Westfälische
Wilhelms-Universität
Münster

Universiteit Twente
de ondernemende universiteit

# “The most competitive and knowledge-based economy in the world” – The Future of European International Collaboration in Research and Development

Bachelor Thesis
Public Administration - Special Emphasis European Studies

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Münster, February 2007

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## List of Abbrevations

| | |
|---|---|
| ACP | Africa, Caribbean and Pacific Group of States |
| CERN | Centre European pour la Récherche Nucléare (European Organisation for Nuclear Research) |
| COST | Coopération européenne dans le domaine de la recherche scientifique et technique (European Cooperation in the field of Scientific and Technical Research) |
| DG | Directorate-General |
| EC | European Community |
| EU | European Union |
| ERA | European Research Area |
| ERAB | European Research Advisory Board |
| ESA | European Space Agency |
| Euratom | European Atomic Energy Community |
| EUREKA | European Research Coordination Agency |
| EUWI | EU Water Initiative |
| FEAST | Forum for European-Australian Science and Technology Cooperation |
| FP | Framework Programme |
| HEFCE | Higher Education Funding Council for England |
| ICT | Information and Communication Technology |
| INCO | International Cooperation |
| IO | International Organisation |
| IP / IPR | Intellectual Property / Intellectual Property Rights |
| JRC | Joint Research Centre of the European Community |
| MERCOSUR | Mercado Común del Sur (Southern Common Market) |
| OMC | Open Method of Coordination |
| R&D | Research and Development |
| RTP | Regional Technology Plans |
| S&T | Science and Technology |

# Executive Summary

The European Community supports International Research and Development (R&D) with its own measures on the base of regulations and funding – these programmes and their international components are the focus of this thesis. It presents an overview of existing EU strategies and policies fostering international R&D. Formal changes between the 6th and the 7th Framework Programme highlight a transformation in Europe's approach to international collaboration, from specific funding to a broader and more pragmatic allocation based on mutual interest.

The thesis shows that European international collaboration is characterized by two types of objectives: firstly to overcome and serve economic challenges and interests. Secondly to find solutions to global challenges, for example through supporting developing countries and tackling environmental problems. The transformation of the EU's approach to international collaboration - from an instrument of foreign policy and development aid towards a more competitive, economic approach - is mainly attributed to the increasing economic necessity of the EU to collaborate internationally. This leads to the question of Europeanisation vs Globalisation, and that through the 7th Framework Programme the immediate future should result in better aligned R&D policy between Member States (Europeanisation). It also follows that in the long term, primarily due to economic realities, a natural increase in Globalisation of R&D will occur.

The current climate of globalisation simply confirms that International collaboration in R&D will continue to be important and valuable within the European Community and thus effective supporting policy in this area is essential.

# 1 Introduction

The European Union is a powerful but complex entity. Current debates such as the formulation of a European Constitution and further enlargement of the EU leave the European Union struggling with its intended definition and underlying identity. However throughout this phase between further integration and consolidation of the status quo, one objective that seems to guide the EU stands out: "To become the most competitive and dynamic knowledge-based economy in the world." Regardless of the achievability of this ambitious goal – known as the "Lisbon Strategy" – it is one of the most important policy goals the EU currently follows. A main strategy to achieve this is to invest into Research and Development (R&D)[1] – mainly expressed through the Barcelona Targets[2]. The EU endeavours to build a European Research Area (ERA) to strengthen binds among its Member States and create a centre of innovation in Europe. Above all, the goal is to attract the best brains from over the world to contribute positively to European development and innovation. The EU recognises the importance of science and technology not only because it has proven to be central in fostering economic growth over the past few decades[3] but it is also crucial in trying to solve global challenges; for example climate change and diseases like HIV, bird flu and Malaria.[4] Therefore Collaboration must occur between both industrialised countries and developing countries as part of acknowledging their special needs. To face the growing challenges of economic competitiveness and global problems of today the international community is forced to work together even more closely. Hence global collaboration should form a key component to the EU R&D strategy. Besides postulating reforms and actions of its Member Sates, the European Community (EC) supports R&D with its own measures on the base of regulations and funding – these programmes are the focus of this thesis.

The existence of international R&D is generally accepted, but the importance, trends and impact of it is "not yet clearly understood"[5]. Literature which refers to the European Union's position on international collaboration in R&D[6] gives no clear or systematic overview on

[1] *In the context of the EU it is often referred to RTD (Research and Technological Development), for better understanding and facilitating the range of terms (that are often ill-defined) it will be consistently referred to R&D even if official documents mention it as RTD.*

[2] *The Barcelona Targets aim to have at least 3% of the GDP spend for R&D – the EU as whole as well as every Member State and that at least 2/3 of this are privately invested.*

[3] *David and Foray define these economic sectors as: pharmaceuticals and scientific instrumentation, information and communication technologies, aeronautics, new materials*

[4] cp: David/Foray 2001: p. 2; ERAB 2006: pp. 8-10

[5] European Commission DG Economic and Financial Affairs 2006: p. 295

[6] *In the following the term international collaboration will be solely used for /be referred to in the meaning of international collaboration in R&D*

European strategies and policies in place. Hence, the objective of this paper is to provide an understanding of what is happening in this domain within the EU, and to present an overview of existing EU strategies and policies fostering international R&D. Furthermore, this paper will explore what the possible future developments in European international collaboration may include. The thesis answers the following research question: *What is the future of European international collaboration in R&D?* In the interest of presenting a well structured research paper, and to effectively address the main research question, sub-questions have been formulated (summarised in Table 1 below). They are answered throughout the thesis providing a basis for the paper structure.

**Table 1 – Research Questions**

| | **Main Research Question** | |
|---|---|---|
| | What is the future of European International Collaboration in R&D? | |
| | **Sub-Questions** | |
| **Chapter 3** | *(SQ1)* | What is 'International Collaboration in R&D' and why is it needed in the European Union? |
| **Chapter 4** | (SQ2) | How do EU Member States engage with third countries in R&D? |
| | *(SQ3)* | What are the EU's policies and strategies concerning international collaboration in R&D? |
| **Chapter 5** | *(SQ4)* | How is international collaboration organised in the sixth framework programme? |
| | *(SQ5)* | What conclusions can be drawn from outcomes of international collaboration in the sixth FP? |
| **Chapter 6** | *(SQ6)* | What changes can be expected from the seventh framework programme? |
| | *(SQ7)* | Does the preferential role of developing countries in EU international collaboration activities change? |
| **Chapter 7** | (SQ8) | Is the trend of international collaboration going towards Europeanisation or Globalisation? |

Source: Own Display

Chapter 2 introduces the theoretical background and the methodology of the thesis. Chapter 3 – 'Background and Problem Definition' discusses two main themes; firstly the concept of international collaboration, and secondly the ways in which international collaboration can help to address challenges the European Union is facing (SQ1).

From this point the main body of the thesis begins with Chapter 4 which describes a view from the Member State perspective before presenting the main focus on European policies. As the national perspective still plays an important role in R&D, a description of some of the Member State's engagement with third countries is given. Two case studies on France and the United Kingdom also help illustrate the diversity in policies implemented by Member States (SQ2). The second discussion within this chapter presents the programmes and instruments used within the European Union to support international collaboration (SQ3). The discussion shows that these are expressed in majority through the EU Framework Programme on Research – which forms the main pillar of EU research policy. The sixth Framework Programme (being the

most recent) is analysed in detail in Chapter 5. By abstracting the international collaboration measures and presenting them in a comprehensive way (SQ4), this chapter is devoted to discussing the successes and shortcomings in international collaboration of the sixth Framework Programme. The chapter concludes with an initial critique on the current trends (SQ5).

The sixth chapter is concerned with possible future developments. The seventh Framework Programme – the largest program yet, recently passed in the beginning of December 2006 – provides a solid basis for the EU's future position. A description and analysis on the role of international collaboration within the seventh Framework Programme is given, and a comparison to measures in the sixth Framework Programme is drawn (SQ6). In the history of the Framework Programmes developing countries have always played a special role and international collaboration in R&D was seen as an active part of Europe's development aid. The growing economic importance of international collaboration and its influence on European policies is discussed in the second of this chapter. It highlights special needs of developing countries, as well as the changes which have occurred and consequences of transforming policies (SQ7). Further insight beyond available literature is also supported through an interview with Dr. Barbara Rhode - policy advisor for the European Commission's Directorate General 'Research'.

Chapter 7 presents a big picture on future developments in international R&D using arguments from this paper, and applying them to the context of globalisation: Is Europe undergoing an 'Europeanisation' in R&D or is it opening to a global research area (SQ8)?

Conclusions of this thesis are presented in Chapter 8 along with suggestions for further work, and reflection on the research.

# 2 Theory and Methodology

This part of the paper introduces the theoretical background this thesis is based on, and outlines the methodology adopted for the research.

