and discussed in more detail below.

	Funding mechanisms		
Implementation mechanisms	**Bilateral**	**Multilateral**	**Unilateral**
Bilateral research activities	X	(optional)	(optional)
Multilateral research activities	(optional)	X	
Unilateral research activities	(optional)	(optional)	X
Directly commissioned Research		X	

Four different implementation mechanisms have been identified for the opening of national research programmes. It should be emphasised that in all cases, the reciprocity principle should apply among countries but may cover activities in a different research area than the one selected for opening-up by a particular country. Thus, one country may participate in research activity in area A conducted in another country as long as it complies to a reciprocal agreement for opening up of research activities in the same research area A or in any other area (B, C, D, etc.). To this end, the implementation mechanisms identified are the following:

Unilateral research activities: A country opens up a national research programme, in which entities from other countries may participate.

Bilateral research activities: Two countries find common ground in a specific research area and build up a joint research programme that corresponds to this specific research priority. They could then open up this action to third countries.

Multilateral research activities: More than two countries open up their national research programmes in a specific area and build up a joint research programme, which can then open up to third countries.

Directly commissioned research: In case a country (or a number of countries) wish to acquire new knowledge, it may directly commission entities from another country(ies) to undertake part of the research activities involved without restriction of nationality or residence.

Three different financing mechanisms have been identified. As in the case of implementation mechanisms, the reciprocity principle should apply among countries but can be limited to activities in a different research area than the one selected for opening-up. Thus, one country may finance research activity in area A conducted in another country as long as (a) it forms part of the joint research consortium or (b) it complies to a reciprocal research agreement. The funding mechanisms identified are the following:

Unilateral funding: Only one country contributes to the expenses related to the implementation of the research tasks. Unilateral funding applies to the cases of unilateral research activities and directly commissioned research. It could also be an optional choice in bilateral research activities under the reciprocity principle.

Bilateral funding: Two countries contribute to the expenses related to the implementation of research. Bilateral funding applies to the case of bilateral research activities and can be optional in the case of unilateral and multilateral research, under the reciprocity principle.

Multilateral funding: More than two countries contribute to the expenses related to the implementation of research. Multilateral funding applies to multilateral research activities and can be optional in the case of unilateral and bilateral research, under the reciprocity principle.

From the above it follows that in all implementation mechanisms it is anticipated that eligible participating entities may come from:

- Countries directly involved in the specific cross-border co-operation agreements, and
- Other countries (both EU and non-EU countries) provided that the reciprocity principle is applied. These countries may or may not contribute to the financing of research activities.

1.2.2. Issues to be explored

There are a number of institutional, organisational and administrative measures that need to be explored for the implementation of cross-border co-operation in research activities. More specifically the following issues need to be addressed:

1.2.2.1. Institutional Measures

These mostly refer to the:

a) terms and conditions that apply to the cross-border exploitation of human resources (scientists and researchers) and

b) general principles that should govern the project selection process.

With regard to (a), issues such as the progressive harmonisation of general conditions for PhD or post-doc grants, as well as the issue of a Green card and the special immigration regulations for researchers have already been under consideration. Work in this area could be influenced by the work carried out by DG XV (Internal Market and Financial Services). From the relevant web site (http://citizens.eu.int) European citizens could get information for any condition that relates to the practice of their profession in another country of the EU (taxation issues, living conditions, work permits, etc.). Member States should be encouraged to launch a free-phone number where foreign researchers can get information about living and working conditions. It should also be noted that the MCFA (Marie Curie Fellowship Association) supports the initiative of the European Commission to develop a pan-European Researcher's Mobility Portal[5] . This portal will provide help with respect to questions about trans-national mobility, international job search etc. and is due to be launched in May 2003.
With regard to (b), cross-border cooperation should not be limited to specific research areas as it happens in the Framework Programmes. Rather, it should be an open-ended, bottom-up process where research activities would span through various fields of interest depending on the priorities of the Member States.

1.2.2.2 Organisational and administrative measures

These are divided into:

a. Measures that involve 'back office' functions between administrations (monitoring and evaluation of research proposals, inter-administrative networking, etc.), and

b. Measures that act as interface with the participating entities (i.e. information kiosks, contact points, marketing and promotion, one-stop shopping)

Regarding the first point (a), the following principles should apply:

- The evaluation procedure for the selection of projects, as well as the evaluation of the results achieved should be undertaken by an international team of experts selected out of the European database of evaluators.
- Research managers from the respective Member States involved in cross-border research activities could undertake the monitoring of projects.
- In each Member State, the administrative agencies responsible for national research activities should set up an office that would serve as information and contact point for all national activities relevant to cross-border cooperation. This office should undertake the co-ordination of national mechanisms (research managers, evaluation agencies) and should also maintain a link with the relevant services of the Commission (e.g. CORDIS).

[5] http://www.mariecurie.org/src/assoc/mobport

Regarding the second point (b), national administrative agencies should cater for raising the awareness of eligible participating entities in cross-border schemes. For this purpose, national agencies should maintain national website(s) and database(s) where all the relevant information would be stored and could be easily available. The same information should also be available in CORDIS.

An emerging role for the **"Open Method of Coordination"** (OMC) could be envisaged in the context of the mutual opening of national RTD programmes. OMC, which was introduced by the Employment Strategy of the Amsterdam Treaty and reaffirmed by the Lisbon European Council in 2000, is likely to turn into a "new concept of deepening European integration". The OMC establishes the so-called "good" practices and benchmarking indicators that go beyond the initial Treaty provisions, thus bringing in new elements that may pave the way for greater effectiveness and/or legitimacy. The OMC was finally codified with the Lisbon European Council applying it to sectors such as information society, research policy, entrepreneurial policy and education policy. OMC is supposed to occupy an intermediate place between intergovernmental cooperation and the adoption of common rules. It comprises four central elements:

- It is a flexible instrument that leaves broader space for closer cooperation between Member States that wish to pursue deeper integration.

- Although its application is non-binding, it is more than simple cooperation, since it contains the intervention of the Community authorities.

- It favours a bottom-up approach to convergence in which governments study each other's different methods, gauge the success of various policy alternatives and mimic best practices employed elsewhere.

- The OMC provides the Commission opportunities to enhance its role as policy broker and catalyst, presenting broad guidelines, organizing the exchange of best practices, proposing indicators and arranging peer review.

The application of the OMC for the European Research and Innovation Area, and more specifically for the mutual opening of national programmes, seems to be an appropriate policy instrument especially because of the existence of RTD programmes at different territorial levels, the structural diversity of the national RTD programmes in Member States and the variations on the performance of these programmes in Member States.

In order to make use of the potential benefits of both the OMC and the opening of national programmes, the regional level has to be considerably more involved in the definition of guidelines and indicators. As far as the coordination of national RTD programmes is concerned, the Council is the appropriate authority for the decision on guidelines and reference indicators. The Commission is expected to play a central role in developing proposals for guidelines and indicators and in ensuring that all concerned public and private actors are involved. Benchmarking could be a key operational tool for the successful application of the OMC in the opening of national research programmes, since it could be used as a diagnostic tool, a learning tool and a tool for monitoring and implementation. Possible indicators that could be used in the benchmarking process in the context of the OMC could involve human resources engaged in projects implemented on a transnational basis, RTD expenditure allocated to programmes jointly executed by several M-S and the measurement of the scientific and technological impact and productivity accomplished through the opening of the national RTD programmes.

The EUREKA model presents an even more structured coordination method, although open for national fragmented activities (see following section)

1.2.3 Summary

There has been some experience in the opening of national RTD programmes in the context of bilateral research agreement between EU Member States and third countries. However, it is questionable whether and how this experience can contribute to the practical application of the 'reciprocity principle' and the enactment of the various cross-funding options that were described above in detail. Still, support for joint implementation of research activities should be seen as an effective way of stimulating cooperation between countries and regions and thus actively contributing to the creation of a European Research Area.

For this purpose, the following activities are proposed to advance the state-of-the-art in the mutual opening of national programmes:

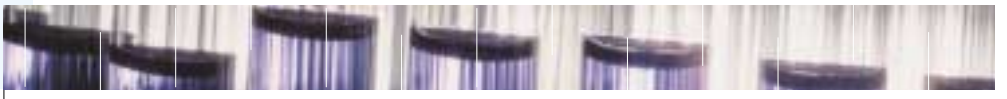
a. Proceed with the small pilot exercises in selected areas (Marine Sciences, Plant Genomics, Complexity and Complex Systems, and Chemistry) that aim to enhance learning on the appropriate mechanisms for the mutual opening of national programmes. This will allow for a real test bed to identify and solve some of the institutional, organisational and administrative issues raised above.
b. Further explore the various mechanisms proposed above for the mutual opening and cross-funding of national RTD programmes in order to study potential problems and pitfalls in their practical implementation.

1.3 Implementation of Article 169

The most powerful means of networking research programmes is joint implementation of whole programmes or large parts of programmes. Article 169 enables the Community to participate in research programmes undertaken jointly by several Member States, including participation in the structures created for the execution of national programmes. Article 169 is potentially a very powerful instrument for the realization of the ERA, because, as opposed to integrated projects and networks of excellence that integrate individual performers of research, it integrates national programmes on the basis of "variable geometry". The objective of the implementation of Article 169 is to promote and support the coherent and coordinated mobilization for the benefit of the entire EU of the organized efforts (programmes) of the Member States. The aim is also to increase the impact of national efforts on an EU scale in matters of interest to many Member States.

1.3.1 FP6 and the application of Article 169

The proposal for a Framework Programme for 2002 – 2006 provides for support for joint implementation going beyond support for the coordination side, with the aid of application of Article 169 of the Treaty. FP6 aims to make the most of Member States' research programmes in areas where their common interests coincide with the overall priorities of the EU. The aim is also to increase the impact of national efforts in matters of interest to many Member States. Therefore, Community financial support in national projects jointly undertaken could be envisaged where it can particularly help to attain the objectives of the Framework Programme. By drawing up harmonized work programmes, coordinating the assignment of budgets, ensuring complementarity of efforts, and launching joint calls for proposals, overall effectiveness can be approved.



The participation of the Community would help, for example:

- to assemble a critical mass of resources in fields of major interest to European competitiveness or to solving problems of direct relevance across the European Union;
- to increase the impact of national efforts at the level of the Union on questions of interest to several Member States;
- to ensure the strong and coherent participation of the EU in research initiatives at international level and in the solving of problems which are best tackled at global level;
- to mobilize the existing research potential of the Member States on topics linked to the implementation of Community policies.

The EU would be involved in defining priorities and monitoring the work, but not in day-to-day management. The EU's financial contribution would cover support for research activities, including the operation of joint structures and support for the participation of researchers or institutions from other Member and Associated States. Article 169 of the Treaty covers this approach. It is also felt that the application of Article 169 will make it possible to achieve results unattainable with the other two instruments, because of the scale and diversity of the resources mobilized and the structural effects of combining the national efforts.

The basic criteria for the selection of the proposals of Article 169 could be the following:

- Involvement of enough Member States to obtain a significant structuring effect and critical mass;
- Topic of great interest to the Community that fits with the thematic priorities of the Framework Programme;
- Principles of co-funding by Member States and Community and of additionality are respected;
- Significant European added value;
- Article 169 is the only way the project could be implemented.

The first pilot application of Article 169 has been identified to be the EDCTP joint programme. Member States and Associated States will invest more than € 1 billion for the years 2002 – 2007 in basic and clinical research to develop new clinical interventions against HIV/AIDS, malaria and tuberculosis. In this programme, 14 EU Member States and Norway have recognized that a political commitment is required to work on these problems. In order to exploit Europe's investment to confront the three aforementioned diseases in the developing countries, and get mobilized and supported by the European Commission, they created the "European and Developing countries Clinical Trials Partnership (EDCTP)" as a flagship initiative to accelerate the development of new clinical interventions to fight these diseases, particularly in the Sub-Saharan Africa. The EDCTP is unprecedented in scope and ambition and unites particularly all the relevant clinical research and development activities undertaken by 14 EU Member States and Norway together with that of the Community. The overall goal of the EDCTP is to accelerate the development and evaluation of new vaccines, drugs and other preventive or therapeutic tools against the aforementioned diseases in full partnership between Europe and the developing countries. The EDCTP has the following three major objectives, which are coherent with EU research, trade and development policies:

a. Networking and cooperation between the participating national programmes to increase their efficiency and impact and overcome the fragmentation of European research in this field. This will contribute to realizing the principles of the ERA in this field of research.
b. Acceleration and development of new products by supporting clinical trials in the developing countries, thus promoting transfer of research into clinical practice, thereby strengthening Europe's R&D excellence on the global market.
c. Strengthening clinical research capacities in the developing countries in the fight of the three poverty-related diseases, in line with European development and cooperation objectives. This aim would help establish a long-term sustainable and genuine partnership between Europe and the developing countries.

The financial goal of € 600 million in the first five years of the EDCTP reflects the dimension of the problem, the need for mobilization of different stakeholders and the challenged that have to be overcome to significantly advance new clinical interventions. € 200 million will come from the participating States and € 200 million from the Community, the sum of these budgets being sufficient and necessary to launch and develop the EDCTP programme. Moreover, € 200 million will have to come from other donors, including industry. The Community participation of € 200 million is calculated to be the substantial but minimum investment necessary to initiate the EDCTP programme in the first five years. The Community participation provides incentives for the cooperation of national activities and creates added value and critical mass at the European and developing countries levels.

The fundamental basis of the EDCTP initiative is the joint programme formed by the participating Member States' and the Associated State's national programmes and the Community. The framework of Article 169 is particularly well adapted to implement the EDCTP initiative as it allows for the participation of the Community in the joint programme, given that the EDCTP programme meets the scientific objectives of FP6 and its research field falls within the priority theme "Life Sciences, genomics and biotechnology for health" of FP6. Furthermore, the application of Article 169 promotes a long-term structuring effect both in European and developing countries' research policies and helps to integrate different policies in a coherent context. Consequently, Article 169 is the appropriate instrument for the Community to support the EDCTP initiative, because it allows for both the coordination of national research programmes and the participation of the Community in the joint programme.

1.3.2. Further steps needed for the application of Article 169

As mentioned above, Article 169 enables the Community to participate in research programmes undertaken jointly by several Member States. The objective of the implementation of Article 169 is to promote and support the coherent and coordinated mobilization of the organized efforts (programmes) of the Member States for the benefit of the entire EU.

The main features of programmes funded under Article 169 can be summarized as follows:

a. Combination of both bottom-up proposals from individual Member States with top-down priorities of the European Union;
b. A minimum number of Member States wish to work together to conduct internationally competitive work at the highest level, with a well structured joint activity;
c. Member States agree on topics for joint action and, with the help of the Commission, put forward for discussion such joint programmes so that other Member States can opt for participation;
d. The quality of accepted proposals is assured through the use of international peer review panels;
e. Implementation requires setting up a formal consortium structure to provide co-ordination and efficient programme management;
f. Monitoring and evaluation are carried out by a committee of participating national agencies and the EC, assisted by a panel of international experts.

Based on the discussion, it is also evident that there are key financial, institutional and administrative issues that have to be clearly defined for the proper implementation of Article 169 in order to achieve the goals of ERA. In the following, we elaborate on the above issues.

1.3.2.1 Programme Eligibility

As the EC has already suggested, the Member States could envisage joint implementation of programmes varying in many ways: public programmes run by national or regional authorities or by national research organisations; programmes implemented directly by research bodies or by specific methods, following calls for proposals; programmes already underway or programmes for which preparations are well advanced.

The proposed projects should come as a result of a balance between applying bottom-up and top-down approaches: The application of Article 169 is to be activated when bottom-up formation of partnerships is made, i.e. Member States decide to pursue common research of major interest. On the other hand, the financial contribution by the EC indicates the strong interest of the EU to participate in such efforts, as long as such programmes are along the lines of the policies adopted by the EU (top-down). These projects should at least clearly show (a) the financial leverage of several Member-states joining forces, (b) common interests at the level of national or regional programmes and (c) no conflict with the Framework Programme.

The proposed projects should exploit a clear joint work programme: Joint implementation of programmes should have a clear effect on the research activities concerned, since (a) these conditions make it possible to achieve results which would be unattainable if the programmes were implemented separately and (b) the scale and scope for these projects is clearly beyond the resources and capabilities of individual programmes. This means that the themes must be important enough to generate large-scale activities in several Member States.

The number of countries participating in the project should reflect a significant joint effort at European level: Article 169 should be used to put forward projects where significant national, regional and European level support is present. Hence there should be a critical (minimum) number of participating countries required to activate a candidacy for Article 169 application. A reasonable minimum is one third of the total Member States. In addition, strict commitment by the countries is required, and should be expressed both by the fact that the sector proposed for a programme is based on a (or combination of) strong national programme and by an endorsement at the highest government level possible.

1.3.2.2.Organizational issues

Among the various organizational issues that need to be addressed, the following are considered very important.

Formal structure among partners: For activities to be covered by Article 169, the structure of partnership should be such that it exploits the commitment of the partner countries as well as the participation of the EC (and possibly the industry or the private sector in general). Hence, a form of a legal body formed for the particular activity, seems to be an appropriate scheme. The proposal of setting up an EEIG for such projects seems to be a viable solution, as it is governed by existing EC regulations. However, this needs to be amended in a way that will allow the official participation of the Community in the structures set up, and in particular in the processes of defining and monitoring the implementation of the programme.