The theoretical background of this thesis cannot be based on a well-established theory as research in the area of international R&D is mostly not conducted under a general theoretical framework. Generally it is assumed that R&D is a key element for the positive economic development of Europe and should therefore be aided by governmental institutions (as it is in the general interest of the society). This assumption is based on the theory of the (new) economy of growth. Up to the 80ies technological progress was seen as an exogenous factor. With the new economy of growth, scientists explained technological progress as endogenous and promoted investment in educating people and supported R&D to enhance the 'human capital'. An implicit link between R&D and innovation is broadly accepted nowadays.[7] Governmental aid for research and development are justified through this theory and steer economic policies to actively support R&D – not only on University level but also in industry.[8] Nevertheless, the link is not clearly demonstrated or analysed in scientific terms. The role of international collaboration has to be seen in the same context and is even more uncertain. Analysis on the benefits of international cooperation do not serve scientific theories, but are mainly based on political interests and assumptions: international collaboration in R&D enables to see what other countries do, and the investments in R&D can be cut down through cooperation. Furthermore it is often seen as part of development aid policies: investments into a third country's human capital will help their economies – and with that serve in the long term several interests of the government who provides aid. It for example cuts down refugee migration or opens a new economic market. These assumptions provide the theoretical background for this thesis. Although it is vague, this theoretical approach is a sound basis as it provides a first insight to political approaches and interests in this policy field.

The methodology adopted in this paper is mainly based on a qualitative literature study. To be able to underline findings quantitative data was analysed. Additionally, to go beyond the scope of the literature, a semi-structured interview was held. The qualitative literature analysis included published sources, mainly reports, analyses, scientific articles, and policy documents which display the processes and strategies in international R&D collaboration. The sources were both primary and secondary. Some of the documents were analysed in chronological order in order to make assumptions on opinions, the evolution of strategies and future

[7] cp: Altmann 2000: p. 251

[8] cp: Altmann 2000: p. 79-81

implications. The most important methodological skill in this topic was to keep an overview on the broad scope of literature: the ability to 'cut through' the literature and select concepts within the relevant documents. Main sources of primary literature are official documents of the European Union. Regulations, communications between the Commission, Council and the European Parliament, and working papers of the European Commission were analysed to answer the research questions. For example: the regulation on the sixth Framework Programme, including the Rules of Participation, offered the legal basis for international collaboration within this programme and possibilities for third countries to participate. The Communication of the Commission about strategies to achieve the re-launched Lisbon Strategy offers a view on the crucial points for the EU to finally achieve the set objectives. Moreover, statements by directorates-general (DG) of the Commission on policies and processes give an insight on discussions and responsibilities. Further insights on international R&D are provided in European journals, a 'grey literature' as for example the brochure on "Reinforcing European Research Policy - The international dimension", gave insights on the official viewpoint on international collaboration. Other secondary literature included analyses on behalf of national governments on the effects of international collaboration in R&D, for example two documents elaborated for the UK Government on the value of international R&D programmes[9], as well as scientific articles. Even though articles on this specific topic are limited, they were a main source for basic understanding, as for example the article "What is Research Collaboration?" by Katz and Martin that gives a sound introduction to the concept of collaboration. Newspaper articles and newsletters which focus on European issues were regularly reviewed to follow recent developments, especially regarding the seventh Framework Programme. A complete list of the literature can be found at the end of this paper.

The semi-structured interview held with Dr. Barbara Rhode, a policy advisor for the DG Research, has provided an opportunity to draw conclusions that go beyond the scope of official documents and data. The transcript of the interview can be found in Annex C. Further insights on the background of international collaboration could be gathered through participation in the European-Australian conference "Research without Borders" held in Canberra (Australia), where stakeholders from the European Commission, Australia and the EU Member States discussed current issues regarding international collaboration. The conference was organised by the Forum for European-Australian Science and Technology Cooperation (FEAST) where the author was completing an internship.

Additionally to these qualitative methods, quantitative data was employed to underline conclusions of the qualitative analyses. Analysed secondary data included was mainly

[9] Technopolis 2005; DTI 2004

collected by official governmental bodies as Eurostat and the OECD. The pitfalls such data can have and possible biases were taken to account. Data analysed include the EU Framework Programme budgets and statistics about expenditures on R&D. The data quality on international collaboration of the EU and its Member States is relatively weak. Problems include difficulty in defining what is understood as 'international collaboration' and differing interpretations of what actually counts as this phenomenon (see also the discussion on defining international collaboration Chapter 3.1.). Researchers who examine the phenomenon of international collaboration face a large variety of institutions in all countries that handle collaborative projects with different responsibilities addressing a number of goals. Literature reviews performed for this paper have been unable to identify any countries, including the European Union, that have a central body that specifically collects relevant data and information. Additionally, international collaboration is often connected to informal networks and interwoven responsibilities, which makes it hard to follow.[10] Because of these challenges, researchers often need to make speculative assumptions that are difficult to justify through scientific methods. Even though improved data would help to make more valid assumptions, some of the data is still useful to support the main statements of this thesis – which is thematically focused on policies and not on actual numbers of collaboration.

[10] cp: Rhode Stein 1999: pp. 1-4 – 1-7

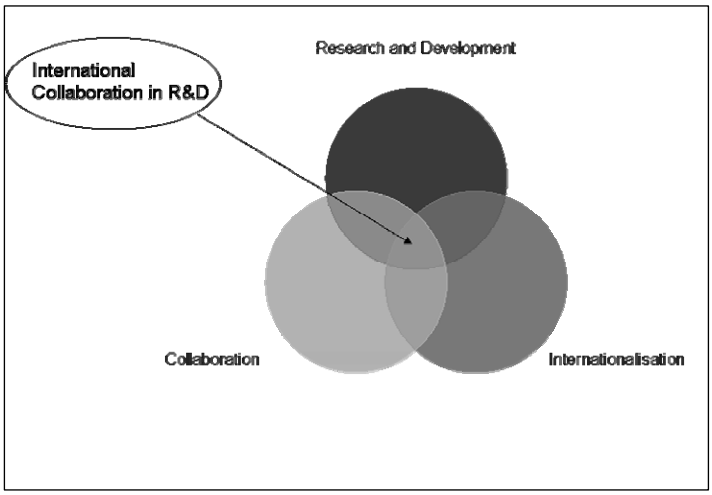
# 3 Background and Problem Definition

This chapter provides the reader necessary background information and defines the problems more precisely to be able to draw a comprehensive picture and to accurately define its context. The first Sub-Question *'What is "International Collaboration in R&D" and why is it needed in the European Union?'* is initially addressed, followed by a section which describes and discusses the concept of international collaboration in R&D. The chapter concludes by discussing some of the challenges faced by the European Union and their relevance to International Collaboration.

## 3.1 Defining International Collaboration in Research and Development

At first sight it seems to be obvious what is understood under the general term of international collaboration in R&D, and many times it is assumed that there is no need of further exploration and explanation of the term.[11] Well formulated definitions are rare. Anyway, to be able to answer the research question of this thesis it is essential to understand the concept and complexity of international collaboration in R&D. The following section tries to shed some light on the concept of international collaboration.

**Figure 1 – Components of International Collaboration in R&D**




Source: Own Display[12]

The term **Research and Development** (R&D) is usually associated with innovation as it is understood as creation and diffusion of knowledge. In other words: "creative work undertaken on a systematic basis in order to increase the stock of knowledge […] and the use of

[11] cp: Katz/Martin 1997

[12] *The idea to break the term international collaboration in R&D into these components came from the systematic structure of the literature study in:* Lundin/Frinking/Wagner 2004: p. 7

knowledge to devise new applications".[13] **Collaboration** in a casual meaning is understood as working together with a joint goal[14]. Putting these two together, **Collaboration in R&D** is defined as working together with the joint goal to create and diffuse knowledge. And surely, Collaboration in R&D is not a completely new phenomenon, but in the last decades an increasing importance of collaboration in R&D has been widely recognised. The creation of knowledge is not a collection of scientific findings anymore but a collaborative activity. "The organisational units of modern science are not individuals, but groups."[15] One of the main indicators of collaborative work, co-authored articles[16] is increasing constantly.[17] But where does collaboration in R&D start? Collaboration in R&D has ill-defined borders and is somewhat 'fuzzy'. Where the border is drawn is a matter of social convention and open for negotiation.[18] Katz and Martin made a recognisable effort to generally define collaboration in scientific terms – yet it is still hard to give a clear definition. Collaboration in science has different forms and characteristics. Informal and formal collaboration, private or public collaboration, public-private collaboration; collaboration on different levels between individuals, research groups, institutions, government departments, sectors, regional areas and countries; these are the most common distinguishing characteristics. Collaboration in R&D can also have different dimensions of exchange: people, money, resources, infrastructure, intellectual property are pooled in order to achieve a joint research goal. Although collaboration between individuals is the most fundamental form of collaboration[19], most policies fostering collaboration are aimed for one of these higher levels, e.g. collaboration between sectors or collaborative activities between entities from different countries.

Reasons for increasing numbers of collaboration in R&D is reflected in push and pull factors in the literature. Push factors are those factors that pressure collaboration. They include escalating costs of conducting fundamental science, the increasing need of specialisation that makes it almost impossible to carry out an experiment by only one scientist, the growing importance of interdisciplinary fields, the globalisation process and the rising importance of knowledge in economic processes. Pull factors on the other side are such factors that facilitate

[13] OECD 2002: p. 17

[14] cp: Wikipedia 2006: Available: http://en.wikipedia.org/wiki/Collaboration

[15] Ziman 1994: In: Carayannis/Laget 2004: p.18

[16] *The Indicator 'co-authored articles' for collaborative science is in nowadays criticsed as noisy data as many biases can influence results of the data and make assumptions drawn from it questionable – but to get an idea and follow trends it is still an appropriate measure. For further discussion on measuring collaboration cp:* Katz/Martin 1997

[17] Carayannis/Laget 2004: p.18

[18] cp: Katz/Martin 1997: p. 8

[19] cp: Katz/Martin 1997: pp. 7/8

collaboration. These factors are firstly the substantial fall in costs of travel and communication accompanied by growing availability and access (reduced transaction costs). And secondly political factors as growth of industry- and cooperation oriented technology and innovation policies (as for example of the European Communities).[20]

**Table 2 – Push and Pull Factors that Motivate Collaboration in R&D**

| Push Factors | Pull Factors |
|---|---|
| • Escalating costs of conducting fundamental science<br>• Increasing need of specialisation (makes it almost impossible to carryout an experiment by only one scientist)<br>• Growing importance of interdisciplinary fields<br>• Globalisation processes and rising importance of knowledge in economic processes | • Substantial fall in the costs of travel and communication accompanied by growing availability and access pull (reduction of transaction costs)<br>• Political factors: e.g. growth of industry- and cooperation oriented technology and innovation policies |

Source: Own Display

But not only collaboration is a crucial factor of modern science, ongoing globalisation inherits also consequences as it enhances the **internationalisation of R&D**. **Internationalisation** became a central phenomenon in the last half of the 20th century and remains a crucial challenge for the nation state, societies and economies in the beginning of the 21st century.[21] Internationalisation is the process of "widening, deepening and speeding up of global wide interconnectedness" with the consequence that national and economic governance have a reduced impact.[22] The formation of economic and political entities, as for example the EU, is as much cause as reaction on internationalisation processes. **International collaboration** therefore is, if on a global scale people, groups or countries work together to achieve a common goal regardless of national boarders. This collaboration is mainly driven by new communication technologies (Internet) and higher mobility of people and goods. At this point again the phenomenon is hard to present in a nutshell. Characterising the phenomenon of internationalisation in R&D one comes across "a wide variety of complex processes"[23] ranging through different dimensions. Firstly internationalisation of science and technology development can be seen at public and private institutes and universities, mainly through the mobility of students and researchers. Secondly an internationalisation of technology development and innovation by firms that develop R&D activities internationally (simultaneously at home and abroad) can be recognised. A study on the percentage of foreign

[20] cp: Lundin/Frinking/Wagner 2004: p. 8; Katz/Martin 1997: pp. 8/9

[21] *Most scholars differentiate between internationalisation and globalisation. Since this thesis is not purely concentrating on the phenomenon of growing globalisation the two terms are set alike.*

[22] Held et al. 1999: pp. 14–17. In: Smeby/Trondal 2005: p. 452

[23] cp: European Commission DG Economic and Financial Affairs 2006: p. 296

investments in R&D showed that small countries have a larger proportion of R&D financed from abroad – up to 21.7% of GERD[24] was financed from abroad in Malta, 21% in Austria.[25] Moreover businesses internationally exploit the usage of their technology. As a forth dimension international collaboration in R&D is mentioned in the literature.[26] Hence international collaboration in R&D is one dimension of the internationalisation of R&D. **International collaboration in R&D** happens when collaborative R&D goes across national boarders – as mainly pushed through the globalisation process (see also push and pull factors as discussed above). Hence international collaboration occurs when research units (researchers, research groups, institutions, businesses, countries) from more than one country joint to work together to create and diffuse knowledge with a common research goal. But as discussions above showed it is hard to define this term specifically, one need to have a flexible approach to international collaboration in R&D as the borders are ambiguous and processes complex.

For the purposes of this paper a **European perspective** on international collaboration shall be added to this definition effort. In the last paragraph, international collaboration was defined as collaboration of units from more than one country. The EU is seen as an entity. If research collaboration between units from more than one European country takes place, this paper refers to European research and does not count it as international collaboration. Hence, in the European perspective international collaboration is understood as collaboration between one or more European countries with at least one so-called third country (a country that is not a Member State).

Table 3 displays in a comprehensive way the definition of international collaboration in R&D. Summarising it can be said that collaboration in R&D has many faces and is complex: collaboration starts with individual researchers that collaborate with other individuals and goes as far as international agreements between countries and regions to collaborate in certain fields of science to create new knowledge. All these different levels of collaboration are under the roof of R&D policies that foster collaborations as a pull factor.

[24] *GERD is the percentage of gross expenditure on R&D*

[25] cp: Frank 2006: p.1

[26] cp: European Commission DG Economic and Financial Affairs 2006: p. 296

**Table 3 – Defining International Collaboration in R&D**

<table>
<tr><th>Internationalisation</th><th>Research and Development</th><th>Collaboration</th></tr>
<tr><td>“[…] the widening, deepening and speeding up of global wide interconnectedness and a corresponding reduced impact of national political and economic governance”[27]</td><td>“Research and [experimental] development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.”<br>(Frascati Definition)</td><td>The process of two or more parties working together jointly with a common goal.[28]</td></tr>
<tr><td colspan="2">Internationalisation of R&D is “a wide variety of complex processes” ranging through different dimensions.<ul><li>internationalisation of science and technology development at public and private institutes and universities (mainly through the mobility of students and researchers)</li><li>internationalisation of technology development and innovation by firms that develop R&D activities internationally (simultaneously at home and abroad)</li><li>businesses internationally exploit the usage of their technology</li><li>international collaboration in R&D</li></ul></td><td colspan="2">Collaboration in R&D has ill-defined borders; where the border is drawn is a matter of social convention and is open for negotiation. What counts as collaboration lies somewhere between the extremes of<br>a) all science is collaboration with the objective to advance scientific knowledge and<br>b) only scientists who contribute directly to all the main research tasks over the duration of a project counts as collaborator.<br>Collaboration in science will generally exclude<br>(i) those who only make an occasional or relatively minor contribution to a piece of research;<br>(ii) those not seen as, or treated as, ‘proper’ researchers (e.g., technicians, research assistants).[29]</td></tr>
<tr><td colspan="3">International Collaboration in Research and Development means collaboration in R&D between research units (individual researchers, research groups, institutes, sectors, countries) from more than one country with a joint research objective.<br>The European Perspective implies that international means collaboration in R&D with so-called third countries – countries that are not members of the EU (collaboration between Member States is accounted as intra-European collaboration).</td></tr>
</table>

Source: Own Display

## 3.2 The Role of International Collaboration in Tackling European and Global Challenges

The European Union is facing a range of challenges that sound research can potentially help overcome. The EU’s main concern is that the innovation gap could be a threat to European competitiveness and economic growth.[30] In more specific terms it is regarded as a threat to the Lisbon goals, and with that to the growth of national incomes and living standards.[31] Europe also faces potential difficulty in the future supply of young researchers. The declining interest of young people to engage in research together with the problem of aging populations

[27] Held et al. 1999: pp. 14–17. In: Smeby/Trondal 2005: p. 452

[28] cp: Wikipedia 2006: Available: http://en.wikipedia.org/wiki/Collaboration

[29] Katz/Martin 1997: pp. 7/8

[30] *The EU is criticised about its low performance in science and technology (S&T) compared to other leading and emerging economies.*

[31] cp: Meister/Verspagen 2004: p. 2

is expected to reduce the ratio of researchers in Europe, worldwide competition in R&D may also have an effect. Measures are therefore needed to make Europe an attractive place to research.[32]

Many upcoming global challenges will also require internationally collaborative solutions. For example health threats such as HIV, bird flue, Malaria and other diseases form a threat for Europe. Environmental issues like climate change are also becoming more prevalent. Research in preventing these diseases and problems is required on an international collaborative level, and will certainly require Europe's participation.

To tackle the above mentioned challenges the European Union postulated to establish the European Research Area (ERA) to overcome the fragmentation of research in Europe. And to also further integrate the new Member States in the area of R&D. But this is only one part of solving a complex problem. The opening of the ERA to international 'third' partners is also considered as one of Europe's strategies to manage the variety of challenges.

Reviewing the literature on this topic, several benefits for the EU that come with international collaboration can be identified. The international opening of the ERA facilitates rapid acquisition of ideas being developed in other parts of the world. It helps to ensure the EU is abreast of the latest trends and technologies, as well as strengthens the EU's ability to respond to new challenges. Furthermore it enhances the EU's ability of knowledge transfer on an international level. This is useful in terms of achieving global solutions to global problems, which is especially relevant for issues surrounding climate change and highly contagious diseases. Additionally it helps propagate European ideas into lesser developed nations, assisting those nations to solve problems with technology and skills they previously did not have and is also strengthening the EU's economic relationship with those countries. Collaboration in R&D with third countries is regarded to have importance to a "peaceful, secure and prosperous future"[33]. Good relationships and successful R&D partnerships also play a role in establishing and reinforcing EU foreign relations.[34] International collaboration measures assist to encourage skilled researchers from outside of the EU to contribute to EU based research which in turn helps reduce the skills shortage. Through international collaboration, European ideas are promoted and can encourage other countries to contribute to the expansion of EU based research activities - driving an increase in R&D output on the

[32] cp: European Commission 2005: p. 1; The Allen Consulting Group 2003: p. 54

[33] European Commission DG Research 2006: p. 7

[34] cp: European Commission DG Research 2006: pp. 6-20; The Allen Consulting Group 2003: p. 54; Katz/Martin 1997: pp. 14-16

European level. Hence, international collaboration in R&D can contribute to European challenges in multiple ways.