Evaluation and Monitoring procedures: Monitoring and evaluation procedures need also to be established. In particular, of main interest are:

- The procedure for the formation and selection of programmes, as well as the evaluation of the results achieved. An international team of experts, not necessarily from EU countries, should undertake evaluation.
- Research managers from the respective Member States that are involved in addition to EC officials could undertake the monitoring of programmes.

1.3.2.3 Financial issues

Financial issues are of major importance and the role and participation of the Community have to be clearly defined. The Commission has proposed that this contribution would cover support for:

- Research activities conducted in the course of jointly implemented programmes, including operation of the joint structure(s) for the activities,
- Participation by researchers or institutions from other Member States or associated countries, where the Member States involved decide to open up the jointly implemented programmes to such participants.

For the purposes of setting the amount for the contribution to the first of these aspects, several options have been proposed by the Commission:

- The same percentage of the total budget for the jointly implemented programmes in every case,
- A contribution set in absolute figures, taking account of the amount allocated to the area concerned in the Framework Programme and of the proportion of that area covered by the activities planned,
- An amount to cover the costs directly linked to joint implementation of the programmes and calculated on the basis of those costs.

A combination of the above schemes should be used depending on the theme and the programme activities. However, it seems appropriate that the financial contributions by the EC are based on a matching-fund scheme, whereby the EC matches funds allocated by the countries that participate in the partnership.

1.3.3 Summary

Application of this as yet unused Article, combined with other instruments, seems, a priori, a particularly appropriate means of implementing the new Framework Programme aiming specifically at contributing towards the creation of the European Research and Innovation Area. Support for joint implementation of research programmes seems, in particular, an effective means of stimulating cooperation between regions from different Member States or between several countries from the same part of Europe.

Two actions may advance the state in this area:

- Proceed with the pilot application of applying Article 169 with the EDCTP programme. This will allow for a real test bed to identify and solve issues such as the ones raised above.
- Use ERA-NET as a vehicle to further study the issues related to Article 169, including: the mechanisms to identify thematic areas, procedures for setting up such joint programmes, rules for evaluation and monitoring, financial aspects and forms of governing structures.

1.4 Conclusions

Support for joint implementation of research activities should be seen as an effective way of stimulating cooperation between countries and regions and thus actively contributing to the creation of a European Research Area. The following activities are proposed to advance the state-of-the-art in the mutual opening of national programmes:

- Proceed with the small pilot exercises in the already selected areas of Marine Sciences, Plant Genomics, Complexity and Complex Systems, and Chemistry that aim to enhance learning on the appropriate mechanisms for the mutual opening of national programmes. This will allow for a real test bed to identify and solve some of the institutional, organisational, and administrative issues raised above.

- Further explore the various mechanisms proposed above for the mutual opening and cross-funding of national RTD programmes in order to identify potential problems and pitfalls in their practical implementation.

Along the same line of reasoning, it is proposed that two actions are taken to proceed with the application of Article 169:

a. Proceed with the pilot application of applying Article 169 with the EDCTP programme. This will allow for a real test bed to identify and solve issues such as the ones raised above.
b. Use ERA-NET as a vehicle to further study the issues related to Article 169, including: the mechanisms to identify thematic areas, procedures for setting up such joint programmes, rules for evaluation and monitoring, financial aspects and forms of governing structures.

EUREKA

2

The way forward

2

2

THE ROLE OF EUREKA IN THE EUROPEAN RESEARCH AND INNOVATION AREA[6]

2.1

Introduction

The Eureka Initiative was launched in 1985 to provide a framework for civil international collaboration in the area of advanced technologies among industries, firms, SME's, research institutes and universities **with the aim of strengthening the productivity and competitiveness of European industries.** It concerns exclusively market-driven RTD projects and over the past decade Eureka has been the preferred framework for industrially led research and innovation close to the market.

The basic principle for initiating Eureka projects is the bottom-up approach and the funding opportunities lie with the Eureka National Offices. So many Eureka projects are co-financed from public funds, in the form of grants and loans, which may vary from country to country. Nevertheless, private funding is the key factor for Eureka projects, mainly for the commercial exploitation of their technological outcome. Moreover, the need for external funding for projects, especially for SMEs, has been a recurring theme for the last six years, due to the tightening of public sector budgets in most member countries. The declining amount of public funding for Eureka projects is of major concern and in a way is a reflection of a reduced political commitment to Eureka.

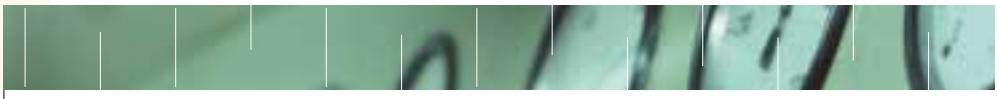
Today the Eureka network consists of 33 member-states (15 EU Member States, 9 of the 10 accession countries, Norway, Switzerland, Island, Romania, Croatia, Turkey, Russia and Israel) and the European Commission as its 34th member. Eureka's network could be taken as an example for the networking of national research programmes. Networking can take different forms, from the simple exchange of information to the joint implementation of programmes with EU support under Article 169 of the Treaty, and is one of the most effective and symbolic ways of enhancing the European Research and Innovation Area.

Today Eureka represents approximately 1% of the European RTD effort. The traditional Eureka projects represent an important share of the total. Clusters are a growing part of the portfolio with more than 2/3 of the total.

The following table summarises the situation of the portfolio during the last 2 years:

Projects	M€	%
Traditional projects	913	26,2%
Medea, Medea+	1969	56,5%
Other NTIC "Clusters"	583	16,7%
"Other clusters"	20	0,6%
TOTAL	3485	100,0%

[6] The present text was drafted by Ms. E. Sofouli Head of the Technology Development Directorate of the General Secretariat for Research and Technology and Mr. J. Papadakis Head of the EUREKA desk of Greece



From a quantitative point of view the trend, concerning "traditional" projects, reflects the fact that the majority of participants are SMEs with limited resources, trying to bring new products to the market quickly. A qualitative analysis shows that Eureka's principles are well adapted to industrialists' needs, both for large multinational groups, mainly through successful clustering, and for SMEs through traditional projects.

2.2 Eureka's Assets[7]

- **Eureka is attractive to SMEs, which are prime "targets" for European programmes.** During the last few years SMEs participation, as project leaders, has increased significantly. This is a very positive result since the development of European SMEs, on the international market is a goal, which is unanimously considered to be important by Eureka's members. Eureka's principles: confidentiality, full ownership of the results and support from efficient regional network (in some countries), are very attractive, not only to high-tech SMEs, but to all kinds of SMEs such as traditional, start-ups, spin-offs of large groups or of public laboratories and also medium size firms.

- **Eureka offers a good ratio of industrial to public funding: towards the 3% goal.** Most European countries admit that the "3% goal" will only be reached if the industrial investment in RTD is significantly increased. Since they already spend close to 1% of their GDP in public RTD, it is the private investment, which has to be stimulated. From this point of view Eureka is probably one of the best existing tools to use efficiently the national public funds stimulating private spending. The ratio of industrial to public funding in Eureka's projects, estimated to be 3 to 4, is very satisfactory: For every public euro invested in Eureka, private sources invest approximately 3 euros of their own resources. This is a very good leverage effect, which is in line with the Member States policies towards the "3% goal". On the top of that, during the last years, some Member States have used increasingly repayable soft loans to support Eureka projects; not only limited amount of public money stimulates large amounts of private money but, in case of success, the public investment is repaid, which increases again significantly the ratio of private to public spending.

- **Eureka's market orientation is a characteristic needed in Europe**\Eureka supports industry oriented, close to the market projects. They are submitted, managed and exploited by industrialists. Eureka's focus to applied research is considered as a very positive characteristic bearing in mind that one of the weakest points of the European RTD is the difficulty to transfer the research results to the market. Despite the difficulties that have been faced, for example with co-ordination of national activities, Eureka has developed a good experience on European co-operative market oriented innovative projects and has achieved some significant successes along that line.

- **Eureka's successful "clusters" are attractive for industry** Although they usually attract some quite different customers, mainly large multinational groups, successful clusters have a good image to the industrial community in general. The principles of industrial management, confidentiality and full ownership of the results are highly appreciated by industrialists. The initiative has been very successful especially in large strategic cluster projects especially in the IST area, such as MEDEA+ and the ITEA.

[7] Based of Mr. G. Nikolaon's/French NPC,analysis on EUREKA send to HLRs for comments in January 2003.

2.3

EUREKA and the European Research and Innovation Area

Following the proposals made at the "Hellenic Event" held at the European Parliament on 20 November 2001, an ad hoc Eureka Working Group, the "Synergies Group" (SYN-Group), was set up, with joint representation from Eureka and the Commission.

The main issues that the Group has examined were the following:

- Synergies between Eureka and the EC Framework Programme and the European Investment Bank (EIB) following the Lisbon EU Summit and the decision to use the EIB more dynamically for research and innovation activities
- Potential increased collaboration between Eureka and the European Venture Capital Association (EVCA) in order to mobilize private funding
- Synergies between Eureka and the EU Structural Funds, mainly in supporting research and innovation projects.

The work of the SYN-Group encompassed the spirit of positive collaboration between European institutions and organisations.

The complementary role of Eureka in relation to the Framework Programme offers an excellent opportunity to reinforce the ERA, with a better coordination of national policies for research and innovation. One of the main advantages of Eureka is its links with industry and businesses, particularly SME's, which provides the basic tools for the development of Innovation in Europe.

2.3.1 Synergies between Eureka and the EC

Eureka is now recognised as an important tool for stimulating Framework projects and for bringing their results closer to the market. For example, the Commission has made moves to increase synergy between FP6 and the Eureka FACTORY and EUROENVIRON projects, in a way that joint actions are encouraged in both technology transfer and development. The fact that cluster projects now make up the bulk of Eureka's portfolio shows that industry values them. The exploitation of opportunities for opening up more cluster projects in some of the technological areas covered by the Thematic Priorities of FP6 is considered as a way of further increasing synergy.

Eureka action in fields covered by FP VI.

- Joint groups consisted of Eureka and the Commission representatives could discuss possible co-operation in the FP priority areas, the launch of new Eureka projects.

- An active participation of the EU FP experts in the board meetings of the Eureka clusters should be further tried and monitored. During these meetings, the so-called "road maps" are being discussed and updated and new project ideas derived from this discussion are pre-screened. EU representatives will have the opportunity to collect from these meetings, information on the interests and the ideas of enterprises.

- The idea of Advisory Councils on specific technological areas could be further explored. The Advisory Council would consist of all relevant "ERA-players" in a given technology area. It could work on defining a strategic agenda and common targets. Important Information and Communication Technology (ICT) players have already indicated their motivation to develop an Advisory Council on ICT. The Informal Inter-service Group covering Eureka matters set up in June 2002, can be a first step in supporting the exchange of information on Eureka within the Commission services. This group is consisted of DG's Information Society, Entreprise, JRC, Energy and Transport chaired by DG Research.

Eureka action in fields not covered by FP6.

Eureka can also build credible technology platforms in fields that are outside the Framework portfolio. Both cluster and traditional projects can be used. There are already signs that certain sectors (i.e. the oil & gas and telecom sectors) see fewer opportunities in FP6 and may be looking to Eureka as an alternative. This flow should be encouraged and welcome by the Eureka network Additionally projects that have been submitted to the FP and are considered that fail the FP6 scope can be forwarded to Eureka through the NPC network. Eureka could also use the Expressions of Interest published on the site of the Commission in order to generate Eureka projects.

Co-operation between Eureka and the Commission on information issues particularly for SMEs.

Common organization of brokerage events with the participation of SME's by Eureka National Project co-ordinators and FP National contact points for the exchange of information on research and funding of projects as well as support for innovation.

2.3.2 National Programmes and Article 169

Eureka is a good example of RTD cooperation among different member states of the E.U. It has institutionalized this co-operation procedure through the HLG and NPC meetings where strategic and practical issues are discussed and decisions are made. In the near past, an effort has been made toward the evaluation procedure synchronization among the different member states of Eureka Initiative. In this context, a survey of the methodologies used by Eureka national offices and the funding authorities in selecting, monitoring and measuring the impact of projects was made. This survey showed the heterogeneous character of each member's contribution. The experience gained from this exercise as well as the proposals in order to synchronize these procedures can contribute to the Article 169 principles and the Opening of the National Programmes.

Eureka can act as an example for the opening of National programmes in the European Research and Innovation Area by using its existing mechanisms (e.g. NPC offices) in specific scientific fields. Common groups consisted of Eureka and Commission members could meet, decide the priorities, and set the procedures (taking into consideration the experience of the Eureka model and especially its clusters).

2.3.3 Mobilisation of private funds

Mobilisation of private capital is a crucial factor for achieving the two-fold 3% - 2/3 Barcelona Objective.

Inadequate access to external finance (debt or equity) at a reasonable cost is a common problem for SMEs and notably for small and newly established high technology companies. The problem is even more acute for RTD

financing because of the risk involved. Given this situation, guarantee mechanisms for both equity and loans can be attractive means of increasing the availability of capital and reducing access costs.

Equity guarantees are typically directed to prospective investors in RTD. Loan guarantees provide a direct incentive to firms to raise their RTD efforts. Guarantees provide a means of sharing risk, thus reducing the exposure of borrowers/investors and companies. In general and when applied appropriately, they can potentially exert leverage on private investment in RTD for a lower cost than direct or fiscal measures.

Many innovative companies require access to equity and/or debt financial markets for investment in RTD and innovation activities. High growth, high technology companies are critically dependent on access to equity financing at different stages of their development: risk capital in early (seed and start-up) and development stages, and secondary markets for the financing of Initial Public Offerings (IPO) and subsequent expansion phases.

Large firms are making growing use of European Investment Bank (EIB) loans to finance RTD and innovation activities. This is an indication that properly designed debt instruments, such as bonds and guaranteed loans could become a significant source of finance for mid-size firms and other organisations investing in RTD and innovation.

In this context the role of EIB is crucial in offering financial support through the Innovation 2000 Plan for research and innovation projects, while Eureka could play a role in mobilizing existing loan guarantee schemes at national level, in order to target them to European RTD projects.

The main issue is the possibility to couple Community grants to RTD projects (most likely the FP6 Integrated Projects) with EIB loans and existing loan guarantee schemes that Eureka would mobilise and target to the RTD projects. If this kind of synergy can be achieved and managed, and make sense from the research, industrial and financial points of view, the resulting RTD projects could be labelled both Community, Eureka and EIB projects, becoming real "projects of the European Research and Innovation Area". These projects could be named "ERIA projects"

The Synergies group, which is consisted of participants from Eureka, the Commission, EIB and the European Venture Capital Association (EVCA) can be institutionalized as a steering committee with the mandate to propose concrete steps towards "ERIA projects".

More specifically the Synergies Group can be assigned with the following tasks:

- Indicate the EC-EIB-Eureka interactions, in particular the financing synergies.
- Test the EC-EIB-Eureka potential synergy on a real FP6 Integrated RTD project.
- Compare the EC, Eureka and EIB evaluation schemes, and identify where added value could be created and duplication of efforts avoided.

2.4 Conclusions

The creation of ERIA needs to be built on a mix of instruments, as no single instrument is able to provide the full range of incentives. It is important to ensure that different instruments are cost-effective and to avoid possible crowding out effects, both in their individual features and in their interactions.

The optimal mix of instruments will necessarily differ across countries and regions and may evolve over time. Financing needs vary across industry segments and each segment contributes differently to the overall private investment in RTD.
Furthermore, the optimal level of public spending on RTD and its allocation between industry and public research institutions also depends on the characteristics of a country's RTD system. In some cases, this may imply changing the allocation between public and private RTD sectors and/or increasing overall public spending.

The use of consistent criteria for the design and impact evaluation of individual instruments and of the mix of instruments would facilitate policy making and mutual learning across countries in Europe.

As the aims to improve Europe's industrial competitiveness and to facilitate exploitation of research results are still to be met, Eureka's role remains essential within the European RTD system. In this context the Council might invite the Commission to further analyse the interfaces between Eureka and its own actions and measures in order to propose initiatives for better synergies and integration of Eureka into the European Research and Innovation Area.

RTD INFRASTRUCTURES

3

The way forward

3

3

RESEARCH INFRASTRUCTURES
Their role in the European Research and Innovation Area[8]

3.1

Introduction

Research Infrastructures are large- or medium-scale research operations, which can provide a unique combination of state of the art facilities together with specialized expertise and are capable of supporting demanding projects at the scientific frontiers. At the European level, the mission of Research Infrastructures is to play a leading role advancing scientific knowledge and innovation in Europe and internationally by providing the appropriate structure and intellectual environment, where new scientific ideas, novel experiments and innovative technologies will flourish. Some of them of general and widespread use, i.e. used by all or most of the researchers (information networks), while other are discipline specific.

In this context European Research Infrastructures:

- *Support and maintain scientific excellence and technological innovation in Europe*
- *Support, maintain and enhance state of the art RTD facilities providing high quality services in combination with a high level of scientific and intellectual environment to research user groups*
- *Promote mobility of European researchers eliminating nationality constraints and provide enhanced educational and training opportunities to young researchers*
- *Facilitate mobility across research disciplines*
- *Promote partnerships within academia and strengthen links with industry in the frame of innovative and ambitious projects*
- *Facilitate networking and co-operation contributing to European integration*

The essential role of research infrastructures, particularly in providing access to users, has been clearly recognized by the European Commission and supported for the last decade through the Framework Programmes. This role is to be strengthened further, with considerable financial support through the 6th Framework Programme, as Research Infrastructures are envisaged as one of the major instruments for advancing Europe's competitiveness in research, technology and innovation and thus structuring and promoting the "European Research and Innovation Area" (ERIA).

The future outlook of European Research Infrastructures and their role in the ERIA is currently under discussion at both the EU (Strasbourg Conference on Research Infrastructures, European Strategy Forum on Research Infrastructures) and individual Member State level and within organizations such as the ESF, OECD, and other involved in high cost science. These discussions are focusing on key issues related to the expansion, upgrading and evolution of research infrastructures; on the need for new infrastructures in emerging disciplines; and on funding schemes to support existing and new infrastructures in view of the rapidly changing international research landscape and the societal needs.

[7] We are highly indebted to Prof. C. Fotakis, Director of the Institute of Electronic Structure and Laser – FORTH, Crete, Drs. D. Agglos and A. Lappas of the same Institute and to Prof. V. Maglaris of the National Technical University of Athens, Chairman of GR-NET for their substantial contribution to this paper.

The European Research Infrastructures are among the priorities for the promotion of the European Research and Innovation Area. In this context, the following key issues might be debated:

- Need for an evaluation-advisory mechanism to facilitate co-ordination, identify new research and technological challenges and respond to them in a rapid and effective manner (this could be one of the roles of the "European Strategy Forum" on Research Infrastructures).

- Increase of the financial basis for Research Infrastructures through support by both the public and private sectors within specific schemes of the Framework Programmes (EC to propose measures for new lines of funding)

- Enhance training opportunities within Research Infrastructures particularly for young scientists (to be considered within future Framework Programmes). Strengthening of the role of Research infrastructures as a model framework for lifting mobility obstacles and promoting the integration of European scientists from new Member States in the European Research and Innovation Area

- Strengthen the support for the successful deployment of Grids enabled e-infrastructure across Europe over the pan-European research network GEANT.

- Increasing, in an effective way, the contribution of the intergovernmental research organization handling and operating Research Infrastructures in the ERA, using for example, the Framework Programme schemes to support access for European users.

3.2 Present situation

3.2.1 Research Infrastructures in Europe

Starting in the middle of the 20th century, it became obvious to the scientific community that progress in scientific knowledge required increasingly large research facilities, which would provide the necessary infrastructure along with human resources to realize novel experiments. Indeed, in response to this need, national and multi-national scientific research infrastructures have been built and operate successfully in Europe, serving diverse scientific disciplines. Financial reasons as well as the need to attract high-level scientists regardless of nationality led to a broad co-operation within Europe. This was extremely important considering the time frame of the initial efforts, within a decade after the 2nd World War, which, among others, resulted in overcoming historical enmities and building stronger ties between European countries.

Notable examples of such research infrastructures, which emerged through multi-national (inter-governmental) co-operation, are, for example, the European Laboratory for Nuclear Research (CERN, 1954), The European Southern Observatory (ESO, 1962), the Institute Laue-Langevin (ILL, 1967), the European Molecular Biology Laboratory (EMBL, 1969), the European Space Agency (ESA, 1975), the European Synchrotron Radiation Facility (ESRF, 1988), and many others. In addition, at a national level, research centres and universities developed medium or small scale but, in many aspects, unique facilities with emphasis in physics, chemistry, biology, engineering etc. These multi-national and national research infrastructures have emerged as main players in the fast growing European research landscape, contributing greatly to the advances of modern scientific research and serving various scientific communities.

3.2.1.1.The role of Research Infrastructures in Europe

Research Infrastructures can be described as research operations, which combine unique state of the art facilities with specialized expertise and are capable of supporting demanding projects at the scientific frontiers. In terms of actual organizational structure, research infrastructures may be single sited (the most common situation), distributed among several collaborating sites or even virtual in cases where electronic means are used for the exchange of knowledge.

At the European level, the mission of research infrastructures is to play a leading role advancing scientific knowledge and innovation in Europe and internationally, by providing a structure and environment, where new scientific ideas, novel experiments and innovative technologies will flourish. Organisational differences aside, research infrastructures in Europe share in common most of the following features as they:

- Support and maintain scientific excellence and technological innovation in Europe
- Support, maintain and enhance state of the art RTD facilities;
- Provide high quality services in combination with a high level of scientific and intellectual environment to research user groups;
- Promote mobility of European researchers eliminating nationality constraints;
- Facilitate mobility across research disciplines;
- Facilitate European networking and co-operation;
- Promote partnerships within academia and strengthen links with industry in the frame of innovative and ambitious projects;
- Provide enhanced educational and training opportunities to young researchers;
- Contribute to the European added value and European integration;

3.2.1.2 Access to Research Infrastructures and the European Commission support

Obviously Research Infrastructures play a most significant role in Europe's competitiveness in research, technology and innovation, providing research teams with the ability to remain at the forefront of their scientific field. But while use of facilities is rather straightforward for internal users, access provided to outside research groups is dependent on availability of funds to cover expenses related to visiting the infrastructure of their choice, which include transportation costs and facility time fees.

This problem, was recognized by the European Commission, and since the early 1990's, Framework Programmes have included specific actions, which support access to research infrastructures. This type of support has been implemented through different funding schemes. The main one is the Access scheme, which provides funding allocated to research infrastructures and designated to cover user-related facility operating costs and user group travel and accommodation expenses. In addition RTD projects among infrastructures aiming at improving the quality of access and Co-operation Networks were also funded.

The beginning of this endeavour was with the 2nd Framework Programme, where the Large Installations Plan (1989-1992), a pilot scheme, provided access funding to 17 infrastructures (28 MECU). Following this successful pilot scheme, the Access to Large Scale Facilities action of the Human Capital and Mobility Programme (1990-1994) in the 3rd Framework Programme supported 72 infrastructures (62 MECU). Within the 4th

Framework Programme the Access to Large Scale Facilities action of the Training and Mobility of Researchers Programme (1994-1998) provided access funding to 116 infrastructures (92 MECU), while in addition supported 24 trans-national RTD projects (24 MECU) and 10 Concerted actions (2 MECU).

Within the 5th Framework Programme, the Access to Research Infrastructures (ARI) action (1998-2002), as part of the Improving the Human Potential and the Socio-economic Knowledge Base (IHP) programme, has continued and strengthened this support through three schemes:

- Infrastructure Co-operation Networks
- Trans-national Access and Research Infrastructures
- RTD projects

The main objectives of the ARI action are to:

- Provide researchers throughout the European Community and Associated States, with new opportunities for access to infrastructures that are essential for high quality research, irrespective of where in the Community or the Associated States the researchers or the infrastructures are, and
- Stimulate infrastructure operators and users to work together to make more effective use of the infrastructures and to improve the services they provide to the scientific community.

A wide range of scientific fields is represented in the Research Infrastructures supported through the ARI action including:

- Large singular installations, such as neutron sources, synchrotrons or astrophysical observatories
- Networked facilities, such as integrated arrays of research installations or networks of computer facilities
- Collections and databases, such as natural history museums, libraries or social science databases
- Centres of infrastructure competence, such as analytical research centres, construction engineering centres or specialised theoretical research institutes
- Special habitats, such as nature reserves

Table 1 shows the distribution of infrastructures funding through the ARI support schemes, across scientific and technological fields.

Table 1. Types of Infrastructures and projects funded by FP5

Thematic Areas	Access	RTD Projects	Networks Projects
Analytical Facilities	8	0	2
Biological Sciences	10	0	2
Biomedical Sciences	6	0	0
Biomolecular NMR	4	4	1
Manufacturing	4	0	0
Structural Engineering	6	1	2
Nuclear Physics	13	10	2
Astrophysics	4	3	2
Free Electron Lasers	2	2	0
Lasers	10	3	1
High Magnetic Films	2	2	1
Neutrons/Muons	7	5	2
Synchrotrons	11	5	3
Nanotechnologies	5	0	1
Mathematics	1	1	0
Oceanography	3	0	0
Environment	14	0	3
Hydraulics	8	1	1
Energy	8	0	1
Supercomputers	5	0	1
Socio-Economic Sciences & Humanities	6	0	5
Transport	1	0	0
TOTAL	**138**	**37**	**30**

Recently the European Commission launched the 6th Framework Programme (FP6) for Research and Technological Development, whose main focus is to implement the European Research Area as a vision for the future of research in Europe. FP6 aims at scientific excellence, improved competitiveness and innovation through the promotion of increased co-operation, greater complementarity and improved co-ordination between relevant actors at all levels. Within the Structuring the European Research Area action of the FP6, financial support will be provided to research infrastructures through the Research Infrastructures activity (total budget: 655 MEuro) in order to "ensure that Europe's researchers may avail themselves of research

infrastructures of the highest quality and performance in Europe". Specifically the activity will aim at:

- ensuring that European researchers may have access to the infrastructures they require to conduct their research, irrespective of the location of the infrastructure;
- promoting the optimum development of new and upgraded research infrastructures of European significance to reflect the needs of the research community.

Calls for proposals were announced in December 2002.

Support for research infrastructures in the FP6 is open to infrastructures throughout the fields of science and technology in a "bottom-up" manner, i.e. without any preference for one field over another. Likewise, access to supported infrastructures will be available on a "bottom-up" basis, i.e. independently of the specific research priorities of potential users. In this way, the present action is complementary to the forms of support available under the thematic priorities of the Framework Programme (e.g. Integrated Projects and Networks of Excellence).

Five principal schemes for support are available under the Research Infrastructures action:

- Trans-national Access
- Integrating Activities
- Communication Network Development
- Design Studies
- Construction of New Infrastructures

3.2.2 Policy Making Issues

3.2.2.1Towards a European Research Area

On January 2000, the European Commission adopted the Communication titled "Towards a European Research Area" setting out the scenario about and inviting a debate on the creation of a real European Research Area. This Area was officially launched at the Lisbon European Council meeting in March 2000, as a major initiative for reshaping the European research landscape and furthermore as a key component of the strategy defined at Lisbon for "making the European Union the world's most competitive and dynamic knowledge-based economy".

The reasons why the European Research Area does not functions yet are among other the compartmentalization of public research systems and the lack of coordination in the way national and European research policies are implemented. Furthermore it seems that barriers among disciplines and between academia and the business world are still hindering the move across and therefore the benefits arising from such cross-fertilisation. In contrast, USA, the major competitor of the EU, has a much more coherent science and technology support system (it is part of a coherent political system as well) and a much higher capital investment and direct or indirect involvement of industry in scientific research and technological innovation.

One of the major instruments for the implementation of the Research and Innovation Area is the European research infrastructures, which admittedly plays a central role in the progress and application of knowledge in Europe. To strengthen this role, a new coherent European approach to research infrastructures "covering both the creation of new installations and the functioning of existing ones and access to them" is needed. In order to further promote and create a framework of discussion on infrastructures the Commission proposed the organisation of a conference on the subject of research facilities in Europe.

3.2.2.2 The Strasbourg conference on Research Infrastructures

A major event on Research Infrastructures was held in Strasbourg, on 18-20 September 2000. The conference entitled "Infrastructures: the backbone of European research", was organized by the European Commission in cooperation with the European Science Foundation and the French Ministry of Research. The conference addressed the many aspects of science policy that relate to research infrastructures. The participants acted as a platform where both the scientific community and policy makers were able to exchange views on present and future priorities. Their interaction was expected to stimulate a move towards a coherent European approach to research infrastructures' financing and support. Six main areas of discussion had been identified and addressed by corresponding Evaluation Panels. These included:

Panel A: *The role of infrastructures in research*
Panel B: *Technological innovation, industrial and socio-economic aspect of research infrastructures*
Panel C: *International dimension*
Panel D: *Evaluation of access to research infrastructures*
Panel E: *Infrastructure networking*
Panel F: *How to develop the European research infrastructure*

The conference steering committee concluded the venue through a plenary session in which it was deemed that building a European Research Area must include research infrastructures. In addition the following issues were considered and stressed out the following:

- The provision of first class infrastructures is now of paramount importance.
- Europe should adopt joint positions and actions particularly in matters relating to Global Programmes, to ensure that European voice is heard strongly in international negotiations.
- An essential element of Research Infrastructures is a robust electronic networking through a high bandwidth communication system across Europe.
- Collaboration with industry is considered an essential part in the process of strengthening the construction of Europe.
- Every effort has to be made to remove barriers to research mobility at all levels and to improve access.
- Central to improvement of Research Infrastructures in Europe is to have a more effective decision-making process.
- Advice on both science and technical feasibility must be independent and come from the scientists and technical engineers. Europe will benefit through and ongoing and systematic review of European research infrastructure, assessment of needs, evaluation and monitoring.
- A permanent strategic body (decision-makers representing nations and the EC) is necessary, as one of the main problems today is that there is lack of proper recipient of advice.
- It is requested that the Ministers and the Commission have Research Infrastructures on the agenda of the Research Council of Ministers in a regular fashion.

A substantial strengthening of European Research infrastructures will not be possible without additional significant funding from the individual nations and from the European Commission. In terms of funding for Research Infrastructures the committee recommends:

- Greater EC involvement not only for access but also for capital investment and running expenses.
- Open and voluntary variable geometry, including the EC, as the preferred model for the near future with the participation of nations remaining significant. Accession countries should be fully involved (from now on) at all levels from advice to decision-making.

3.2.2.3 The Council of Ministers on Research Infrastructures

The Council Conclusions on "Infrastructures in the European Research Area", adopted by the Research Ministers in June 2001[8] have recognised the benefits of a coherent and effective European approach on research infrastructures in the context of the *European Research Area*. The Council has invited the Commission, in close collaboration with the Member States, to:

- Study the best means of providing independent scientific advice on the development and use of research infrastructures and of facilitating coordination and decision-making in this domain, by making use, as far as possible, of existing scientific organisations and relevant bodies;
- Identify the need for and, where appropriate, to explore the establishment of new arrangements to support policies related to research infrastructures, involving all parties concerned with decision-making and ensuring the exchange of clear information with this respect.

3.2.2.4 The expert group on research infrastructures

Responding to the invitation by the Council of Ministers, the Commission convened an Expert Group with representatives designated by all fifteen Member States, which examined the achievements and shortcomings of the European research infrastructures policy and produced a report (February 2002) identifying measures that have to be taken with respect to the future of research infrastructures. Among the main conclusions of the expert group was that "policy making on Research infrastructures with European significance has steadily become more complex and less effective and that a more collective approach is indeed now needed to guide policy making in the Member States".

In this respect it is suggested that a new arrangement need to be put in place with the aim of supporting policy making in a multilateral context, so as to structure and share collectively the strategic process of giving European added value to the development, evaluation and operation of research infrastructures. The new arrangement should assist policy makers to clarify rationally the cost/benefit ratios of infrastructures, including S/T benefits and the wider socio-economic and European impact. It would also help guide the development of road maps and a comparative overview across different disciplines and technical areas, taking into account the different kinds of relevance across fields and regions. Indeed the new arrangement should help develop a European Research and Innovation Area for Infrastructures, within the wider and urgent considerations of the growth goals outlined at the Lisbon Summit.

In order to better identify proper ways of supporting policy making related to research infrastructures, the main recommendation by the expert group was that the Member States set up a European Strategy Forum on Research Infrastructures.

3.2.2.5 European Strategy Forum on Research Infrastructures

The mission of the European Strategy Forum on Research Infrastructures (ESFRI), set up by the Member States of the EU on the initiative of the Commission, is to provide a platform open to all EU countries to monitor the needs expressed by the scientific community on an on-going basis. It will act as an incubator for European or

[8] 2363rd Council Meeting – RESEARCH – Luxembourg, 26 June 2001

multi-national projects with the aim of developing new research infrastructures in Europe. The Forum comprises representatives of Member States appointed by the Research Ministers and directly responsible for science policy in their own countries as well as the Commission. The scope of the Strategy Forum is to:

- Support a coherent and strategy-led approach to policy making on research infrastructures in Europe;
- Facilitate multilateral initiatives leading to a better use and development of research infrastructures.

In this context, the Strategy Forum acts as an informal body on issues raised by one or more country representatives. It gives national authorities the opportunity to be informed about and to explore (i.e. without "a priori" commitments) international and national proposals of European significance. Among the expected outcome of the Strategy Forum are variable geometry negotiations on specific infrastructure related projects by Member States, for which the Forum acts as an incubator. Furthermore, once its working methodology is firmly established, the Forum is planning to open up to candidate countries and other associated states.

Currently the Forum has set-up Working Groups of experts to address three different areas, which include:

- Neutron facilities
- Free electron laser facilities
- Research Infrastructures in Marine Science

3.2.2.6. e-Infrastructures and the concept of a "common market for computing cycles and data storage resources in Europe" - Overview of the current situation

Recent advances in Europe in the area of Research Infrastructures resulted in a pan-European coverage by a high speed research network (the fastest in the world) including a full-fledged administrative and operational support. This support is provided by DANTE/NRENs for the backbone network (Géant) and by the corresponding NREN (National Research and Education Network) entity in each Member-State. A policy committee, in addition, consisting of representatives from all NRENs defines common rules in the access to Géant, common approaches for its continuous upgrade and coherent views in the upgrade of the NRENs.

At the same time a number of research initiatives in Europe and the world (building on the Grid technological concept and the availability of high-speed networks and broadband connections) are creating pilot implementations of a model of a shared use of computing and data resources across technological, administrative and national domains.

As an example here is mentioned the DataGrid EC-funded research project, whereby computing and data storage resources distributed across different technology and administrative domains (e.g. institutions located in different countries in Europe) are used in a collaborative and shared mode in the context of three different scientific application areas, namely High Energy Physics, Biology and Earth Observation.