However international collaboration is not an end in itself, and will present challenges. It requires researchers and institutions to overcome a number of barriers: Financial and Time costs of collaboration, cultural differences, language barrier and communication problems, logistics of performing research remotely, and the reluctance of parties to share information due to IP ownership implications.[35] How effectively these barriers can be overcome will depend on the policies for international collaboration developed by governments in general, and the EC in particular. These policies form a key part of encouraging EU based researchers to participate more actively in international collaboration.

Besides defining international collaboration in R&D the complex aspects of international collaboration where outlined, showing that international collaboration is connected to globalisation processes and has both economic and scientific values. International collaboration in R&D can help to overcome these regional and international challenges, characterized by two types of objectives: firstly to overcome and serve economic interests; and secondly to find solutions to global challenges, for example through supporting developing countries and tackling environmental problems.

[35] cp: Katz/Martin 1997: pp. 14-16; The Allen Consulting Group 2003: p. 54

# 4 European Engagement in International R&D Collaboration

A number of approaches are available to help tackle R&D Collaboration challenges. The following chapter is looking at characteristics of EU Member States in international collaboration, as the national level still plays an important role in R&D: Answering the Sub-Question *'How do EU Member States engage with third countries in R&D?'* (Sub Question 2). Afterwards European measures are in focus; addressing the question *'What are the EU's policies and strategies concerning international collaboration in R&D?'* (Sub-Question 3).

## 4.1 International Collaboration in R&D of the EU Member States – Patterns and Policies

Looking at the EU and its measures in any policy field one always needs to distinguish between the level of competences of the European Communities (EC) and the single Member States with their very own measures and competences on national level. The logic of subsidiarity always has to be followed (Art. 5 Treaty on the European Union); hence only problems that cannot be solved on the lowest administrative level are handed over to the next higher 'senior' level. In general challenges tackled by the EU are ideally only those who cannot be solved by the single Member States themselves or harmonisation on European level makes processes more efficient. Anyway, in practice the boarders of responsibilities and interests are not easy to draw and therefore often not clear – the area of R&D is no exception.

The large majority of R&D funding is still found in the national systems of the Member States. Only around 10% of European wide funding comes directly from EC budgets.[36] Reviewing the literature it became clear that data on measures and strategies in international collaboration in R&D are rare and hardly any study summarizes them in a sufficient way. The best source on comprehensive information is a study commissioned by the European Commission on international cooperation policies of the EU-15, published in 1999. The so-called INCOPOL study observed the collaborative activities of Member States and their priorities.[37] This study especially outlines the complexity and difficulties collecting comparable data. Most countries operate (in varying degrees) decentralised Science and Technology (S&T) systems, which makes it itself hard to keep track of all activities. Even though the different ministries and

[36] cp: The Allen Consulting Group 2003: p. 45

[37] *As this study on International Co-operation Policies (INCOPOL) is from the late 1990ies it needs to be noted that it only observed the EU-15. And as international collaboration is a highly dynamic field it is likely that some observations are not perfectly valid anymore. Nevertheless this study is the only attempt to analyse systematically international collaboration of a group of countries and gives a*

departments reflect the broad national strategy of their government, they have their own objectives and follow them. Hence looking on the specific level of national policies it needs to be noted that: "National activities of the EU/EEA countries resemble more an aggregation of the activities of individual agencies."[38] But anyway, the study gives interesting insights on priorities and patterns that can be observed throughout the European Member States as summarized and analysed below.

**Figure 2 – Case Study France**

**Case Study France**

Looking at French international R&D policies a number of special features distinct France from other countries. Not only that France is regarded as the biggest spender in international R&D – having science as part of foreign policies emphasises the comparable active approach of the French government. [39]

Compared to other European countries, S&T policy in France is mainly centralised, but is recently undergoing a process of decentralisation with public research institutions taking a greater role.[40] Nevertheless, the main responsibility concerning R&D policies is in the Ministry for National Education, Research and Technology. But, as already mentioned, R&D collaboration is also considered as part of international cultural affairs and consequential the Ministry of Foreign Affairs plays an important role in promoting R&D collaboration with France in overseas countries. France has by far the most extensive science attaché network in industrialised countries. Science attachés represent a contact person for researcher interested in collaborating with France, but also actively promote collaboration efforts. One example can be seen in the Australian-French FEAST Network mainly established by representatives of the French embassy, offering an active portal for researchers interested in France.[41] Not only the interest in industrialized countries is accounted as comparably high, also their aid related R&D activities are compared to other countries high.[42]

The focus of French international collaboration is on research programmes. Where two main types can be identified: Firstly Programs of Integrated Action (PAI) – that are bilateral agreements administered and financed by the ministry of Foreign Affairs in collaboration with the Ministry for Education, Research and Technology. And secondly research programs established by individual public research institutions with overseas partners.[43] Furthermore bilateral science and technology agreements with several countries have continuously open calls for proposals. A so called Guest Researcher Card for foreign researchers has been established to facilitate paperwork and to assist with any administrative obstacles that way researchers have more time to follow their actual tasks and makes France more attractive for third countries.[44]

Generally the main geographic priority of European Member States in collaborating on an international level can be seen with scientists from the USA and Japan.[45] This can be linked back to the perceived innovation gap: scientists are by nature interested in collaborating with

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*comprehensive insight on the ways European Member States are engaged in international collaboration in R&D.*

[38] cp: Rhode/Stein 1999: p. 3-6

[39] cp: ibid: p. 1-10

[40] cp: ibid: p. 2-50

[41] cp: FEAST 2006: Resources – Countries – France. Available: www.feast.org (last accessed 2006-12-13); The French Embassy/ FEAST 2006 – last updated: Science and Technology - FEAST France. Available: http://www.ambafrance-au.org/rubrique.php3?id_rubrique=100 (last accessed 2006-12-13)

[42] cp: Rhode/Stein 1999: p. 1-10

[43] cp: ibid: p. 2-51

[44] cp: FEAST 2006: About Feast – Articles: Cut through red tape with a guest researcher card. Available: http://www.feast.org/?article&ID=450 (last accessed 2006-12-14)

[45] cp: Rhode/Stein 1999: p. 4-B

the best in their field – finding that the main number of collaborations is situated in these countries shows that Japan and the USA are regarded as high world standard in science, hence are the most attractive partners to collaborate with for Europeans. However, it needs to be noted that in the past years a shift of major interest might have happened- or is about to happen: China and India as emerging major economies are in focus of many countries, this can be observed through a growing number of S&T agreements, emerging networks and increasing scientific importance of these countries especially in the area of Information and Communication Technologies (ICT).[46] Dr. Barbara Rhode mentioned repeatedly in the interview the growing importance of collaborating with emerging economies: "If you look at ICT […], with China or India you cannot have better collaborators."[47]

Taking the above mentioned economic and excellence interests out of the equation, partner countries in international collaboration are often related to cultural and geographic linkages. Germany for example has a clear priority in Central and Eastern Europe and Russia; and is the biggest spender on R&D collaboration in this country group. But especially in countries with a relatively low expenditure on R&D, cultural, historical but also linguistic relations play a significant role in international collaboration. Portugal's international engagement for example is mainly with Brazil and certain (Portuguese speaking) African countries. A general trend observed in the INCOPOL study is that countries with a small R&D budget spend only very little on international collaboration. Some countries run none collaborative research through their own investments (Luxembourg, Liechtenstein) and others only with very few selected countries (e.g. Greece, Portugal, Ireland). Their international involvement is mainly based on European opportunities.[48] This trend is complimented by newer figures of Eurostat: small countries have the highest percentage of foreign investment in their R&D.[49]

Having national policies on international collaboration in mind, the study outlines the high importance of informal linkages that develop over time (especially in collaboration with highly developed countries), and not necessarily only proactive policies on the national level.[50] But as the case studies (Figure ?? and ??), an active approach on international collaboration is, in the Member States, more and more seen as a key to 'globalised' knowledge. The two case studies give an overview on national policies and approaches before concentrating on EC

[46] for example the China-EU Science and Technology Year 2007. In: http://ec.europa.eu/research/iscp/eu-china/index_en.html (last accessed 2006-12-13);
also cp: Rhode 2006a: Annex C

[47] Rhode 2006a: Annex C

[48] cp: Rhode/Stein 1999: p. 1-10 and p. 3-5

[49] cp: Frank 2006

[50] cp: Rhode/Stein 1999: p. 4-A

measures and policies. France and the United Kingdom were chosen because they represent two of the major players in the EU area and still have significant different approaches and developments in international R&D policies. Compared to other countries France is exceptional active to drive international collaboration. Nevertheless, as the scope of the thesis is concentrated on the pan-European future of international collaboration in R&D, only two brief case studies give examples on Member State's activities on international collaboration in R&D.