In addition to the above-mentioned European initiatives, some National programmes in Europe are creating a similar model for the shared use of resources on the National level across institutional and user application domains. Most characteristic example in this case is the e-Science programme in the UK whereby a Grid-based

infrastructure is being built to enable next generation scientific research based on the shared use of computing and data resources across the country and across numerous scientific disciplines.

3.2.2.7 Intergovernmental RTD organisations of European interest with large infrastructures

Beyond Research Infrastructures established at the national level, Europe has created and operates very large multi-national facilities managed by intergovernmental organizations such as for example CERN, EMBL, ESRF, ILL, ESA etc. This reflects the needs for stronger ties between European countries in order to address the increasingly rapid developments in the economic situations and secure high-level co-operation among various research communities.

The legal nature of international co-operation varies among different organizations but in general involves a broad intergovernmental agreement (level I) to an interagency agreement (level II). Regulations about operation of and access to such facilities are detailed in the intergovernmental Convention and associated Financial Protocol, which set out the Organisation's purpose, conditions of membership, operational bodies, etc. Access to this type of facilities is provided only to members of the respective intergovernmental organization weighed on the basis of their financial contribution to the annual budget. Potential functional problems may arise as a result of this model particularly when the number of participating states increases or when there is disparity in the level of financial contributions. Also, scientists from member states non-participating in the councils intergovernmental organization are not entitled to access to such installation. A case, where this problem is partly solved, through the EU Access Programme, involves the "European Radioactive Beam Facility for Nuclear Physics and Applied Sciences" (ISOLDE) at CERN. However if these facilities are to contribute to the European Research Area the issue of access has to be handled in a more open way

As indicated by Commissioner Busquin on the occasion of the EIROforum's charter signature, the establishment of the forum "is a concrete example of the dynamic created by the European Research Area".

3.2.2.8 OECD on Research Infrastructures

On an international level, the Organization for the Economic Co-operation and Development (OECD), among a multitude of activities, assesses how science, technology, innovation and education policies can efficiently contribute to sustainable economic growth and employment creation and provides policy advice on coping with the challenges arising from developments in new science-based industries. In particular the Global Science Forum (formerly Megascience Forum) is a venue for meetings among senior science policy officials from OECD Member countries its goal being to identify and maximise opportunities for strengthening the global research infrastructure (facilities, instruments, databases, research networks and programmes).

As a result a number of important reports, which among others discuss the role of research infrastructures have been published, following working group meetings of experts in various fields. Reports relevant to research infrastructures are listed below:

1. Report of the Neuroinformatics Working Group (05/08/2002)
2. Report of the Consultative Group on High-Energy Physics (29/07/2002)
3. Report of the Workshop on Large Scale Facilities for Studying the Structure and Dynamics of Matter (23/04/2002)

4. OECD Global Science Forum: Compact High-Intensity Short-Pulse Lasers (23/10/2001)
5. OECD Global Science Forum: High-Intensity Proton Beam Facilities (25/09/2001)
6. OECD Global Science Forum: Structural Genomics (08/06/2001)
7. OECD Global Science Forum: Deep-Sea Neutrino Observatory (01/01/2001)
8. OECD Global Science Forum: Nuclear Physics (31/01/1999)
9. OECD Global Science Forum: Neutron Scattering Facilities (01/11/1998)
10. OECD Megascience Forum: Sub-group on Access to Large Scale Infrastructures (30/06/1998)
11. OECD Megascience Forum: Very Large Scale Scientific Facilities in Europe (13/09/1995).

The last one on the list provides a detailed analysis of the legal texts governing institutional co-operation for Very Large Facilities such as CERN, EMBL and others. The analysis focuses on issues related to the founding philosophy, partner representation, organizational flexibility and adaptability and evolution in the context of the European Union. Most of the other reports devote a large fraction on the significance of the Research Infrastructures on providing scientists in different fields the opportunity to perform cutting edge research and advance scientific knowledge. In particular the report on Access to Large Scale Infrastructures discusses issues related to current infrastructure policies and practices, trends and concerns, schemes to facilitate access as well as the role of governments in decision- and policy-making.

3.2.2.9 Research Infrastructures in the EU Member States -The example of the United Kingdom

In the UK, the Council for Central Laboratories of Research Councils (CCLRC), founded in 1995, as an autonomous, non-departmental public body under the Office of Science and Technology (OST) owns and operates the country's high-technology facilities (the Rutherford Appleton Laboratory in Oxfordshire, the Daresbury Laboratory in Cheshire and the Chilbolton Facility in Hampshire). These institutions support the research community by providing access to advanced facilities and an extensive scientific and technical expertise.

The mission of CCLRC is:

- to promote high quality scientific and engineering research by providing facilities and technical expertise in support of basic, strategic and applied research programmes funded by persons established in the United Kingdom and elsewhere;
- to support the advancement of knowledge and technology, meeting the needs of research councils, other customers and their user communities, thereby contributing to the economic competitiveness of the United Kingdom and the quality of life;
- to provide advice, disseminate knowledge, and promote public understanding in the fields of science, engineering and technology.

Financial support to CCLRC is provided by the OST, the six scientific Research Councils, government departments and executive agencies, Universities, the European Commission, industry and other international partners. As an indication the CCLRC's operating income for the year ended on March 31st, 2002, was 101.2 MBP (74% coming from the other Research Councils, 7.5% directly from the Government and 18.5% from outside sources) with over 90% of this arising from national sources.

The role of CCLRC is considered of primary importance with respect to maintaining and operating state of the art research infrastructures in the UK. In fact a recent governmental review about CCLRC has recommended that :

- the CCLRC should assume responsibility for the continuing development of its large-scale facilities and
- the CCLRC should fulfil a strategic role and act, on behalf of Research Councils UK and other Research Councils, as the national focus for large-scale facilities for neutron scattering, synchrotron radiation and high power lasers.

3.3

Perspectives of the European research infrastructures: their role in the structure of the European Research and Innovation Area

3.3.1. Responding to new challenges

As presented in the first part of this section, Europe has a number of multilateral research infrastructures in active and successful operation, many of them being world leaders in their fields. Some of them are run by intergovernmental organisations in which the Member States of the EU have the absolute majority of votes. These infrastructures provide efficient services to and are used by a broad user community. They are important drivers for basic and applied research and examples of the strength resulting from exchange of ideas and collaborative activities.

However, the rapidly evolving international scientific landscape requires that research infrastructures have the tools to identify and adapt to new research challenges in a prompt manner in order to maintain leadership in their corresponding scientific disciplines and assure maximal benefit for the users. Responding to new scientific challenges and maintaining excellence requires the presence of several key factors such as:

- Proper scientific advice from an independent body ,
- Scientific and managerial leadership and flexibility within the infrastructure and
- Sufficient and secured funding.

In this respect a coherent European scientific strategy capable to address these issues in an effective manner is considered essential. This will lift obstacles arising from fragmentation and could have a structuring effect to the ERA process. Specific support towards the co-ordination of research and innovation policies in Europe is provided by FP6 through activities (such as the ERA-NET scheme) aiming at networking national and regional research programmes. Also, the role of the European Strategy Forum for Research Infrastructures could be re-examined in view of providing consultation and facilitating co-ordination in an informal and open way.

3.3.2. Networking of Research Infrastructures

Under the perspective of the new (6th) EU Framework Programme, first-class research infrastructures are considered of paramount importance in promoting European excellence and competitiveness worldwide while they are expected to serve as major vehicles for achieving the structuring of the European Research and Innovation Area.

One of the main provisions of the action in support of Research Infrastructures in the FP6 involves the

Integrating Activities for Research Infrastructures. The philosophy underlying this supporting scheme is to integrate, at a European level, infrastructure related services provided to the research community, by networking similar research infrastructures. This approach fosters European co-operation, which admittedly has not been among the priorities of most national research policy organizations across Europe.

The networking activity between national infrastructures and the better coordination of European intergovernmental organisations research infrastructures within the ERA is expected to have a catalytic effect in promoting an optimised and co-ordinated use of resources leading to an effective co-operation between infrastructures and thus maximizing the benefits for both operators and users. Furthermore cross-disciplinary interaction will be encouraged in fields of novel scientific or technological importance and wide European interest. Infrastructure operators will benefit from such an approach, by handling more effectively new scientific problems or developing state-of-the-art instrumentation, while users will take advantage of improved and complementary services provided through the integrated network of infrastructures. In addition, this scheme is expected to have a broad structuring effect in European research, developing a coherent basis for optimized infrastructure operation in various scientific fields.

3.3.3. e-Infrastructures and the concept of a "common market for computing cycles and data storage resources in Europe" - The vision and the challenge

The recent developments create the expectation that technology is maturing in fast pace to support the emergence of a new infrastructure paradigm according to which the shared use of computing and data resources across administrative and technology domains will become a commodity service. The idea is also such an infrastructure to be built on top of the existing high-speed networking infrastructure in a way that a fully integrated communication and information processing service is provided to the user application communities. An objective of the Research Infrastructures part of the 6th Framework Programme for research of the EU (FP6), is to create such an infrastructure in Europe, else known as an eInfrastructure. It is obvious, that such a paradigm has the potential to dramatically change the way in which people work and do business over the Internet today and this is the reason why Grids is seen by many people as the enabling technology for the next generation of the Web.

The importance of Grids is acknowledged today world-wide and important new research initiatives are almost daily announced in Europe, the US, the AP-region and others. Those initiatives aim at extending and further advancing the technology base and at the same time creating a Grids enabling infrastructure for e-Science. In the context of the Research Infrastructures part of FP6, for example, a budget of €250m is foreseen to support the building/upgrade of high-speed networking and Grid research infrastructures in Europe including the transition from pilot to production level facilities which will provide a pan-European coverage and will be able to serve a broad range of scientific disciplines. Still in FP6, an additional budget of €125m is also planned for the further development of the Grid technology base in Europe.

Further to the research effort, experience shows that the full exploitation of a new innovative technological paradigm with such a broad scope and cross border relevance like the Grids concept can better (and in some cases only) happen when the appropriate administrative and policy decision mechanisms (on the level of the resources shared use) are put in place, in close pace with the technological advances. For Grids some relevant questions in this context are the following:

- We believe that it is the interest of the Member and Associated States in Europe to support the creation of a Nation- and European-wide Grid-based infrastructure for e-Science.

- What are the necessary policy level decisions and actions to enable the effective cross institutional, cross border and cross scientific discipline sharing of resources?

- What would be the appropriate administrative and operational support schemes in this case?

- What could be the roles for National legacy schemes (e.g. the NRENs)?

It is proposed in this context the creation of an initiative on the policy level to discuss and formulate views on the above issues and to facilitate the creation of the necessary administrative and policy decision mechanisms for the successful deployment of a Grids enabled eInfrastructure across Europe. An initiative to lead to the creation of "a common market for computing cycles and data storage resources in Europe" with both scientific and commercial relevance.

3.3.4. Synergies with other EU programmes

Synergies with other "Structuring" activities of the 6th Framework Programme can be exploited, particularly those within the Marie Curie actions on mobility and training. It has already been observed, over the time period that FP5 has been active, that infrastructure users and especially young (post-doctoral) researchers and PhD students can benefit to a great degree by furthering their stay in a research infrastructure drawing support from various types of training and mobility fellowships.

Such synergies will be of increasing importance, given the recent expansion of the EU, for the smooth and quick integration and active contribution of scientists from the 10 new Member States in the ERIA.

3.4 Funding for research infrastructures

3.4.1 Present situation

Research infrastructures are supported at a number of levels and through various mechanisms. Funding for Research Infrastructures is determined to a large extend by the organizational character of the infrastructure. There are two major types of infrastructures; those founded and operated at a single state level and those at an international level. The latter (for example, the very large scale facilities of CERN, EMBL, ILL etc.) are based on agreements among the governments of a number of states (intergovernmental organizations) and/or agencies from different states (inter-agency organizations).

Currently resources for funding Research infrastructures are drawn mainly from the national budgets. This support is directed into two major channels. One is determined by the needs of facilities operating at the national level while the other is connected to the national contributions associated with the operation of intergovernmental research organization. Funding decisions are made on a science need basis, and may be at government level in competition with other spending areas (e.g. health or education) or at agency level in competition with other areas of science. This scheme works best at the national/single agency level, where one agency has total control of the funding, or where there is an agency/country willing to give a strong lead. Clearly as the number of partners increases the partnership becomes more difficult to create unless formed at a govern-

ment level with a strict formula for funding shares.

Complementary to state funding it is an issue of major importance for Research Infrastructures to obtain support from the private sector. Since Research Infrastructures have demonstrated the potential of creating technological innovation, cooperation with industry may lead to substantial advances (socio-economic impact). Therefore, measures to attract support from industry to enhance novel technology oriented research should be encouraged. A paradigm case, which is expected to draw support from the private sector because of its inherent business nature can be the e-Infrastructures described in the previous section. "Grid technologies" will offer the possibility to use computing and data resources across administrative and technological domains as a commodity service. In the context of the Research Infrastructures support scheme of the FP6, for example, a budget of 250 MEuro is foreseen to support the building or upgrade high-speed networking and Grid research infrastructures in Europe.

3.4.2 EU funding

At the EU level and within the Framework Programmes, there has been and continues to be (in a significantly enhanced proportion within FP6), a crucial funding component related to support for research infrastructures (see for details in section 1.1.3; also section 2.1.2). Five principal schemes for support are available under the Research Infrastructures action:

- Trans-national Access
- Integrating Activities
- Communication Network Development
- Design Studies
- Construction of New Infrastructures

3.4.3. Need for new infrastructures?

Apart from enhancing the role of successful infrastructures and improving the services provided there is a need for investing in new research infrastructures in response to emerging scientific and societal needs.

A major task in this respect is to define the scientific fields or disciplines (more and more interdisciplinary research is needed) and the type of infrastructure required to address the issues and provide services. Main difficulties involve the very high investment costs required for construction and operation of such facilities, which in many cases are exceeding the capacity of a single member state or organization.

In general, essential criteria for a European research infrastructure involve:

- Contribution to the objectives of the Treaty set by art. 163
- European dimension
- International level of excellence
- Uniqueness and impact of quality of research
- Rigorous dimension of added value
- European dimension of added value.

Again the need of a unified European research policy and the framework to properly mobilize the main players involved becomes obvious. In this respect an independent body such as for example the "European Strategy Forum for Research Infrastructures", established and functioning in the frame of the European Union, can have

a critical role in evaluating the needs for starting a new infrastructure and advising the parties engaged (member states, research centers, scientific societies, industry), on how to approach such an endeavour.

3.4.4 Funding for new Research Infrastructures

Of course mobilizing the main players and furthermore supporting the creation and operation of new infrastructures requires sufficient financial support through a well-established scheme or combination of schemes. Several proposals have been put forward about funding the construction of new infrastructures or carrying out substantial upgrades in existing ones. These are briefly described below and are largely based on the report produced by the Strasbourg conference on research infrastructures.

The creation of a Single European fund or of a specific line in the EU budget for Research Infrastructures. It would enable new facilities (or even existing ones in need of upgrade), identified as priorities through joint actions, to be funded on a joint basis. This would ensure that all community scientists had access to world-class infrastructure. Such an approach assumes a uniform requirement for facilities across all states, which may not be true, and the funding/location decisions may take on a political rather than science led dimension, divorcing the new facility from existing centres of expertise. Implementing this pooling of capital in a central fund requires a firm and continuous commitment from Member States to devote a substantial percentage of their national scientific research budgets to this purpose. This can be handled either by an independent European Union organization or by the EC through a specific budget line.

Regional Development funds are available in parts of several Member States, and may be used for science and technology facilities where these are shown to contribute to economic benefits of the region, including the development of human capital (skilled workforce). Co-ordination of proposals for new facilities with proposals for regional funds should be encouraged to ensure that facilities constructed through this method meet the scientific objectives of the Union as well as its regional development objectives. The ERA-NET scheme of FP6 could be appropriate in this case.

"A la carte" procedures have in the past created successful multi-partner schemes that operate world-leading facilities in Europe. Member States should be encouraged to continue to support these centres, and to undertake bi- and multi-lateral negotiations on the formation of new partnerships or the expansion of existing ones when these can achieve their scientific goals.

"Variable geometry" options, where additional funding from Member States is combined with limited EU funding to create new activities in which only some of the Member States participate, are foreseen in the Amsterdam Treaty (Article 169). The Panel considers that these offer the best option for the European Union to work with its Member States to develop a coherent programme of large facility support with the European Research and Innovation Area.

Regarding EU funding two options can be available:
- to meet the start up costs for concept and engineering design studies or,
- to become the owner of the project.

In either case the EU funding could be used to address new areas requiring a fast response, to catalyse action where a clear need has been identified, or to internationalize a project currently supported by only one Member State but where there is a clear need across Europe.

Start Up Costs – in this model the Commission would ensure that following science case preparation, funding is available to ensure that the concept is sound and then that the necessary engineering design studies are complete. Since these may take up to 10% of the capital cost of a project, this would represent a significant investment on behalf of any Member State who subsequently wished to join the consortium. However, there is the risk that the Commission could fund studies on facilities which the Member States then do not construct. It may therefore be prudent that the Commission seek funds of at least 50% of the design costs from Member States to ensure that the projects concerned have achieved some level of approval at the national level.

Full ownership – in this model the Council will delegate to the Commission the competence to establish a board of interested parties from the start of the project (before or after design studies), and to contribute to the total cost. The Commission would have to make provision for a suitable share of the operating, maintenance and upgrade costs. An Access Grant, as awarded in previous Framework Programmes (and to a similar manner in FP6), would not be sufficient since this does not provide a long-term commitment, or meet all the costs.

If either of these models is adopted, it is important that they serve to facilitate the selection and funding of facilities, and do not extend the period of negotiation beyond that already required. The necessary funding has to be planned at least globally in the Framework Programme. These administrative complexities would need to be simplified to allow this process to operate effectively.

EUROPEAN RESEARCH ORGANIZATIONS

4

The way forward

4

4

EUROPEAN RESEARCH ORGANISATIONS their role in the European Research and Innovation Area[9]

4.1

Introduction

The importance of the European intergovernmental research institutions in the implementation of the European Research and Innovation Area process was recognised at an early stage of the discussions on this concept. Some of these institutions are as old as the European Community, and in any way older than the Framework Programmes. As mentioned in the first Commission's communication launching the European Research Area, these institutions play an important role in Europe's science and technology scene; they face common problems and it would be useful to provide them with a framework in which they could discuss their respective roles and their relations between one another and the European Union. In conformity with this recommendation, several major centres and organisations of European scientific and technological cooperation have joined forces in the EIROFORUM in an effort to optimise their action and tackle joint problems in a more coordinated way. The Competitiveness Council of March the 3rd 2003 asked the Commission to produce a report on this issue as soon as possible, while the Spring Council asked for particular attention to the "cooperation with European intergovernmental research organisations" in building the knowledge-based economy.

Having the European Research and Innovation Area (ERIA) as the guiding principle and knowing the existing differences between Member States not only in terms funding schemes for research but also in the national systems and institutions, the European Union should also seize the opportunity to further integrate into its policies these structures and institutions that already exist and have demonstrated their usefulness and effectiveness to the common goal for the implementation of the European Research and Innovation Area. These institutions vary as to their degree of present integration into the EU policies and may be broadly classified in 5 main groups:

- European Commission's services - the Joint Research Centre
- Intergovernmental organisations, with large research facilities, in which all or almost all the Member-States participate and have the absolute majority in the Board/Council (i.e. CERN, EMBL, ESA, ESO, ESRF etc) and organisations with strong impact on R&D effectiveness (European Patent Office).
- Intergovernmental agreements managing cooperative R&D and innovation at European level, such as Eureka and COST
- Interagency coordination organisations, in which the main participants are institutions from the Member-States in majority (i.e. ESF, DANTE)
- Regional organisations that contribute to financing but do not perform their own research, such as the Nordic Councils of Ministers

[9] We are highly indebted to Dr. E. Papathanasiou, Director of the Institute of Oceanography of the National Centre for Marine Research (NCMR) for his substantial contribution to this paper.

All these institutions have a very strong potential in building the European Research and Innovation Area, that has not been measured yet in financial terms, but secures a large net European added value. One of the goals of ERIA is to establish a common approach on the needs and the means of financing large-scale research infrastructures in Europe. Several major centres and organisations of European scientific and technological cooperation, performing "big science" (such as CERN, ESA, EMBL, ESO, ESRF, ILL) will be called to play an important part in the ERIA process, contributing at the same time to the creation of fundamental knowledge and innovative technologies that, having fulfilled research objectives first, may be disseminated to the economy.

Although not one of these organisations is similar to the other, all have an important share in the European academic research activities. They play a complementary role to the Framework Programme, which is mainly supporting the competitiveness of the European industry and the Community policies in identifiable areas. Any initiative to organise academic research at European level has to take into account not only national research institutions and FP's activities (in particular the networks of excellence of the FP 6) but also the programmes and the potential of the intergovernmental research organisations.

One cannot overlook that Member-States contribute enormous amounts of funds to the annual budgets of the intergovernmental research organisations. The level of coordination among their and the Union's policies is far from satisfactory. In several cases representatives from the same Member-State express divergent opinions on the same issue in the competent decision making bodies of the Union and the intergovernmental organisation, due to the fact that they represent different national agencies. In this respect, it is rather questionable whether proposals for establishing in the future institutions of the same type outside the Union's structure will promote the implementation of ERIA, integration and competitiveness. The size of the actual or potential problems is shown by the difficulties encountered at present in the effort to join forces of the Union and the European Space Agency.

In order to minimise duplication and contradictions, the links of affiliation of the intergovernmental organisations to the European Union have to be re-considered and enhanced. The enlargement of the Union to 25 Member-States makes this issue more prominent and calls for further attention in the near future.

Therefore, it seems, reasonable and mature to re-examine the status of the intergovernmental R&D organisations and to explore alternative proposals and scenari affiliating or integrating them to the Union. Moreover, means for improving inter-institutional coordination have to be devised.

In this context, the present chapter will try to investigate:

a) The role of the intergovernmental R&D organisations in the European Research and Innovation Area and the Union and the evolutionary process from their present status to the future, taking into account their present status and their co-ordination activities that may evolve in the future.
b) The status and future role of the Joint Research Centre (JRC)
c) The status and role of interagency organizations and in particular the European Science Foundation (ESF)
d) Proposals for the evolution of the R&D consortia funded under the Framework Programmes and of the networks of excellence that will be established with the 6th FP.

The first part of this chapter is devoted to a detailed presentation of the various types of national and regional funding institutions as well as of the large-scale international research organisations, in view of their connection with the ERIA. Furthermore, the present chapter also aims to provide a basis for discussion concerning the potential evolution of these organisations within the ERIA and to make a contribution to the debate on the scope of creating new ones.

4.2 Present Status

This chapter presents some basic characteristics of the current status of the major European intergovernmental and interagency research institutions and the JRC. It focuses on those organisations performing the so-called "big-science", having large-scale facilities, which are expected to play important role in the implementation of the European Research and Innovation Area. It also makes an attempt to illustrate one regional system (the Nordic Council) through which countries could be funded in doing research to attribute to regional level.

Summarized information on the international research organisations, is also presented in Tables 1 and 2.

Table 1: Membership by Institution - 2002

		Countries	ESA	CERN	EMBL/EMBO	ESO	ESRF	ILL	EUREKA	COST	DANTE	ESF
EU M-S	A	Austria									C	2
	B	Belgium									C	2
	DK	Denmark									X	8
	F	France									X	4
	FIN	Finland									X	2
	DE	Germany									X	4
	EL	Greece									X	1
	IRL	Ireland									X	3
	I	Italy									X	3
	LU	Luxembourg									C	1
	PT	Portugal									X	3
	E	Spain									X	2
	S	Sweden									X	7
	NL	Netherlands									X	2
	UK	Un. Kingdom									X	8
Economic space	IS	Iceland									X	1
	NO	Norway									X	2
	CH	Switzerland									X	2
EU M-S 2004	CY	Cyprus									C	1
	CZ	Chech Rep.									X	2
	EE	Estonia									C	2
	HU	Hungary									C	2
	LV	Latvia									C	
	LT	Lithuania									C	
	MT	Malta									C	
	PO	Poland									C	1
	SK	Slovakia									C	1
	SL	Slovenia									X	2
Candidates 2007	BG	Bulgaria										2
	RO	Romania									C	1
Candidate	TR	Turkey										1
West Balkans	CR	Croatia									C	1
	AL	Albania										
		Bosnia Herzegov										
		FYR Macedonia										
		Serbia Montenegro										
	IL	Israel									C	
Other European countriesWest Balkans	RU	Russia										
		Ukraine										
		Armenia										
		Georgia										
		Azerbaijan										
		Moldova										
		Byelorussia										

C = connected to GEANT, X = DANTE shareholder

Table 2. Main characteristics of the principle European intergovernmental research organisations, intergovernmental agreements, interagency and regional organizations

Name	Year of establishment	MemberStates	aprx. annual budget M€	Employment 31.12.2002
ESA	1975	15 Members A, B, DK, F, FIN, DE, IRL, IT, NL, PT, E, S, CH, UK NO + (CA)	2857	1898
CERN	1954	20 Members A, B, BG, CZ, DK, FIN, F, DE, EL, HU, IT, NL, NO, PL, PT, SK, E, S, CH, UK	1470	3000
EMBL/EMBO	1974	16 Members A, B, , CR, CZ, DK, FIN, F, DE, EL, HU, IS, IRL, IL, IT, NL, NO, PL, PT, SL, E, S, CH, TR, UK	52	>1100 in EMBO
ESO	1962	10 Members B, DK, F, DE, IT, NL, PT, S, CH, UK	85	200 International Staff members, Fellows and Associates; in Chile 50 and 130 local Staff members.
ESRF	1988	17 Members A, B, CZ, DK, FIN, FR, DE, HU, IL, IT, NL, NO, PT, E, S, CH, UK	70	560 Staff
ILL	1967	9 Members FR, DE, UK, IT, A, E, CZ, CH, RU	53	420
EUREKA	1985	33 Members + 4 nic A, B, CR, CY, DK, EE, FIN, F, DE, EL, HU, IS, IRL, IL, IT, LV, LT, L, NL, NO, PL, PT, RO, RU, SK, SL, E, S, CH, TR, UK, F, Serbia-Montenegro	410	n.a
COST	1970	34 Members A, B, BG, CR, CY, CZ, DK, EE, FIN, F, DE, EL, HU, IS, IRL, IT, LV, LT, L, MT, NL, NO, PL, PT, RO, SK, SL, E, S, CH, TR, UK, F, Serbia - Montenegro, FYROM	1500	n.a
ESF	1974	76 members from 29 States A, B, CZ, DK, EE, FIN, F, DE, EL, HU, I, IRL, IT, NI, NO, PL, PT, SL, E, S, CH, TR, UK, RO, BG, CY, CR	6,3	~55
DANTE	1993	18 shareholders EL, DE, PT, F, IRL, IT, UK, DK, FIN, IS, NO, S, E, NL, CH, HU, CZ, SL connected networks from 31 countries, those above and : A, B, CR, CY, EE, IL, LV, LT, MT, PL, LU, RO, SK.	45	25 (staff)
JRC		E.U.	300	~2150
Nordic Council	1952	5 Members DK, FIN, I, NO, S.	DKK 750 M	

4. 2.1 Intergovernmental Research Organisations

4.2.1.1 European Organisation for Nuclear Research (CERN)

CERN is the European Organisation for Nuclear Research, the world's largest particle physics centre. It was founded in 1954 and as shown in Tables 1 and2, it now includes 20 Member States. Member States have special duties and privileges; they contribute to the capital and operating costs of the CERN programmes, and are represented in the Council. They are also responsible for important decisions about the Organisation and its activities.
CERN uses a fair amount of its budget (which is approximately 1,47M€/year) on building new machines, such as the Large Hadron Collider for example. Thus, it can only partially contribute to the cost of the experiments. As a result, physicists and their funding agencies from both Member and non-Member States are responsible for financing, construction and operation of the experiments on which they collaborate. This enables scientists to participate in some of the world's most advanced physics experiments, and without spending great amounts of their national science budget.

Due to the special requirements of certain experiments, CERN collaborates closely with industries, to the benefits of both partners. This is because experiments such as cancer therapy treatments, medical and industrial imaging, radiation processing, electronics, measuring CERN's accelerators and detectors. All these require the best technology and this is what the collaboration with industries aims to accomplish for the scientific needs of CERN.

The highest, decision making authority within CERN is the Council. Almost all the activities of CERN (scientific, administrative, technical) are controlled through the Council. Moreover, the Council approves CERN's budget and programme of activities. Each Member State is represented by two delegates, one from a governmental authority responsible for research and one from the scientific community. Each Member State has one vote and most decisions require a simple majority although in practice the Council aims for a consensus as close as possible to unanimity.

The Council is assisted by the Scientific Policy and the Finance Committees. The Scientific Policy Committee ensures the scientific value of the activities proposed by the physicists and makes recommendations on CERN's scientific programme. Its members are scientists elected by their colleagues on the Committee and appointed by Council on the basis of scientific eminence.

The Finance Committee consists of representatives of Member States national administrations. Its main role is to take care of financial contributions of the Member States and of CERN's budget and expenditures.

4. 2.1.2 EMBL The European Molecular Biology Laboratory (EMBL)

The European Molecular Biology Laboratory (EMBL) was established in 1974. It is an intergovernmental organisation supported by sixteen countries including nearly all of Western Europe and Israel. The EMBL consists of five facilities: the main Laboratory in Heidelberg (Germany), Outstations in Hamburg (Germany), Grenoble (France) and Hinxton (the U.K.), and an external Research Programme in Monterotondo (Italy).

EMBL's mission consists of four important components: to conduct basic research in molecular biology, to provide essential services to scientists in its Member States, to provide high-level training to its staff, students, and

visitors, and to develop new instrumentation for biological research. Over the last 25 years of its operation EMBL has achieved a deep impact on European science because it is a truly international, European institution, and a critical mass of services and facilities driven by cutting-edge biological research.

The Laboratory has a number of unique features. Its Outstations provide European biologists access to instruments for the study of protein structures, some of the world's biggest databases of DNA and protein sequences, and a host of services operated by highly trained biologists. The Outstations are located on campuses that provide links to a large network of European science; some of the neighbours include the Sanger Centre and the Welcome Trust, DESY, the ESRF and the ILL, EMMA, and a host of academic and industrial partners.

The annual budget of the Laboratory is roughly around 52M€.
EMBL works hard to complement its core funding from member-state subscriptions, with project-specific external funding. Contributions of public research from these countries are the Laboratory's major source of funding.

4.2.1.3. The European Space Agency (ESA)

ESA was created in 1973 in an effort to combine the aims of the former European Launcher Development Organisation and the European Space Organisation. The 10 founding members of ESA included the largest western European countries, France, Germany, Italy, Spain and UK, together with Belgium, Denmark, Netherlands, Sweden and Switzerland. Five other small and medium size countries joined later. At present ESA has 15 Member States in Europe, plus Canada as a Cooperating State in some of ESA's projects (Tables 1&2).

Most Member States also belong to the European Union, but some do not. Also some members of the EU do not yet belong to the ESA. The ESA is an independent intergovernmental research organisation, yet it maintains common space policies with the EU. There is cross-membership also in the Council of Europe, in CERN and the European Southern Observatory. The diversity of ESA's Member States remains a source of vitality and versatility, with each country bringing to the Agency its own scientific traditions, technological skills, political priorities and cultural style.

ESA's mission is to draw up the European Space Plan and carry it through. The Agency's projects are designed to find out more about the Earth, its immediate environment, the solar system and the Universe, to develop satellite-based technologies and to promote European industries. The development of powerful launchers and novel spacecraft is one method by which ESA operates. Another is by creative interaction with the national space agencies and aerospace industries in ESA's 15 Member States. Moreover, ESA also wo9rks closely with space organizations outside Europe.

Europe's citizens fund ESA. There is a distinction between ESA's 'mandatory' space science programme and general services, for which all Member States must pay in proportion to their national wealth (GDP), and the much larger part of ESA's budget going into 'optional' programmes where countries contribute whatever they choose - in some cases, nothing. In 2001 the ESA budget reached about 2856,8 million Euros. Most of the contributions by Member States to ESA's budget go straight back to them in the form of contracts awarded to their industries - and so protect or create jobs.

ESA has its headquarters in Paris. Here, the Director General and the majority of the Programme Directors have their offices. Here is also where decisions are taken about ESA's activities in general. ESA structure also includes

Centres that are administered from Paris too. Here, the main offices for finance, budget, strategy and international relations are based. Each ESA Centre has offices for finance and communications that report to the ESA Headquarters as well.

ESA's governing body is the Council. This is made up of ESA Member States Representatives and has the role of drawing up the European Space Plan and making sure it is being followed and ensuring the long-term funding of ESA's activities. Each ESA Member State has one vote and is represented by a Council Delegate from the Ministry responsible for space activities in each Member State.

ESA has liaison offices in Brussels, Moscow, and Washington, as well as an office in Houston to support International Space Station activities.

4.2.1.4. ESO European Southern Observatory (ESO)

The European Southern Observatory is an intergovernmental, European organisation for astronomical research. It has ten member countries and it operates astronomical observatories in Chile with its headquarters in Garching, near Munich, Germany.

ESO was created in 1962 and it is currently supported by Belgium, Denmark, France, Germany, Italy, the Netherlands, Portugal, Sweden, Switzerland and United Kingdom. Other countries have expressed interest to become a member as well.

ESO operates two major observatories in the Atacama Desert in Chile. The La Silla observatory is located 600 km north of Santiago de Chile and consists of a series of optical telescopes and the very large telescope (VLT) on Paranal is located on a 2.600 m high mountain some 130 km south of Antofagasta. These telescopes can also be used in combination as the VLT interferometer (VLTI). The VLTI had "First Light" in March 2001. Furthermore, ESO plays a major role in the Atacama Large Milimeter project (ALMA) and is performing a concept study for OWL, a 100-m ground-based optical/IR telescope.

ESO's mission was to "establish and operate an astronomical observatory in the Southern Hemisphere, equipped with powerful instruments, with the aim of furthering and organising collaboration in astronomy".

The ESO Headquarters is located in Garching, near Munich, Germany. It is the scientific, technical and administrative centre of ESO where technical development programmes are carried out to provide the observatories with the most advanced instruments. There are also extensive astronomical data archives and facilities. In Europe ESO employs about 200 international Staff members, Fellows and Associates; in Chile about 50 and, in addition, about 130 local Staff members.

4.2.1.5 European Synchrotron Radiation Facility (ESRF)

The European Synchrotron Radiation Facility (ESRF), in Grenoble, France, is a joint facility supported and shared by 17 European countries (see table 1). In 1988, twelve European countries joined forces to create the synchrotron in Grenoble. Since then, five more countries have joined the group. Together they create the indispensable synergy needed to carry out advanced scientific research. At present the following countries are Members of ESRF: Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal,

Spain, Sweden, United Kingdom, Switzerland, Norway, Israel, Czech Republic.