**Figure 3 – Case Study United Kingdom**

**Case Study United Kingdom**

Even though the UK spends in comparison to other European countries less than the average on R&D, in research volume and quality the UK is regarded as a leading country in Europe. The internationalisation of R&D is especially interesting as research is increasingly dependent on foreign funding. Hence the high internationalisation means that international collaboration becomes increasing interesting from a funding perspective.[51]

The UK, in contrast to France, lacks a centralised policy that leads the different departments to a unanimous policy. The overall responsibility for R&D policy is in the Office of Science and Technology (OST) in the Department of Trade and Industry (DTI).[52] But government funding is provided through three different main channels: the Research Councils, various Ministries, and Higher Education Funding Councils (general funds for Universities for both teaching and research). UK Ministries are provided with their own budget for research that is contributing to their field of work and policy responsibilities, which is not necessarily following a common approach.[53] Hence, this results in funding that is mainly based on the strategies of the different institutions and not on one overall UK R&D policy.[54] The same goes for international collaboration approaches in R&D. The UK prefers multi-lateral approaches through EU and other international channels. National actions have rather an emphasis on technical assistance.[55] Even though the main focus of international collaboration is on multilateral approaches, it is stated that the UK needs to increase its focus on Europe and third countries to effectively increase international collaboration.[56]

Nevertheless, the British Government seems to be aware of the growing importance of international collaboration in R&D and calls for improvements. After recent studies on the importance of international collaboration, first steps to a more active approach can be noticed: increased investments in research funds and infrastructure. Also the establishment of a new Higher Education Innovation Fund and extend of the network of science attachés are signs for a growing awareness on policies to foster international collaboration in R&D.[57]

The country studies showed that Member States have different approaches and different challenges through internationalisation of R&D and resulting collaborations. France is the largest spender in international collaboration in R&D with a clear focus on science in their foreign policy. The UK in comparison has a relative weak organisation for international collaboration, but recognised however the importance of engaging in science on an international scale in the last years and proclaims reforms and more action. It was outlined that all Member States have their own measures to attract researchers to their country, but still it needs to be acknowledged that the European Communities (EC) – especially through the postulated ERA – have a European interest that differentiates to the heterogeneous interests of the individual Member States. Hence the EC follows its own policy fostering the different aspects of European and international collaboration, and as well aims to harmonise the policies of the Member States.

[51] cp: Little/Veugelers 2005: pp. 7- 9

[52] cp: Rhode/Stein 1999: p. 3-87

[53] cp: ibid: p. 3-87

[54] cp: ibid: p. 3-88

[55] cp: ibid: p. 2-64

[56] ibid

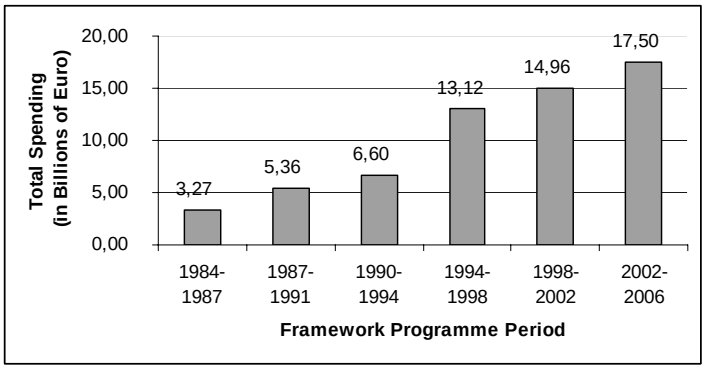
[57] cp: The Allen Consulting Group: p. 53

## 4.2 European Policies on Collaboration in R&D

Through early initiatives and EC programmes to foster collaboration, the EU can look on an "extensive intraregional collaboration" of its Member States, also driven through proximity and historical ties.[58] These experiences lead to a progressive approach and are highly valuable to transfer these to other environments as for example collaboration with third countries.[59]

The main pillar of European R&D policies is formed by the Framework Programme on Research (FP). The Framework Programme is a framework to support and increase primarily pan-European research, and is decided by the bodies of the European Communities, i.e. proposed by the European Commission, decided by the Council and the European Parliament. It defines objectives, priorities and financial support for European research from the EC for a period of approximately 5 years and is therefore seen as an instrument for medium to long term planning of research.[60] The European Commission, i.e. the Directorate General (DG) Research is the executive body for the FP, i.e. publishes calls for proposals, approves them and has all administration responsibilities. The first FP was established in 1984, and in 2007 the seventh FP will be launched. Figure 3 shows the constant rise of the budget over the years, reflecting the growing importance of a European approach in research over the last decades. Policies concerning international collaboration in R&D within the Framework Programmes reflect European approaches the best and reflect the common position. In the following the sixth Framework Programme and its 'successor' - the seventh FP - are analysed under the focus on international collaboration. Conclusions on FP 6 through analysis and literature study and analysing significant changes in the seventh Framework Programme give a sound basis to look on possible future developments.

**Figure 4 – Total Spending on the First Six Framework Programmes**




Source: European Union. In: US Department of Commerce 2000; updated with data from budgets, available: http://cordis.europa.eu/en

[58] Science and Engineering Indicators 2006: p. 5-43

[59] cp: Rhode/Stein 1999: p. 3-5

[60] cp: The Allen Consulting Group 2003: p. 41

As already noted in the previous chapter: international collaboration in R&D is a complex process that calls for a number of approaches, hence the Framework Programme is not the only measure that considers international collaboration; hence the next section of this chapter gives an overview on other European instruments in international collaboration and their role in the European political system before the sixth Framework Programme is in focus in the next chapter.

## 4.3 European Programmes and Measures Related to International Collaboration in R&D

Looking at other measures beside the Framework programme the importance of the later becomes clear as almost all programmes and measures are somehow interrelated with the Framework Programme.

An instrument that is strongly related to the Framework Programmes is international S&T agreements by the European Union with third countries. These agreements are a policy dialogue to promote and foster R&D activities and more important define the role of the third country in the Framework Programme. As it would simply overload capacities to have dialogues and agreements with all countries in the world, policy dialogues between EU and other regions in the world (e.g. ALCUE – EU and Latin America, and Caribbean countries) are regarded as an additional important instrument.[61] Under the umbrella of S&T agreements the EU gets important links to third countries and partners up with other regions in the world. These agreements notably enable effective cooperation whilst ensuring the interests of the parties concerned (for example intellectual property rights).[62]

Other programmes on European basis with international aspects are the European Cooperation in Scientific and Technological Research (COST)[63], and the European Research Coordination Agency (EUREKA). COST is an EC programme to promote European collaboration and is the "oldest and widest system for research networking in Europe".[64] Activities are reduced to intra European research nevertheless a backdoor for international researchers is opened on a case-by-case basis.[65] The system for research collaboration with 35 Member States[66] is primarily funded by the Framework Programmes. 156 Institutions from

[61] cp. Rhode 2006a: Annex C

[62] cp: European Commission DG Research 2006: p. 19

[63] *French abbreviation for: Coopération européenne dans le domaine de la recherche scientifique et technique.*

[64] cp: COST 2006a: p. 9

[65] cp: The Allen Consulting Group 2003: p. 45

[66] *COST Member States include: EU Member States (25) + EFTA Member States (3) + Acceding and Candidate Countries (5) + Republic of Serbia and Israel*

21 third countries participate in COST actions whereas the Russian Federation, Canada, the USA and Ukraine are the countries with the most collaborating institutions.[67] COST does not have specific thematic priorities or a fixed programme; initiatives to participate come from the researchers (bottom-up). Not only therefore COST actions are regarded as non bureaucratic and relatively easy accessible.[68] EUREKA is a pan-European network that is focussed on marked-oriented R&D and encourages technological development to strengthen the position of European technology on the world market. Industry and research institutes collaborate to develop and exploit technologies that are critical for European competitiveness. A ministerial conference of the EUREKA Member States[69] is the political body that announces new projects and decides on EUREKA's future.[70] The most famous projects that evolved from the EUREKA initiative are MUSICAM and Galileo. The recent guidelines "EUREKA 2000plus" form a framework to enhance project generation and a focus on international R&D cooperation.[71] As an additional way to engage with third countries Article 169 of the Treaty allows the community to participate jointly in programmes with member states and third countries. In practice this was the first time possible under FP 6; a positive example for this kind of collaboration in R&D is the European and Developing Countries Clinical Trials Partnership (EDCTP)[72]; where the European Union funds together with funds from Member States Medical Research in developing countries. There are numerous possibilities for third countries to participate in European research apart from the rules of the Framework Programmes, organisations like COST and EUREKA will continue existing, regardless the changes of the Framework Programmes and develop their own future policies, that are opening up to third countries and offer a less bureaucratic way of participation.