ESRF is an outstanding example of European co-operation in science. Seventeen nations work together to use the extremely bright beams of light produced by the ESRF's high-performance storage ring to study a remarkably wide range of materials.
ESRF operates the most powerful synchrotron radiation source in Europe. Several thousand researchers travel to Grenoble every year, where they work in a first-class scientific environment to conduct experiments at the cutting edge of modern science. Interdisciplinarity is probably the key issue in ESRF. At ESRF, physicists work along with chemists and materials scientists. Biologists, geochemists, medical doctors, meteorologists, geophysicists and archaeologists have also become regular users. Industrial applications are growing too, notably in the fields of pharmaceuticals, cosmetics, petrochemicals and microelectronics.How ESRF works

Every year several thousand researchers come to Grenoble to take advantage of the unique properties of the synchrotron radiation generated at the ESRF and to conduct experiments using its highly specialised beam lines.

Twice a year the ESRF solicits research proposals. Of the large number of proposals that are received, most come from European University laboratories or national research establishments. The projects are reviewed by external committees, and roughly half the applications are accepted. Each successful team is then allocated some "beam time" -3 days on average - on the beam line that is best suited to their experiment.

Since 1998, the annual budget for the operating costs of the ESRF has been of the order of 64 million Euros. All the countries make contributions to the annual budget according to their GDP. The percentage of the country contribution, depending on its GDP, is seen below: France 27.5%; Germany 25.5%; Italy 15%; United Kingdom 14% Spain 4%; Switzerland 4%Benesync (Belgium, Netherlands) 6%; Nordsync (Denmark, Finland, Norway, Sweden) 4%. Additional contributions not exceeding the 1% of the Members' total contribution are presented below: Portugal 1%; Israel 1%; Austria 1%; Czech Republic 0.38%; Hungary 0.2%. The contributions made, are based in the "juste retour" concept.

About 560 people work at the ESRF. Also, About 3500 visiting researchers come each year at the ESRF to carry out experiments. The ESRF synchrotron is an ambitious project that represents a very real technological, scientific and human challenge.

4.2.1.6. Institute Laue- Langevin (ILL)

The Institute Laue-Langevin (ILL) is an international research centre based in Grenoble, France. It was founded in January 1967 on the initiative of France, Germany and the United Kingdom. The United Kingdom joined ILL as a full member on 1973 and since then six other countries became partners of the Institute (Austria, Spain, Italy, Czech Republic, Russia and Switzerland) The ILL is directed by its three founder countries. France via the Commissariat a l'Energie Atomique (CEA) and the Centre National de Recherche Scientifique (CNRS), Germany via the Forshungszentrum Julich (FZJ) and the United Kingdom via the Engineering and Physical Sciences Research Council (EPSRC) in association with its 6 partner countries.

The ILL operates the most intense neutron source in the world together with unique advanced instrumentation which is used for scientific research. The Institute's instrumentation is continuously renewed and upgraded is one of the great strengths of the ILL ensuring that it continues to play a dominant role in neutron research world-wide.

The installations of the Institute are available to scientists from Universities and laboratories from the nine member states. Also, a scientist from a member state can invite scientists from other countries. More than 750 experiments selected by a scientific review committee are completed every year by about 1500 scientists coming to ILL to carry out their research programmes. ILL attracts a variety of scientists (chemists, physicists, biologists, crystallographers, specialists in magnetism) all of which are also experts in neutron research and technology. The projects are selected by the scientific council of ILL and its subcommittees made up by experts from member states. When a proposal is chosen, the research team concerned is awarded, free of charge a specific time on one of the several instruments to carry out its programme. Traveling expenses of scientists from member states are also paid by the ILL.

Furthermore, a percentage of the instrument time is also given to confidential R&D programmes on the basis of commercial contracts. For these programmes the use of instruments is subject to a paying fee. For these programmes access is rapid and it is not subject to selection by the scientific council and the results remain confidential.

ILL has the status of a French private company. The three founding members nominate a Steering Committee. The Institute is directed by a director assisted by two scientific associate directors. The Institute has around 400 members of staff including 70 scientists, more than 200 engineers and technicians, 60 safety and reactor operation specialists and about 50 administrative staff. The annual budget is around 53 M€ of which almost 80% is coming mainly from subventions from the founder countries, plus those from partner countries and revenues from industrial contacts.

4.2.1.7 EIROFORUM

A number of powerful research infrastructures and laboratories used by an extensive network of scientists have been developed and deployed within Europe by European Intergovernmental Research Organisations (EIRO) since the early 1950s. Several major centres and organisations of European scientific and technological co-operation, described in the previous sections (CERN, ESA, EMBL, ESO, ESRF, ILL), have joined forces to optimise their action and tackle joint problems in a more co-ordinated manner, in conformity with a recommendation made in the Communication on the European Research Area in January 2000. In 2001 these organisations have set up a co-ordination and collaboration Council (EIROforum) with their Directors General or equivalent as its members. The EIROforum is included in the present chapter despite the fact that it is not an international R&D Organization but rather a Union of Organizations, since the reasoning behind its creation arose from the general ERA concept and the identified needs for better coordination and cooperation.

The primary goal of EIROforum is to play an active and constructive role in promoting the quality and impact of European Research. In particular the EIROforum Council will be a basis for effective, high-level interaction and co-ordination between the member organisations. It will mobilise its substantial combined expertise in basic research and in the management of large international infrastructures, facilities and programmes, for the benefit of European research and development. This will be pursued by exploiting links between the member organisations and their respective European research communities. The aims of EIROforum are, in particular:

1. To encourage and facilitate discussions among its members on issues of common interest, which are relevant to research and development.
2. To maximise the scientific return and optimise the use of resources and facilities by sharing relevant developments and results, whenever feasible.

3. To co-ordinate the outreach activities of the organisations, including technology transfer and public education.
4.To take an active part, in collaboration with other European scientific organisations, in a forward-look at promising and/or developing research directions and priorities, in particular in relation to new large-scale research infrastructures.
5.To simplify high-level interactions with the European Commission (EC) and other Institutions of the European Union, and enable an effective response to specific requests for expert advice in the areas covered by the member organisations.
6.To provide co-ordinated representation to the outside world including the general public, national governments, non-European countries etc.

All elements of its mission are in line with several ERIA aims and objectives. It is therefore evident that EIROforum will have an important role in future efforts towards a closer cooperation between the E.U. and International Research Organizations and the realization of ERIA

4.2.2 Interagency Organisations

4.2.2.1 The European Science Foundation (ESF)

The European Science Foundation is an interagency organisation having Member organisations as members rather than countries. It is the European association of national (but not governmental) organisations responsible for the support of scientific research. Established in 1974, the foundation currently has 76 Member Organisations from 29 countries (Table 1). The ESF is a non-governmental organisation, and it maintains close links with other international bodies with interests in scientific research, including the European Commission.

ESF's Mission and Structure

According to its Mission Statement, "The ESF promotes the development of European science at the forefront of knowledge by bringing together leading scientists and scholars and research and funding agencies to debate, plan and implement European research". In other words, ESF aims to advance European co-operation in «basic» research (mobility of researchers, free flow of information and ideas, use of facilities); to examine and advise on research and science policy issues of strategic importance; to plan, and where appropriate, to manage collaborative research activities.

The scientific work sponsored by the ESF includes research in medical sciences, life and environmental sciences, physical and engineering sciences, humanities and social sciences. In these domains, five disciplinary Standing Committees, composed of leading scientists nominated by the Member Organisations, are responsible for identifying scientific priorities, formulating strategies and developing research agenda. In addition, a number of Expert Committees provide further advice in areas requiring specific attention.
The ESF works with two communities, its Member Organisations (funding agencies, national, but not governmental, research organisations and academies of sciences and letters) and the European research community at large, which ESF and its Member Organisations serve.

The ESF is committed to facilitating co-operation and collaboration in European science on behalf of its principal stakeholders (Member Organisations and Europe's scientific community). This cross-border activity combines both 'top-down' and 'bottom-up' approaches in the long-term development of science.

The contributions of the Member Organisations pay for the ESF activities. These are channeled both to the ESF general budget and to specific scientific programmes and projects in which Member Organisations participate. The contributions of the members are calculated on the basis of their country's Gross Domestic Product. Moreover, the ESF Member Organisations also contribute to the funding of EUROCORES.

ESF's general budget for the year 2002 reaches 6.3 million €. This is without including the *à la carte* funding of specific Scientific Programmes by Member Organisations and partial funding of the EURESCO programme by the European Commission. The total annual cash flow is over 17 million €.

The structure within the ESF includes a decision-taking component, which is strongly connected to its Member Organisations. The *Assembly* is the main decision-taking body in this structure plan, and it meets once a year. In this, all Member Organisations are represented. The duties of the Assembly include the appointment of the President, the Secretary General, members of the ESF Executive Board, and the chairpersons of the Scientific Standing Committees. It approves the report of the committees, the budgets and the accounts, statute changes, and admits new members.

Members that have been nominated by the "national groups" of Member Organisations make up the *Governing Council.* Amongst the responsibilities of this council some are setting, approving, directing and monitoring the overall strategic direction of the ESF. It is chaired by the President of the ESF with the Executive Board also present at its meetings.

The *Executive Board* consists of 8 people: the President, the two Vice-presidents, the Secretary General, and up to four members elected by the Assembly as advised by the Governing Council. The Executive Board has in its authority the implementation of the strategy and policy that the Governing Council has set, as well as the development of the Foundation's science policy activities.

The *Standing Committees* cover broad scientific disciplines and the Member Organisations nominate the members of the committees. The Committees identify scientific priorities, formulate strategies and develop a research agenda. All Committees cooperate in order to promote interdisciplinary studies.

Network launches are reviewed and approved by the *Network Group.* This Group consists of the chairpersons of ESF Standing Committees and three members of the Executive Board.

The *EURESCO Committee* contributes to the scheme of European Research Conferences proposed by the ESF.
Other Expert Committees and Boards are established as necessary. Their role is to fill in the gaps in specific scientific subjects such as marine and polar sciences, nuclear physics and radio astronomy.
Regular review of the committees and their activities is necessary. Review groups will also be introduced to speculate on the current criteria for membership of the ESF.
The Office of the ESF is based in Strasbourg. It is directed by the Secretary General, who is appointed by the Assembly, and is assisted by international staff.

How ESF works

ESF will support the proposals made by either the scientists themselves or from Member Organisations, but only as long as they satisfy the main criteria of scientific excellence and European added value. The proposals that are eventually supported are the ones that clearly show the added value to be obtained by bringing scientists together or laboratories from several countries. Also, it is very important to the ESF that new proposals identify and develop new scientific advances and demonstrate multidisciplinary nature.

Within its new Action Lines, the main instrument is EUROCORES (ESF Collaborative Research Programmes). Its aim is to provide a variable geometry mechanism for funding basic research at the European level.
Another new Action Line that is currently being developed by the ESF is that of ESF Scientific Forward Looks. They will ensure that Europe's scientific community can develop medium to long-term perspectives and analyses of future research developments in multidisciplinary topics and also to bring together scientists and policy makers from ESF Member Organisations.
The third Action Line within the ESF is that of Research Infrastructures (RI). It has been in ESF mandate since 1974, and ESF scientific studies for RI has led to the creation of new facilities e.g. ESRF. Also, RI studies comprise analysis of the scientific and technical care and follow up with funding organisations and ESF also undertakes assessments and evaluations of RI.

The ESF also employs four main networking instruments;

- *ESF Exploratory Workshops* provide the means for scientists to come together and examine specific scientific issues. They may lead to ESF or other networks on a longer-term basis.
- *ESF Scientific Networks* aimed to be of an interdisciplinary nature. It involves a planned package of workshops, exchange visits and dissemination for a three-year period, in order to reach out to the wider community.
- *ESF Scientific Programmes* are longer-term activities focused on specific themes. that are aimed to bring together research projects of multinational teams with the participation of about 10 countries.
- *European Research Conferences (EURESCO)* consists of scientific discussion meetings in all areas of research, with about 80-100 scientists involved. Its purpose is to overcome research borders and to enhance free discussion on forefront topics between younger and experienced scientists.

Exploratory Workshops and Networks are funded from the ESF general budget, while programmes are funded on an *à la carte* basis by participating Member Organisations.

4.2.2.2. DANTE - Delivery of Advanced Network Technology to Europe- Ltd.

DANTE Ltd. was established in 1993 in Cambridge. It was founded by Research and Education Networks from all over Europe, in order to organise, manage and build international networking services on their behalf. As its name suggests, the objective is to build communication networks using the most advanced technology and operating at the highest speeds on a pan-European basis.

DANTE's origins go back to the late 1980's as a result of the apparent need for international cooperation among National Research Networks in Europe. At that time the National Research Networks as part of an Eureka programme and with the support from the European Commission, established the Cosine project to develop a pan-European approach to research networking. The project was responsible for creating two generations of networks to interconnect the European National Research Networks. The second one of these networks, EuropaNET was the first truly ubiquitous pan-European research Internet. It was then that the National Research Networks (NRENs) involved recognised the need to have a permanent organization geared to provide international high-quality network services to the European Research community, to manage and to develop the network that provided European connectivity between them. Thus, DANTE was established as the organization to fulfil this role on their behalf.

DANTE was set up in 1993, and as a result of an international competition for its location, was established in Cambridge. It has been granted a "Research Association" status by the UK Department of Trade and Industry. It is owned by the Research Networks responsible for its establishment and organises, manages and builds international networking services on their behalf. Currently, DANTE has shareholders from 18 countries, namely, the U.K., France, Portugal, the Netherlands, Spain, Ireland, Italy, Germany, Denmark, Finland, Sweden, Norway, Iceland, Switzerland, Czech Republic, Slovenia and Hungary. It is based in Cambridge U.K. with 25 employees and manages a turnover of about 50M€ connecting National Research and Education Networks to over 30 countries and other world regions (see Tables 1 & 2).

DANTE's principal activity is the pan-European network. The current generation of the network, GEANT, is the 6th to be implemented in 12 years. Each generation has implemented more advanced technology than its predecessor and GEANT now connects National Research and Education Networks (NRENS) in 30 countries. The network itself has been built by DANTE on behalf of a consortium of 27 NRENS, with co-funding by the European Commission as part of the 5th Framework Programme.

DANTE, in addition to organising and managing network services, DANTE has been carrying out studies, research projects and (user) surveys over the years. Furthermore, DANTE is an active participant in the development of new networking services to support European research. In addition to operating the network, DANTE carries out a number of projects (e.g. EUMEDCONNECT, CAESAR, SEEREN, SERENATE, etc) to help promote the development of the Information Society.

The establishment of DANTE was backed by political commitment. However, DANTE is not based on formal intergovernmental agreements and its structure has many similarities to an interagency international organization rather than in intergovernmental one, since its shareholders are not governments but National R&E Networks. This structure provides DANTE with a remarkable degree of flexibility and enables it to operate on a rather moderate budget strongly relying to the strengths and abilities of its member National Networks. Its mission and strategy is directly linked to the needs of its users, the National Research Networks and the research community in general. Furthermore, DANTE represents a good mix of both National and EU efforts since its funds come from both national and Framework Programme sources, through participation on competitive calls for proposals. DANTE also provides a good example of an international organization that was created following the evolution of successful international cooperation projects to a more permanent structure.

4.2.3. European Commission's Services - Joint Research Centre (JRC)

The Joint Research Centre is the European Union's scientific and technical research laboratory and also an integral part of the European Commission. It is a separate Directorate General, providing the scientific and technical advice in order to support EU policies. It's a Commission service, which guarantees independence from private or national interests.

The work that the JRC carries out is split between institutional research in support of Commission policymaking, direct support for specific Directorates-General (DGs) and competitive activities in strategic relationships with the scientific and business communities. One of the JRC aims is to "add value" where appropriate, rather than to compete directly with research establishments in the EU Member States.

"The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national."

In line with its mission described above, the JRC provides customer-driven research as scientific and technical support for other Community policies, such as those on the environment, agriculture etc. The JRC is involved in competitive activities to validate its expertise and increase ability in its core competencies.

In addition to the institutional activities, JRC closely co-operates with external organisations. A strategic approach in the role of a partner has been developed; several high level agreements have been set up with large scientific and industrial communities on new networks and research collaboration.

The budget may reach over 300 million Euro per year provided by the European Commission's research budget and from competitive income.

The available credits to the JRC are sub-divided into staff expenses, means of execution (maintenance of buildings and equipment, electricity, insurance, etc.), operational credits (direct scientific activities) and decommissioning credits. The credits come from the institutional budget, made available directly from the European budget to the JRC for the 5th Framework Programme. The JRC research programmes are funded by the EU budget with additional funding from associated countries.

The JRC consists of seven different institutes, each with its own focus of expertise, on five sites around Europe. The Science Strategy Directorate provides co-ordination and links the institutes and the policymakers.

The Directorate co-ordinates the research carried out by the institutes and helps to ensure its quality by interacting with the international scientific community and industry. An important role of the Directorate is the promotion of technology transfer of the JRC research outcome both to create industrial added value for competitiveness and growth in Europe and to support the Community's policies on innovation.

The foundation of JRC's research activities is the JRC Work Programme in support of the European Commission's Framework Programmes on research and development. The Work Programme is structured according to the priorities of the European Commission DGs.