[67] cp: COST 2006b: pp. 30-33

[68] cp. Grabert 2006

[69] *Eureka Member States include: EU-25 Member States, Croatia, Iceland, Israel, Monaco, Norway, Romania, Russian Federation, Republic of San Marino, Serbia, Switzerland, Turkey, Ukraine. Plus Morocco as associated country.*

[70] cp: The Allen Consulting Group 2003: p. 45

[71] cp: US Department of Commerce 2000: p. 40

[72] cp: ERAB 2006: p. 14; Rhode 2006a: Annex C

# 5 International Collaboration in the 6th Framework Programme

Looking back at the previous section it became obvious how interwoven European initiatives for research are with the research Framework Programme. And even though the sixth Framework Programme is finishing by the end of this year, a discussion on the structure of International collaboration within this programme will give insights on the way the EC handled the topic of international collaboration during the past 4 years. Referring to the official website of the sixth Framework Programme "the general objective of international cooperation activities […] is to help open up the European Research Area to the world."[73] The first step of this chapter gives an overview on the structure of FP 6 (Sub-Question 4 *'How is international collaboration organised in the sixth framework programme?'*). The analysis of the framework and the role of international collaboration will be the basis for interpreting the role of international collaboration in the following section addressing Sub-Question 5: *'What conclusions can be drawn from outcomes of international collaboration in the sixth FP?'*

## 5.1 Structure of the 6th Framework Programme

Generally the sixth Framework Programme is focused on further integration of the European Research Area and is one of the largest R&D programmes of this kind in the world.[74] The FP is divided into three specific programmes to foster research from different approaches (see also Figure 4): Focussing and Integrating European Research (Programme I), Structuring the ERA (Programme II), and Strengthening the Foundations of the ERA (Programme III). International collaboration is pursued through three complementary routes in Programme I and II (cp. Numerals in Figure 4): Integrated in the so-called Thematic Priorities, Specific INCO measures and Mobility. Hence, aspects of international collaboration can be found in two of the three Programmes. It is mainly incorporated in Programme I (Focussing and Integrating European Research).[75] Programme II (Structuring the ERA) incorporates international collaboration through its mobility funds – the so-called Marie Curie actions (cp. Figure 4). Eligible to participate in the Framework Programme are all legal entities from the EU Member States and associated countries like research institutes, universities, the Joint Research Centre of the European Community (JRC), private companies including SMEs, public administrations, civil society organisations, non-governmental organisations and natural persons. European Interest Groups and International Organisations may also participate in

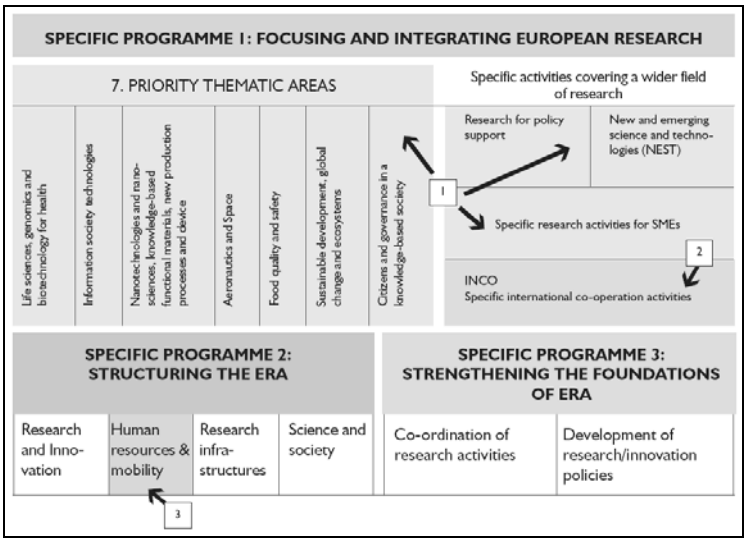
[73] cp: Cordis 2006: European Union Research Policy & Funding – International Cooperation in FP 6. Available: http://cordis.europa.eu/inco/fp6/index_en.html (last accessed 2006-12-13)

[74] cp: ERAB 2006: p. 13

[75] cp: European Commission NN: p. 4

international research.[76] And as long as a minimum of the above listed entities from Member States are part of the research consortium (the number depends on the specific instrument and can be found in the "Rules of participation"), the Framework Programme is open to almost every country in the world, while co-funding of the entity from a third country is assured. In general collaboration with third countries is build on the basis of mutual interest.[77] The next part of this section is discussing more closely the role international collaboration plays in the sixth Framework Programme – as special budgets are allocated for international activities.

**Figure 5 – International Collaboration in the 6th Framework Programme**




Source: European Commission NN: p. 4

The integration of **international collaboration in the thematic priorities** was compared to former FPs a major transformation which meant that international collaboration was partly shifted from a specific effort to be integrated into regular instruments of the ERA (cp. Numerical 1 in Figure 4). The particular objective in the first programme is to have access to knowledge and expertise existing elsewhere in the world, and to help ensure Europe's strong and coherent participation in research initiatives conducted at international level (push back of boundaries of knowledge and resolve global issues).[78] Third countries that wish to participate are differentiated by in categories and therefore treated with different priorities.[79] Firstly the Associated States which are treated like Member States, through an S&T association treaty they commit to the FP and its policies and have budgetary commitments.[80] The so-called

[76] cp: European Commission NN: p. 9

[77] cp. Rhode 2006a: Annex C

[78] cp: European Commission DG Research 2005b: pp. 1/2

[79] cp: European Commission DG Information Society 2003: pp. 1/2

[80] *Associated Countries to the FP 6 include: Bulgaria, Romania, Iceland, Liechtenstein, Norway, Israel, and Switzerland*

INCO target countries (including Developing Countries, Mediterranean Partner Countries, Western Balkan Countries, and Russia and the other New Independent States) have a dedicated budget in each of the thematic priorities, what means until this amount is fulfilled participants from INCO target countries cannot be refused on basis of their geographical location.[81] Other Third Countries have S&T agreements with the EU and are specifically considered in calls for proposals and might have a preferential treatment or might be able (under special circumstances) to get partly European funding. All other third countries are welcome to participate but are not especially named anywhere and need to provide co-funding if interested in collaboration. A complete table on the groupings of countries can be found in Annex A.

Also included in Programme I - and traditionally regarded as the main action in international collaboration - are the **specific INCO activities**. INCO activities are specifically aimed at the so-called INCO target countries. Added together the target countries are round about 150 countries. Each of the geopolitical groupings has specific research areas defined; those are not covered through the thematic priorities, but are addressing specific problems for each country group (for more detail see Annex A). The particular objectives of the specific INCO activities are to lend support to other European policies such as foreign policies, trade and development aid policies in the field of science and technology. The aim hereby is to give support to develop and consolidate the partner's research system and to promote "research co-operation for sustainable development".[82] Chapters include research areas of mutual interest defined through bi-regional dialogue (e.g. Monitoring Committee of the Euro-Mediterranean cooperation, the ad-hoc group of high level officials for the Western Balkan Countries)[83]

The third aspect of international collaboration in the sixth Framework Programme is '**Mobility**' in Programme II (Structuring the ERA). Through the so-called Marie Curie actions the international mobility of researchers is supported which facilitates collaboration for many researchers. Marie Curie actions provide fellowships for in-coming researchers (researchers who have a project in Europe) as well as out-going fellowships (for European researcher going anywhere else in the world). To attract top-researcher from outside the EU on the one hand and to promote training of European researchers abroad on the other hand are the specific objectives of this programme. But also a reintegration aspect that supports European internationally experienced researchers who whish to return to Europe is part of international

[81] cp: European Commission DG Information Society 2003: p. 2
[82] cp: European Commission NN: p. 9
[83] cp: European Commission DG Research 2005b: pp 16/17

Marie Curie actions. Other Marie Curie Actions (training and career development opportunities) are also open for third country researchers.[84]

Community policies in the sixth Framework Programme are characterised by twofold objectives. On the one hand, Europe is highly interested to attract the best 'brains' of the world to come to Europe to share and integrate their knowledge. This is mainly addressed to industrialised and knowledge-based countries and driven by economic interests, as already outlined in the third chapter. Whereas on the other hand Europe recognises its excellence compared to poorer and developing regions in the world. Therefore policies addressing international collaboration in R&D are also seen as part of Europe's development aid. These twofold objectives reflect the extreme division of the world into industrialised (developed) and developing or less developed parts – but also outlines that two obviously completely different interests are followed under the same policy 'roof'. A challenge that occurs at this point is how to tie these opposite interests together under the same Framework Programme. INCO target countries are treated differently to industrialised countries, as the geopolitical groupings show. The question is what is actually in the interest of the EU in international collaboration. Looking at the ambitious goals like Lisbon and Barcelona, and the de-facto higher interest of scientists to collaborate with peers that are equally or higher qualified the contrast between these interest and interest on the paper (which emphasise on Developing countries and the Millennium Development Goals) could not be bigger. Anyway, this aspect is more closely discussed in the next chapter.