The JRC provides sound scientific support to underpin EU policymaking and gives the process itself added credibility. The JRC is an integral part of the European Commission, sharing the same objectives and hence, it could be easier to address directly issues related to the issues described in the realisation of the ERA[1]. JRC can provide advice to European countries institutions for shaping key European policies and on the impact of technology on policy or the effect of policies on competitiveness, sustainability and the individual citizen.

Research is carried out with the co-operation of the European Industry and other bodies. This ensures that the JRC is aware of new developments and can support policy measures etc.

JRC should ensure that the results of the research effort could benefit the wider European economy. Most projects are formulated and carried out in close collaboration with Member State Organisations and this allows European scientific support to policy to be more decentralised than corresponding US efforts.

Although the potential of research that is being done within the JRC is good, the prospects of JRC in the future should be reconsidered to further promote innovation and to grasp more opportunities arising from cooperation with industry. Taking into account that the JRC is a EU Institution it should lead the way to enhance Europe's research potential and fulfil the two-fold – 3% - 2/3 Barcelona target. The best approach to meet those aims has not been identified yet and it might be advisable to be further investigated in the framework of the Commission's study on International Organisations.

4.2.4 Regional Organisations: The example of the Nordic Council

The Nordic Council was formed in 1952. It is a forum for inter-parliamentary co-operation. The Council has 87 members, representing the five countries and three autonomous territories. The members of the Council are members of national parliaments; they are nominated by their respective political parties and elected by the parliaments. Thus there is no procedure for direct election to the Nordic Council.

The Nordic Council, led by a presidium, has held annual sessions since 1996. It also organises theme sessions for more comprehensive treatment of selected issues. Continuous work on policy issues in the Nordic Council is conducted via five committees and four political party groups.

The Nordic Council has national secretariats in the Nordic parliaments, attached to the delegations of the respective countries. It co-operates with other international and regional organisations. For example it co-operates with the Baltic Assembly, as was concluded in the 1992 agreement.

Allocation of funding is made via the Nordic budget. The funding is allocated to a wide range of activities that are initiated, executed and supported by the Nordic Council of Ministers. Annual allocations are awarded to projects, the operation of co-operation bodies in various policy areas and sectors, and grants schemes open to external applications, where the main goal is to promote mobility in the Nordic region. A high percentage of the budget is allocated to the Nordic institutions, which focus primarily on Nordic education and research and cultural activities.

The Nordic budget is drawn up and administered by the Secretariat of the Nordic Council of Ministers in Copenhagen, and is adopted by the Nordic ministers for co-operation. Throughout the 1990s, the Nordic budget has remained fairly stable; roughly DKK 750 m in 2000 prices. The budget is jointly financed by the five Nordic countries, in accordance with a "key" based on the single country's share of the aggregate GDP of the Nordic region at factor price.

The Presidium is the Nordic Council's supreme decision-making body between the annual sessions. It allocates and co-ordinates work between the Council's bodies, draws up action plans and budgets and deals with joint foreign and security policy issues. The Presidium for the next calendar year is elected at the annual session. It consists of a president elected by a special procedure and 12 members representing the national delegations.

Each Nordic country sends a delegation to the Council. The delegation is made up of members elected annually by the national parliament. Only members of national parliaments are eligible to be members of the delegation.

Each national delegation elects a chairperson and a vice-chairperson from its members. The delegations ensure that decisions made by the Council are implemented at a national level. Each delegation has a national secretariat based in its parliament.

4.2.5. Thoughts on the proposed European Research Council- ERC

The creation of a European Research Council (ERC), a science driven institution with the necessary autonomy to support internationally competitive basic research at the European level is currently attracting a lot of interest. On the 7th-8th of October 2002, the Danish Research Councils hosted a Conference titled Towards a European Research Area: Do we need a European Research Council? The purpose of the conference was to discuss whether, and under what conditions, setting up a European Research Council (ERC) could add value to the ERA. However, still there are several aspects to be considered whereas and the goals, the opportunities, the strengths and the weaknesses of the European Research Council need further investigation. The main issues that have to be thoroughly discussed before any decision guiding the creation of an ERC are its mission, its structure, its added value to the existing structures and most importantly its sources and level of funding.

Potential Mission

The mission of the ERC, as it has been debated in the Copenhagen Conference, could cover certain aspects related to fundamental research. More specifically, the ERC could complement the Community Framework Programmes (FP) in this field. Although the 6th FP has a stronger element of support for basic research than the previous ones, many scientists feel that this is not enough and a new structure is needed to further address the relevant issues and to co-ordinate in a more effective way basic research at a European level. Commissioner Busquin identified several preconditions that could ensure/sustain the ability of the ERC to support excellence in fundamental research, to enhance, co-ordination among national research agencies and to provide added value in terms of resources. Since the objective is to provide greater support than at present for basic research, funding has to come either from existing and/or new sources. The idea of fresh funding from national sources will probably not be equally accepted from all member countries and, if done, has to be decided by the Governments beforehand given the limitations on public deficits and debts.

The basic principles for an ERC, that have not been discussed yet, according to the final report of the Copenhagen Conference, should address the following:

- Scientific autonomy: An ERC must have a high degree of autonomy and be run by respected scientists. Funding decisions must be based on scientific criteria and a rigorous and transparent peer review process.
- Accountability: Clear ownership of an ERC must be identified. An ERC must be accountable to its owners and society.
- Clear objectives: An ERC must have clearly defined objectives, formulated in its statutes and a mission statement
- Adequate means: An ERC must have the instruments necessary to accomplish its mission and the resources to provide critical mass in its fields of activity.
- Added value: Funding through an ERC should demonstrate genuine added value and avoid unnecessary duplication of existing mechanisms.

The mission of an ERC could thus focus on the reduction of fragmentation and to more effective co-ordination of basic research activities in Europe. An ERC could also complement and function in a subsidiary way with respect to existing funding bodies -and more importantly to the Framework Programmes, in order to stimulate competition and avoid unnecessary duplication. Moreover, an ERC could find in its mission the obligation to promote regional development and to strengthen research capacity of weaker parts of ERIA.

4.3

Proposals for the evolution of the research organisations in the ERIA

The Treaty of the European Community some decades ago provided for research funding by the Commission, aiming to enhance the competitiveness of the industry and the economy in general and to support the various Community policies. The rational of this orientation originated from the economic character of the European Community. This orientation gave rise to the Framework Programmes for Research and Technological Development that make their way now for approximately 20 years.

However, despite the clear orientation of the European research policy towards industrial competitiveness two major facts have recently marked the progress of the E.U research policy:

- The identification of the "European paradox", which revealed the innovativeness gap between EU and the USA, although European research is very prolific in terms of publications and citations
- The Lisbon and Barcelona decisions to use research for enhancing the competitiveness of the Union and to increase consequently the RTD intensity to 3%, with 2/3 funded by the business sector.

These facts lead to the adoption of new instruments by the 6th Framework Programme and created the feeling to the research community, which has a very strong component in fundamental research, that the long-term knowledge production is neglected or even undermined.

Whether this is justified or not, time has come to start thinking on the redesign of the European landscape of academic research. In this frame of policies there are some very important parameters to be taken into account:

a. Production of fundamental knowledge is par excellence the most internationally structured segment of RTD. This explains why this segment could better be served by policies at European than national level
b. National budgets have a long tradition of funding academic research and the principle of subsidiarity keeps the Union at distance from this activity
c. Framework Programmes have not excluded academic research from funding, although this has not been the focus of competitiveness. Financial support to large research infrastructures and to training and mobility creates a lot of challenges for the basic research community. Moreover, the 6th FP is promoting the networks of excellence, which are principally addressing the needs of fundamental science. Similarly,
d. A number of intergovernmental research organisations operate for several decades and provide basic research with a structuring framework and with considerable funding in important areas such as space, particle physics and biology.
e. The European Science Foundation, as well as COST and other institutions and agreements, have also offered a framework for coordination and cooperation to European researchers whose work has to be of international character. Nevertheless, the lack in Europe of an institution corresponding to the American National Science Foundation has generated the idea for the creation of a funding authority under the name of European Research Council.

In this context, the following section will be devoted to an attempt to explore the opportunities to move European research one step further by revisiting the roles and structures of existing institutions and the scope for creating new ones with the aim to increase the level of integration of European research, to enhance its effectiveness and its impact to current societal needs.

4.3.1 The role of the European Intergovernmental Research Institutions

This group consists of Intergovernmental Organisations such as ESA, CERN, EMBL and Intergovernmental Agreements such as Eureka. The case of the Joint Research Centre (JRC) is a particular one, since it operates as a Directorate General of the Commission, and therefore it has a board of "intergovernmental" character but not the managerial autonomy of the other intergovernmental institutions. COST is also a case per se, operating under Council's authority, depending till now on the financial and organisational support of the Commission and currently undergoing a period of redefinition.

The importance of space science and technology in reinforcing the competitiveness of the European industry as well as in supporting other E.U. policies, including Defence and Security Policy, has lead the Council to ask for closer cooperation with the European Space Agency. The level of investment required for developing space technology and the fierce competition in space telecommunications and earth observation markets make duplication of efforts unthinkable. Although, overlapping in membership of the EU and ESA exceeds 85% (13/15) it has been proven quite difficult to conclude an agreement between the Commission (mandated by the Council) and ESA's administration. Differences in the operating modes of the two institutions and the proximity of RTD to exploitation seem to be a serious stumbling block in the negotiations. The issues at stake look much higher than those dealt under the FP6, to be managed in the same way. The political will is probably not yet strong enough to put aside the interests of the individual Member States and lead to compromises for medium and long-term common policy and action. For example, one could envisage a strong integration of ESA into the EU, with a transition period for a smart merging of the "juste retour" principle with more merit dominated and flexible management principles, and taking into account the interests of the participating Member States as well as the new opportunities for innovation and development. Such a change requires the revision of the ESA statutes in order to take care of the interests of the non-EU Member States, as well as the inclusion in the Treaty of provisions for this type of cooperation.

Less urgent but equally important are becoming the changes required in the EU relations with the other intergovernmental organisations. CERN for example, with much broader membership than ESA, may acquire a prominent position in research both in the field of particle physics as well as on software for networks technology development. Furthermore, EMBL and EMBO constitute a nucleus for research and researcher training in molecular biology, the discipline with the highest potential for the advancement of knowledge in this decade.

Along these lines, the Union should also probably re-examine the status of the JRC as quasi "civil service" and explore alternative organisational settings that will give to this body higher flexibility and autonomy to fulfil the mission attributed by the Union.

The links between EUREKA and COST on one side and the policy-making bodies of the EU should also be strengthened, although there is no apparent need to involve directly the EU budget in the operation of these initiatives.

Up to now, the research policy design of the Commission is mostly dominated by the requirements of the Framework Programme, leaving limited potential and financial means to the broader ERIA issues. The Member States did also focus overwhelmingly on the FPs and on the administration of the subsequent projects, trying to maximize returns to their national institutions. Moreover, the Council and the European Parliament are only occasionally involved in the strategy for building the Research and Innovation Area. The on going works of the

Convention should therefore consider the issues and provide for the processes by which ERIA a will be constructed.

Following the decisions of the European Council of March 21st 2003, the short-term target of the Union is to "adopt a framework for the joint EC/ESA space strategy by the end of 2003". In the medium term the Union needs sustainable efforts to bring all these organisations closer to Union's RTD and innovation strategies with a long-term goal of integration.

4.3.2 The creation and evolution of "networks of excellence"

The main aim of networks of excellence funded by FP6 is to promote integration at European level of existing or emerging national or regional research capacities and activities. In particular each network aims at advancing knowledge in a particular area by assembling a critical mass of expertise and resources. The activities concerned will be targeted in general towards long-term multidisciplinary objectives, rather than towards predefined results in terms of products, processes and services.

As defined by FP6, a Network of Excellence will be implemented by a joint programme of activities involving some or, where appropriate, all of the research capacities and activities of the participants in the relevant area to attain a critical mass of expertise and European added value. A joint programme of activities should aim at the creation of a self-standing virtual centre of excellence. The European wide networks of public and eventually also private research laboratories/institutes, operating as consortia with soft legal binding will be a strong element of the implementation of the ERIA.

The alternative futures of the networks may be described as follows:

- Total or partial dissolution of the network at the end of the Community financing and return of the constituent research units to their usual businesses
- Continuation of the joint activities under a loose coordination mechanism (periodic meetings for exchange of information and good practices)
- Continuation of the joint activities with strong, but timely limited ties defined in common contract-bounded programmes and/or projects, providing for exchange of personnel, exploitation of results, common representation to third parties and the like.
- Establishment of new legal entities, as affiliated entities, which shall undertake jointly identified activities of common interest (i.e. DANTE Ltd.)
- Establishment of new legal entities, which will absorb all or some of the constituents of the networks or will result from the merger of these entities into one unique legal entity.

The Commission should monitor systematically the evolution of the networks and facilitate their internal cohesion to the highest possible degree. Such catalytic intervention of the Commission could provide for model contracts and other legal support to the contractors for creating either "integrated joint long term programmes" or new legal entities. Another issue requiring further investigation is whether merging of the activities and/or institutions would need a new legal context that will go beyond the national legislations offering to the "evolved" Networks the status of European RTD organizations.

Organisations that may emerge from such a process shall be distinguished from interagency or intergovernmental institutions or from national institutions with foreign affiliates, constituting a new breed of RTD centres, sharing policy and financial links with the Union and leading the way for a new landscape for Research and Innovation in an enlarged Europe.

4.3.3 Towards a pan-European system for funding academic research

It has already been argued that the academic community in Europe expresses the feeling that long-term knowledge production is neglected by the current European research policy. Researchers, especially from countries where public funding and university research have relatively low shares in the Gross Expenditure for RTD, took the initiative and with the direct or indirect support by their national authorities, opened the debate for the creation of a pan-European institution for funding fundamental research.

Table 3 shows the relatively low level of public participation in the national effort in some countries where there are good arguments for enhancing this in order to boost the total national RTD effort and support further the business innovativeness with fresh knowledge. In most of these countries academic research is directed and financed through national "Research Council"- type mechanisms. These mechanisms secure the bottom up orientation of research, the evaluation of proposals by peers and the enforcement of scientific merit criteria in the selection of projects and the assessment of output. The Councils are publicly funded on "block grants" and are accountable to the society on long-term basis. The effectiveness of this system depends on at least two important factors:

- The compatibility of the academic sub-culture with the dominant social values in the country concerned
- The ability of the economic actors to valuate and exploit the outputs of the "public research system", such as trained human potential, scientific and technical information, prototypes, devices, blue prints etc.

An extrapolation of this mechanism at European level could easily lead to the conception of a European Research Council (ERC).

Table 3: Shares of government financing and public institutions' performance in GERD

	% of GERD financed by government	% of GERD performed by the Higher Education sector	% of GERD performed by the government sector
Belgium	23.2	23.9	3.3
Denmark	32.6	20.3	15.2
Finland	26.2	17.8	10.6
Ireland	21.8	21.2	5.9
Netherlands	35.7	26.2	16.5
Sweden	24.5	21.4	3.4
United Kingdom	28.9	20.7	12.2
Average EU	35.0	20.9	14.1
Average OECD	29.8	17.3	10.8

Source: OECD Main science and technology indicators
Data 1999 or 2000, latest available

The mission, structure and organisation of the future ERC have not been defined yet. However, it is clear that in order to make an impact in European research, the ERC should be organised in a flexible way, enabling quick responses to new emerging challenges and scientific fields. It should complement, as far as possible, the national disciplinary structure, in order to contribute to the implementation of ERIA in the best possible way.

In this context, three important interfaces have to be thoroughly studied:

- The relative missions and roles of the Framework Programmes and ERC activities
- The links between ERC and the reformed European Science Foundation
- The subsidiarity of ERC to the national and regional research councils.

Within the 6th Framework Programme, one can find several activities that could be delegated to the ERC. Fellowships and networks of excellence could be among them. These are activities of recognised European value, designed by the Commission and included into the FP with the consent of the Council and the Parliament, since the Treaty does not make provisions for other financing institutions. If the FPs keep their initial mission to support the competitiveness of the industry and other EU policies, these activities may be implemented by an "independent" body, managed by the scientific community of Europe, and could be transferred to the ERC along with the relevant financial and human resources. The Commission shall then reinforce its role as policy maker and evaluator whereas the Union should set the targets of the ERC and monitor its outcome and impact on European science by periodic multi-annual inter-institutional evaluation and decisions. To proceed on this context, the Treaty needs to be revised accordingly, in order to give the authority to establish the ERC and provide for support with adequate resources.

The application of the subsidiarity principle would be used to clarify the other interface, that with the national and regional research councils. Under the subsidiarity rational, the Union and the Member States would examine the eventual merging of the national research councils into the European one and to subsequently transfer also the corresponding public resources. Such a process has to be gradual and prepared well in advance, in order to balance the European and the national interests. Several transitional consecutive periods should be needed. But the end product might be an institution equivalent as to the size and impact to the National Science Foundation of the USA.

The third interface is developing with the European Science Foundation, an interagency body that has not own resources for funding research, but plays an important role in coordinating and networking basic research activities (exploratory workshops, networks and programmes). Recent initiatives of the Foundation try to raise funding from its member agencies and even from the Framework Programme to increase effectiveness in priorities' coordination, to improve the capabilities of medium and long-term forecasting of science orientation and to provide advice, assessments and evaluations of research infrastructures. To a large extend the mission of the ESF seems quite different from that of the incubated ERC and its membership is mostly determined in a rather restrictive and defensive way. Nevertheless, since both institutions target more or less the same scientific population and they might probably compete for the same funding sources, there is strong need for securing complementarity of their actions. Therefore it might be advisable to slow down the on-going discussion on the revision of the statute of ESF in order to take into account the outcome of the Convention on the new European Treaty's articles on research and technology, that has a much broader social and political bearing.