After the first year of FP 6 more than 16,000 proposals have been submitted from more than 50 countries whereas Marie Curie actions were the most popular. Out of the 17.5 billion Euros of the total FP 6 budget[85], about 5% were allocated to international collaboration. This includes project funding, mobility as well as networking and horizontal activities (promotion, policy dialogues, etc). After the enlargement of the EU in 2004 the budget increased to a total of 19.2 billion Euros. The dedicated budget of 315 million Euros for Specific INCO Activities increased to more than 355 million Euros. The implementation is processing well: it is expected that 100% of the dedicated amount will be committed to projects with INCO target countries. An oversubscription exists with an average success rate of 15%.[86] But looking at the main innovation of FP 6, the opening of the thematic priorities to almost all countries in the world,

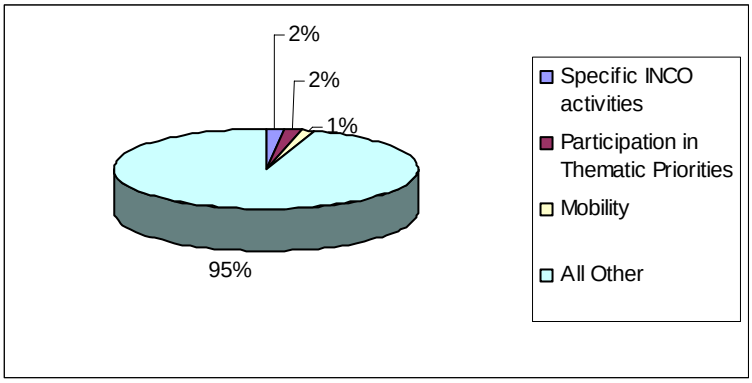
[84] cp: European Commission NN: p. 11

[85] *The numbers presented in the following are based on data from the planned budget in 2002. The budget increased in 2004 with the enlargement of the European Union to 19.2 million Euros. There was no updated sound data available for the purposes of this research. A more detailed Table on the Budget of FP 6 can be found in Annex B.*

[86] cp: Bonas 2005: pp.2/3

the low participation of countries in the thematic priorities cannot be denied.[87] The results in this Programme are behind expectations: only 15% of the target amount will be used for international collaboration. Due to the low interest in these funds the rest has been reallocated to other areas what equals a loss for international collaboration of approximately 240 million Euros. Even though on paper international collaboration is seen as an important dimension of R&D policy the budget on international collaboration is comparable small the clear focus is on European measures is underlined from the budget point of view. It is expected that international partners also financially contribute to collaborative activities, if that is in the interest of fostering actively international collaboration to take credit for successful collaboration is a different question. In the next sections a few first conclusions from the sixth Framework Programme are drawn.

**Figure 6 – Estimated Share of the Budget for International Collaboration in the 6th Framework Programme**




Source: Own Display

## 5.2 Conclusions from the 6th Framework Programme

The previous section introduced the structure and already some implications of the sixth Framework Programme. This section goes a step further and looks at the performance and effects of policies in FP 6 on international collaboration.

As already outlined in the previous section the budget for INCO countries in the thematic priorities was not claimed in its full possibilities and resulted in a reallocation of the remaining budget. The principal reasons for a failure of this policy can be divided in three groups: administrative obstacles, lack of corresponding thematic priorities, and miscommunication of the European Commission. The introduction of new instruments in the thematic priorities, created besides higher competition significant difficulties to European researchers, mainly because of their size and complexity. This minimised the wish of researchers to include third countries because international collaboration was seen as an additional problem: Firstly the

[87] cp: European Commission DG Research 2006: p. 19

need to persuade members of the consortium for added value if a third country participates. And secondly the increased financial commitments and administrative obstacles like visa requirements, tax, pension policies, healthcare arrangements and IP issues in third countries often diminished the wish for international collaboration.[88] The second main reason for the low participation is that the thematic priorities of EU are not necessary priorities of third countries and perceive the Framework Programme as Eurocentric with no necessary genuine benefit for the third country.[89] The miscommunication of the European Commission at the beginning of FP 6 left for many unclear where the main budget for international collaboration was.[90]. The scientific officers that were in charge of the thematic priorities were not in a position to promote successfully the participation of third countries. Their main task was to implement the thematic priorities and often no sufficient expertise of the science officers to communicate and promote international collaboration.[91] Collaboration partners from third countries outlined additional problems that occur during the projects. The review of the Argentina S&T Agreement outlines that the European Coordinators have a tendency to omit third country partners and "coordinators may not even know the contents of and how to have access to the funds allocated to their project".[92] A major problem for collaborating with third countries is that participants often are not aware of community procedures which makes it hard to understand the logic and instruments the European Community uses and hence to engage in projects.[93] To avoid such confusions, and to minimize even Member States administrative efforts the Commission needs a more efficient management structure to better coordinate and cooperate with other DGs and EU agencies as for example DG Development and DG Enlargement.[94]

Nevertheless, in countries where the sixth Framework Programme was actively promoted an increase of participation could be recognised, for example in Australia where in 2001 the Forum for European-Australian Science and Technology Cooperation (FEAST) was established and jointly funded by the European Commission and the Australian Government.[95]

Summarizing, it can be said that the Framework Programme has a spelled out international component, but it is part of a transformation. It is clearly moving away from the traditional centralized INCO activities to a more inclusive approach where collaboration is part of the

[88] cp: Bonas 2005: pp.1-3; ERAB 2006: pp. 12/13
[89] cp: ERAB 2006: p. 11
[90] cp: Rhode 2006a Annex C
[91] cp: Bonas 2005: pp.1-3
[92] cp: ERAB 2006: p. 13
[93] cp: ibid: p. 11
[94] cp: ERAB 2006: pp. 2-3
[95] cp: ibid: p. 15; Johnston 2006

instruments in the thematic priorities. It seems like the EU awakened and realized the economic value of international collaboration, but finds it self still in its old patterns and objectives. Therefore instruments with a clear development aid focus are mixed with instruments to attract the 'best brains' to research in Europe. There is a disconnection in between the interests and the actual measures of the EU in international collaboration. To move forward the EU needs to clearly spell out priorities to be able to apply a policy mix that reflects the complex structure of the world. Turning half away from developing countries but not really including industrialized countries created confusion and made it hard for third countries to participate in a highly attractive R&D programme.

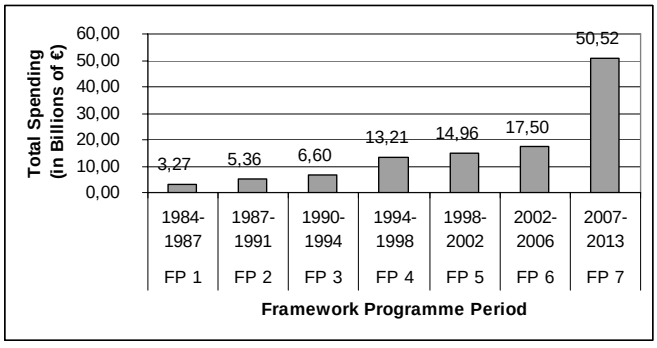
# 6 The 7th Framework Programme – First Outlooks into the Future

The sixth Framework Programme has a transforming approach towards international collaboration. At the end of 2006 the European Union decided on a new Framework Programme. The first section of this chapter describes and discusses the structure of the seventh Framework Programme and the differences from its predecessor (Sub-Question 6 *'What changes can be expected from the seventh framework programme?'*). The role of developing countries is in focus for the second section of this chapter, addressing the question 'How is *the preferential role of developing countries in EU international collaboration activities changing?'* (Sub-Question 7).

## 6.1 The 7th Framework Programme: Changing attitudes towards International Collaboration?

At the beginning of December 2006 the European Union agreed on the seventh Framework Programme. With an increased total budget of 50.52 billion Euros the new Framework Programme is by far the one with the highest volume (see Figure 6). An increased duration of time is planned to reflect from now on the financial years of the EU but also ensures that people involved in the FP have longer consistencies on instruments and funding schemes. The commission claims that the new Framework Programme is going to step away from the complexity and administrative efforts criticised in the sixth FP: simplification is a major objective.[96] The new structure has four specific programmes: Cooperation (funding collaborative research along thematic groups), Ideas (supporting frontier research), People (investing in human potential), and Capacities (building research capacities).

**Figure 7 – Total Spending on Framework Programmes including expected spending on the 7th FP**




Source: Own Display [97]

[96] cp: Damiani 2006

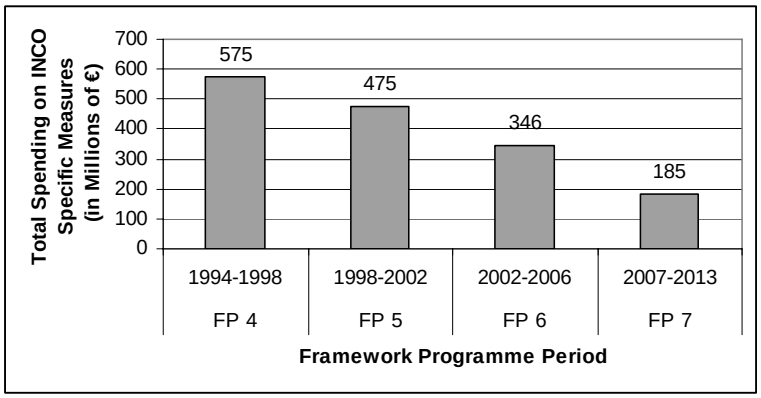
[97] *The difference in time-periods needs to be acknowledged (longer time period means more money in total but not necessarily in relative terms) – in this case even in relative terms a constant increase can be observed – data from FP 7 as agreed after the Council's agreement in July 2006*