Discussions on the creation of an ERC are currently under way. However to reach the political endorsement needed for firm action, more dialogue and more concrete proposals are needed.

The following issues could summarise the prerequisites for the creation of an ERC:

- Need for a very good proposal backed up with concrete ideas, which will be not simply the expansion of the national agencies to a European level
- ERC should be truly European with at least all EU Member States involved.
- No country bans from the process (if there is no consensus) but all the European countries need to reach a consensus, including on transitional periods accommodating national specificities
- Work together with the existing structures and add value to their work.
- Study rather than lobby will eventually make the creation of this new body possible to meet the future challenges.

4.3.4 Scenarios on the evolution of the European research institutions

The previous sections give an idea of the extremely complicated system of research institutions involved in RTD in Europe, built throughout the years in an incremental way, with little prior design and lot of political pressure. Now that the EU is increasing its membership from 15 to 25 and a Convention discusses the future configuration of the European institutions and while ambitious projects are proposed for the role of Europe as the most competitive area of the world, it is time to start thinking about redesigning this system. The complexity of the elements of the systems, of the relationships among these elements and with the external environment does not allow for a fully "rational" decision. Politics are by no means an important source of inspiration, as is the case with feelings and behaviours. This is why it is not realistic to elaborate an optimum organisational setting of the European RTD landscape but to provide for alternative scenarios of the same more or less degree of probability.

Aspects of the alternative futures on the relationships between the E.U. and International Research Organizations may be described in the following scenarios, in the horizon of 2010. The first scenario may be identified as the **"business as usual"** scenario. The second one is the **"complementarity enhancement"** scenario, while the third one draws on **"integration enforcement"** efforts. Their discussion and analysis at political level could improve the understanding of the European Research and Innovation Area we as Europeans wish to build.

– Business as usual –

Among the pressures exercised in the next five years, the strongest originate from the European scientific community. The prevailing arguments of the researchers lead to the establishment of the European Research Council while the ESF continues to provide coordination of national activities and intergovernmental organisations unionise for better participation in the funding of the Framework Programme. Some flexibility could allow the FP to include more fundamental research elements. ESA and the EU find a common ground for cooperation on selected projects but still no agreement is reached on a common European Space Policy. The FP is always criticized for limited impact on the European competitiveness, while RTD funding is still fragmented with no coherent policy to co-ordinate the activities of research organisations and research infrastructures. The ERIA remains a vague goal under continuous scrutiny, Europe might have difficulties in addressing global issues lagging well behind its global competitors and the pressure on national research budgets continues to increase.

- Complementarity enhancement –

The European Union follows the practice of becoming a member of the intergovernmental organisations, in order to monitor their activities and participate in decision-making (as in EUREKA or as scheduled in the European Patent Office). This participation enables the Commission to intervene when decisions may harm the relations between the EU and these organisations. ESA in particular becomes an elected partner of the EU in space research for activities that are complementary to those of the FP. The FP priorities are drafted in a way to complement the ESA programme. Efforts are made to expand such a co-ordination between the EU and other Research organizations. Moreover, the ESF restructures in order to cover also the COST mission and types of activities and extends its membership to new research agencies and new countries. Co-ordination of RTD policies is improving but fragmentation of funds is still a problem. The "willing" national research councils establish a cooperative-like institution and operation for joint financing schemes of European character in fundamental research. Some positive impacts through the bottom-up approach will become evident, but co-ordination of research infrastructures will hardly be achieved. There is yet lack of cohesion, while differences between regions still exist becoming even more pronounced.

c. - Integration enforcement -

The European Union, under a strong impulse of the new Treaty resulting from the Convention's works, integrates the intergovernmental organisations, ESF and a Europe-wide Research Council into its own institutional framework. The statutes of the intergovernmental organisations are also gradually modified in order to give the place of the member states to the Union. Their funding as far as the 25 MS of the Union are concerned is operated through the Union (under all three actual pillars). The "juste-retour" concept will be diminishing gradually in favor of a more "European excellence" oriented aspect. Special arrangements are made with the non-MS of the Union for their participation in decision making and funding. The JRC also acquires a similar status. Managing boards of these organisations are composed by a small number of high competence individuals from different national origins, whereas "assemblies," in which all MS are represented meet every year to give general policy guidelines and to control the implementation of annual and multi-annual programmes and financial results. The ERC is established as a European body, in which funds from the FPs and from national research councils are transferred through the EU budget. National research agencies continue their efforts towards opening-up of national programmes to European research.

A true single market for research is emerging with RTD co-ordinated and supported through a more centrally geared mechanism. Stronger links are established between research and other E.U. policies.

4.4 Epilogue

In January 2000 the European Commission launched a proposal for the creation of a European Research Area, in an effort to bring more coherence into Europe's highly fragmented science and research landscape. Now, three years after launching this idea, substantial progress has already been made towards that direction especially through the new instruments of FP6 aiming to reduce fragmentation and increase the impact of European research.

However, in view of the aims set at Lisbon to "make Europe the most competitive knowledge-based society in the world by the year 2010" and given the widening gap between Europe and its main rivals in the field of RTD, one may argue that more daring steps are needed to develop a true and partly remodelled European Research

policy. As the pressure on the European research system continues to increase and in several M-S research budgets are facing restrictions and are very often pushed to the limit, there is no more room for fragmented, overlapping and uncoordinated research efforts and investments. As argued in several discussion fora what is needed is a level of co-ordination that is so far rarely seen at national level and is certainly new at a European level. The vision for "European Research" asks for federation-oriented concepts in science and certainly needs more than the sum of national programmes, intergovernmental cooperation agreements (COST, Eureka) and "big-science" Organisations such as CERN, EMBO, ESA, ESO etc.

Following the first steps initiated by FP6 and its new instruments (which only corresponds to 5% of the sum of M-S research budgets), the discussion on broader co-ordination applying to a wider spectrum of research activities and institutions is becoming most relevant. For the International Research Organizations, the need for closer cooperation and stronger coordination is becoming more evident especially in line with the current debate on the creation of an ERC. Since most of the International Organizations perform high quality fundamental research in various fields, their role within ERIA needs to be thoroughly investigated in parallel with the debate on the need and potential mission of an ERC.

As Europe is preparing for the largest enlargement of its history and the works of the Convention are aiming to revise the Treaties and to produce a new Charter for the Union, the opportunity to reach new balances among European Research Institutions is unique. Enlargement along with the vision for the creation of a true internal market for research in Europe should be seen both as challenges and tools for steps forward.

The three scenarios presented above are by no means exhaustive of the possible evolution of the relationships between the E.U. and International Research Organisations in view of the creation of ERIA. They offer some ideas to fertilise the on-going debate on the future of the European Research system.

The Commission should further focus on this issue and work along with Member States and the governing boards of the International Organizations to take the ERIA concept one step further, embracing all aspects of research (both fundamental and applied), and all relevant institutions and organizations.

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7. **Towards the Sixth Framework Programme**. Presentation of the European Commission, Research DG.

   This is a presentation of FP6, found in the web site of DG Research. This presentation briefly describes Community RTD so far and introduces FP6. It describes the main components and the basic principles of FP6, as well as the allocation of its budget to the suggested three groups of action. It describes in more detail the thematic priorities, the categories of activity of each group of actions and the instruments to be applied for the full implementation of FP6. Apart from that, the rules of participation, the evaluation principles, the criteria and the procedures as well as the financing systems are also briefly discussed.
8. **On the progressive mutual opening up of national RTD programmes. Note proposed by the Spanish Presidency as a starting basis for the Ministerial Debate, January, 2002.**

   This document presents the acknowledged general principles for progress in the area of the mutual opening of national programmes, as proposed by the Spanish Presidency. The document also discusses potential action lines and steps for the future.
9. **Potential action lines on the process of progressive mutual opening up of national RTD programmes, January, 2002.**

   This document briefly discusses the three levels of implementation of the mutual opening of national programmes. It also proposes main types of actions and measures and identifies pilot exercises in candidate thematic areas of priority.
10. **Towards the progressive mutual opening of national RTD programmes: The way forward. Note proposed by the Spanish Presidency as a starting basis for CREST discussion, March 2002**

    This document outlines the general principles governing the mutual opening of national RTD programmes and suggests the establishment of networks of national RTD programme managers and the clustering of thematically related projects as future steps towards the opening of national programmes.
11. **Aspects of the ERA in the Commission's Proposal for a new Framework Programme. Synergies of national and european RTD activities. CREST REPORT. 5/9/2001**

    This is a CREST document, which addresses the general concerns about the creation of the ERA and the networking of national research activities, discusses the main features of the proposed models for networking within FP6 and makes recommendation for the work ahead.
12. **Proposal of practical measures to promote cross-border cooperation in the EU. Preliminary draft for discussion**

    This document acknowledges the general principles and conditions to be taken into account for the promotion of cross-border cooperation in the EU. It also suggests some cooperation domains and discusses the role of the Commission in facilitating these activities.
13. **Analysis of existing practices in cross-border cooperation**

    This is a CREST document that briefly discusses existing practices in cross-border cooperation in the EU. It describes the current situation in some Member States and identifies the most relevant positive factors that encourage cross-border cooperation as well as the main obstacles to be considered.

14. **Annual plenary meeting of the chairmen and secretaries of the EU national advisory councils for S&T policies. Internationalization of national R&D systems. Helsinki 2002, June 13-14**

This is a background paper of the annual plenary meeting of the chairmen and secretaries of the EU national advisory councils for S&T policies. The main topic discussed is the internationalization of national R&D systems. This document addresses the main political and institutional issues, as well as the main questions that have to be elaborated for the opening of national programmes. Finally, the document presents the state-of-the-art and views of national S&T Councils concerning the opening and internationalization of research activities in Austria, Belgium, Germany, Greece, Luxembourg, the Netherlands and UK

15. **Supporting the cooperation and coordination of research activities carried out at national or regional level, the ERA-NET scheme. Working document. Unit B1. DG Research, European Commission, 5 August 2002**

This is a working document of DG Research on the ERA-NET scheme, which aims to support the cooperation and coordination of research activities carried out at national or regional level. Its main objectives are described and main features concerning participants are discussed. The activities to be supported within an ERA-NET are also presented and the main financial issues, including Community participation, are discussed. Finally, proposal and evaluation procedures are described.

16. **Provisions for implementing the "ERA-NET SCHEME". Supporting the cooperation and coordination of research activities carried out at national or regional level, DG Research, European Commission, 24 January 2003**

This document is a practical guide on the provisions for implementing the cooperation and coordination of research activities carried out at national or regional level in the Sixth Framework Programme.

17. **Summary report: CREST initiative on the opening of national RTD programmes – Plant Genomics. 12 January 2003**

This short report summarizes the outcome the "kick-off" meeting of Member State Plant Genomics representatives on the opening up of national Plant Genomics RTD programmes, which was held on 12th-13th December 2002.

18. **CREST Working Group 3 – Policy coordination / Article 165. CREST Working Groups on "Opportunities and challenges for future European Research Policy". Draft version, Feb. 2000/rev. 5a**

This document concentrates on article 165 of the Treaty and its implementation. It discusses the main benefits of coordination, all the potential agents that could participate in the coordination, as well as their coordination goals and possible cooperation mechanisms. It also addresses problems that could arise in the coordination procedure.

19. **Communication from the Commission to the Council and the European Parliament. The Framework Program and the European Research Area: application of Article 169 and the networking of national programs. Brussels 30/5/2001 COM(2001) 282 final**

This document briefly describes the current situation of national research activities in Europe and discusses the structuring effect of networking national research programs. It describes this procedure in the context of FP6 and introduces the application of Article 169 towards this end. It also discusses the main principles and conditions of Community participation in the application of Article 169, in both institutional and financial terms.

20. **Proposal for a decision of the European Parliament and of the Council on Community participation in a research and development program aimed at developing new clinical interventions to combat HIV/AIDS, malaria and tuberculosis through a long term partnership between Europe and the developing countries, undertaken by a number of Member States and Norway. Brussels 28/8/2002 COM(2002) 474 final**

This document describes the EDCTP program and its main objectives. It also describes the application of Article 169 as the appropriate instrument for funding this program. In the attached technical annex, the budget breakdown is presented as it is allocated to the participating countries and the Commission.

21. **The European and Developing countries clinical trials partnership EDCTP "Strategic plan", 30/5/2002**

This document addresses the political context of the EDCTP program and describes its main components. It also describes the overall financing scheme and examines in detail the participation of the Commission and its funding for networking national programs in this specific research field.

22. **Working document from the Commission services: Development of an open method of coordination for benchmarking national research policies – Objectives, methodology and indicators**

This document briefly discusses the application of the open method of coordination on the implementation of the European Research Area. It discusses the objectives of benchmarking national RTD policies and proposes a few themes, indicators and studies for its successful application.

Finally, it comments on the role of the Commission and the Member States.

23. **A new concept of deepening European integration? – The European Research Area and the emerging role of policy coordination in a multi-level governance system. Robert Kaiser & Heiko Prange (2002) European integration online papers (EIoP), Vol. 6, No 18.**
24. "**Research Infrastructures 2002 vol A**" European Commission, Luxembourg 002
25. "**Research Infrastructures 2002 vol B**" European Commission, Luxembourg 2002
26. "**Support for Research Infrastructures in FP6**" Draft Work Programme, European Commission, Luxembourg 2002
27. "**The Role of Infrastructures in Research**" Panel A report, Strasbourg conference
28. "**How to develop the European Research Infrastructure**" Panel F report, Strasbourg conference
29. "**Conference on Research Infrastructures. Steering Committee Declaration**" Prof. E. Banda, Strasbourg conference
30. "**Very Large Scale Scientific Facilities in Europe: Analysis of the legal texts governing institutional co-operation**" OECD Megascience Forum: (13/09/1995)
31. "**Report of the Workshop on Large Scale Facilities for Studying the Structure and Dynamics of Matter**" OECD Global Science Forum (23/04/2002)
32. "**Workshop on Compact High-Intensity Short-Pulse Lasers**" OECD Global Science Forum: (23/10/2001)
33. "**Sub-group on Access to Large Scale Infrastructures**" OECD Megascience Forum: (30/06/1998)
34. "**Support for Policy Making on Research Infrastructures in the European Research Area**", Document by Expert Group convened by the Commission with representatives designated by all 15 Member States
35) "**European Strategy Forum on Resaerch Infrastructures: Activity Report**" Brussels, November 2002
36) "**New policies for research infrastructures in Europe; the Megascience Forum's experience as a guide; the ESS as a test**" Prof. A. J. Tindemans, Strasbourg conference
37. "**From Cooperation through Coordination to Integration. From Spinelli to Busquin: Research Policy of the EU**", P. A. Schregardus, G. J. Telkamp, The Netherlands Institute of International Relations 'Clingeldael', (July 2002)
38. "**Towards a European Research Council? An OFFER that cannot be refused**" P. A. Schregardus, G. J. Telkamp, The Netherlands Institute of International Relations 'Clingeldael', The Hague (November 2002)

Web sites

http://www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/publicHome.jsp
Web site of the EUREKA network

http://cost.cordis.lu/src/home.cfm
Web site of the COST cooperation framework

http://www.esf.org/esf_activity_home.php?language=0&activity=7
Web site of the EUROCORES initiative

http://europa.eu.int/comm/regional_policy/interreg3/index_en.htm
Web site of the INTERREG programme

http://welcome.cern.ch/welcome/gateway.html
Web site of the CERN organization

http://www.esa.int/export/esaCP/index.html
Web site of the ESA organization

http://www.embl-heidelberg.de/
Web site of the EMBL organization

http://www.esrf.org
Web site of the ESRF organization

http://www.eso.org
Web site of the European Southern Observatory

http://www.ill.fr
Web site of the ILL organization

http://www.nsf.gov
Web site of the National Science Foundation

Abbreviation List

CERN	European Organisation for Nuclear Research
CREST	Committee for Scientific and Technical Research
COST	Co-operation in the field of Research and Technology
DANTE	Delivery of Advanced Network Technology to Europe
EC	European Commission
EDCTP	European and Developing countries Clinical Trials Partnership
EEIG	European Economic Interest Grouping
EIB	European Investment Bank
EIRO	European Intergovernmental Research Organizations
EMBL	European Molecular Biology Laboratory
EMBO	European Molecular Biology Organisation
EPBRS	European Platform for Biodiversity Research Strategy
ERA	European Research Area
ERC	European Research Council
ERIA	European Research & Innovation Area
ESA	European Space Agency
ESF	European Science Foundation
ESFRI	European Strategy Forum for Research Infrastructures
ESO	European Southern Observatory
ESRF	European Synchrotron Facility
EURAB	European Research Advisory Board
EU	European Union
EVCA	European Venture Capital Association
FP	Framework Programme
GDP	Gross Domestic Product
IHP	Improving Human Potential and the socio-economic knowledge base
ILL	Institute Laue – Langevin
IST	Information Society Technologies
JRC	Joint Research Centre
M-S	Member States
MFCA	Marie Curie Fellowship Association
NCP	National Contact Point
NREN	National Research and Education Network
NSF	National Science Foundation
OECD	Organization for the Economic Co-operation and Development
OMC	Open Method of Co-ordination
RTD	Research and Technological Development
SMEs	Small and Medium size Enterprises