Compared to its predecessor the new Framework Programme has a further going integrative approach for international collaboration. The international dimension is integrated in all four specific programmes of the seventh Framework Programme. Looking on the budget for specific international collaboration measures (Figure 7) it becomes clear that the EU is gradually turning away from specific measures to collaborate – as it will become clear especially with developing countries. The trend of a transformation from a very specific 'INCO approach' to a more open approach is ongoing. The objectives for international collaboration are still similar to previous ones, nevertheless the formulations emphases stronger on the economic interest of collaboration: the focus on working together with other knowledge systems is higher than previously. International cooperation with third countries is divided in 3 classes: associated countries and associated candidate countries; industrialised countries; and the so-called International Cooperation Partner Countries. Analysing the sixth Framework Programme it was criticised that third countries are treated as a homogenous group despite their different needs and resources.[98] To have effective international collaboration policies they needed to consider the complex political and social structure in the world. The group of International Cooperation Partner Countries covers about the same group as the former INCO target countries, whereas the sub-groupings are slightly different. The focus is on three sub-groupings: neighbouring countries (including Mediterranean countries, Western Balkans, Eastern European and Central Asian States); developing countries (ACP, Asia, and Latin America); and Emerging economies (e.g. China, India, Brazil, Russia, South Africa). Looking at the country characteristics: neighbouring countries which are in focus of the EU with the aim to have similar economic and political conditions and have therefore a special funding priority, developing countries – that often have no other chance to get funding from their home country, and emerging economies – characterised by relatively high expertise (especially in ICT) and comparably low wages makes them attractive for Europe. It becomes clear that the geopolitical division is mainly based on budgetary questions, but also divides the world more along its complex political and economic reality. The FP is open to industrialised partner countries, but funding is not available for their scientists – they are, as in FP 6, expected to participate through co-funding.[99]

[98] cp: ERAB 2006: p. 14

[99] cp: Rhode 2006a: Annex C

**Figure 8 – Spending on INCO Specific Measures – FP 4 to FP 7**




Source: Own Display

The '**Cooperation**' programme, which has the largest budget of all specific programmes in FP 7, will carry out theme-oriented international cooperation actions. Compared to the structure of FP 6 there won't be an especially allocated budget for international collaboration anymore, theme-orineted collaboration in generally open for third countries (if collaboration is with at least three legal entities from Member States or Associated Countries). The specific objectives are clearly spelled out on having mutual partnerships to enhance Europe competitiveness and to contribute to implementing EU policies (e.g. Barcelona Target, knowledge based economy) and international commitments (e.g. Kyoto Protocol, Millennium Development Goals). The lack of an especially allocated budget for International Cooperation Partner Countries makes the funding uncertain, especially for those countries where funding of the home country cannot be expected. This could minimize the number of applicants for collaborative projects including these countries. As it became clear in the previous chapter the budget for INCO target countries was mainly not used because of lacking promotion and administrative obstacles. It is obvious that the EU is more interested on engaging with the excellence of science which is mainly found in highly industrialised countries or the so-called emerging economies. But except for collaboration with emerging economies (which are part of the International Cooperation Partner Countries), these countries are not part of a special funding scheme which might attract more easily the 'brains' to the ERA – instead it is expected that the ERA becomes itself attractive enough that third countries spend money on collaborating with European partners. Nevertheless, an innovative measure regarding the promotion and coordination of international collaboration is the establishment of International Contact Points, which are locals from third countries especially briefed for FP 7 to be able to promote and support activities with the EU. This might enhance the popularity of the Framework Programme in the world and promote European research. The level of engagement in international collaboration is not dependent on the budget but rather on the people that work in the cooperation themes and their preferences.

The Participation in the specific Programme '**Ideas**' draws a similar picture: it is clearly spelled out on the mutual benefit of the partners and the need to justify a third country's participation on the basis of added scientific value for Europe. Especially the added scientific value might make it hard for less developed countries to participate and gain from collaboration as their capacities and infrastructure are hardly enough to add value to push frontier research. International actions in the area of mobility, i.e. incoming and outgoing fellowships as well as reintegration measures, are located in the '**People**' programme. It is furthermore planned to work out a partnership programme to support the exchange of researchers in the manner of rather having 'brain circulation' than 'brain drain'.[100] As mobility was already in the sixth Framework Programme the mostly used instrument and hardly any changes were made, it can be expected that the success story will continue and might even grow. A planned exchange programme without long term commitment should enhance collaborations on a more informal level.

The '**Capacities**' programme is the only programme with an especially allocated budget for international collaborative activities and will implement so-called 'horizontal support actions'. These horizontal activities include policy dialogues with third countries and partner regions, as well as maintaining the resulting S&T partnerships. Additional measure include enhance and support the coordination of national programmes on international scientific cooperation, and an overall coordination of the international cooperation actions in FP 7.[101] Hence the specific measures on international collaboration have the function to moderate collaborative activities with third countries, on both the European and national level. The concrete collaborative activities are allocated to the other programmes and not in the responsibility of this measure anymore.

Looking at the above described changes it becomes clear that the approach of the European Union towards collaborative R&D with third countries is in a process of transformation. The trend to integrate international collaborative activities is – apart from difficulties in FP 6 – ongoing. Nevertheless, the critic on FP 6 was in the construction of FP 7 considered: country groupings were restructured, an opportunity for more informal participation through the planned exchange programme is created, and a more active promotion is aspired. Yet, besides these changes the new policies do not indicate a special interest in collaborative research with third countries as the role of third countries is still not clearly spelled out. The role and significance is compared to the previous Framework Programme even more

[100] cp: Damiani 2006; Rhode 2006b

[101] cp: Cordis 2006: FP7-Capacities. In : http://cordis.europa.eu/fp7/capacities/international-cooperation_en.html (last accessed 2006-12-13)

uncertain, especially considering the growing importance of engaging internationally in many fields of science.

## 6.2 The changing Role of Developing Countries in Europe's International R&D Collaboration

Developing countries always played a special role in the international R&D collaboration policies. It already became clear that the role of the 'instrument' international collaboration is shifting from a clear focus on development aid – the first INCO initiatives where focussed on agriculture and health, scientific areas that are typically very important for developing countries[102] – to a focus on the 'brains' of the world and therefore economic benefits the EU can gather through collaborative activities.[103] This section outlines the role scientific collaboration plays for developing countries and examines the future role Europe can play.

If international collaboration is aimed to find solutions for global problems the European Union cannot ignore the needs of developing countries and should help the 'South' to benefit from internationalisation in R&D. Attempts on the paper exist[104], but reality - as conclusions from FP 6 and changes in FP 7 show - implicates an inconsistent strategy of the European Union. An active role of the EU is needed to enhance collaborative research and capacity building on the level of research in these countries. On a global scale collaboration with developing countries is marginal as the share of collaborative scientific articles demonstrates.[105] Without including developing countries in research, especially in the shift to knowledge based economies, it will be harder for them to catch up and the gap of wealth and poor will continue growing. Especially through this policy that is mainly lined up along economic and scientific interests, the already existing problem of a "club effect" will remain a major obstacle. Experience shows that North-South-collaboration often means the north partner has more knowledge to teach but has normally also the better capability to learn (similar to the club effect). And also that collaboration often ends up in being steered by the north partner and his interests. To avoid this, an active policy to ensure equity and enhance interest to collaborate is needed.

The major challenge is to awake the interest and motivation of researcher to collaborate in these countries. Scientists from industrialised countries are often not interested in collaboration with their peers from countries; because of their perceived lower standard no

[102] cp: Chassériaux 2005

[103] cp: European Commission DG Information Society 2003: p. 4; Rhode 2006: Annex C

[104] cp: European Commission DG Economic and Financial Affairs 2006; European Commission DG Information Society 2003; European Commission DG Research 2004; European Commission DG Research 2005a; etc.

[105] cp: Archibugi/Pietrobelli 2003: p. 874

added value for 'Northern' knowledge creation is seen.[106] Through its policies and consequential measures the EU should allow and ensure an increase of learning for researchers from the south and an exchange of information between Europe and Developing Nations.[107] These policies should acknowledge the interests of both – the northern and the southern researchers. To achieve these ends especially two aspects should be considered: helping to build relevant scientific institutions in developing countries (for capacity building, successful collaboration and to attract researchers back to their homeland) and to foster South-South collaboration (as interest for collaboration with each other is higher because of similar challenges and expertise – solutions that fit to problems are more likely to be found). International organisations as the EU can play an important and vital role through aiming to achieve multilateral collaborations.[108] For example in their already established dialogues and be a mediator between regions with similar interests and expertise. As well as be a consultant, because Europe's expertise in fostering collaboration and integration on a regional level is unique and could help to elaborate similar regional agreements.

Through the shift of international collaboration to the responsibility of the thematic priorities it is in the hands of the thematic areas to choose who to collaborate with. This has a number of advantages as they know better where the best value for collaboration is. Different countries have interests in different thematic areas, as well as researchers from different thematic areas have (depending on the nature of their research) certain countries as preferential collaborative parties. Mostly the interest of developing countries, for instance, is focussed on research fields like agriculture, health and environmental issues – and often researchers from the mentioned areas have a particular interest to work in the field in developing countries as these topics often relate to challenges in this group of countries.[109] Whereas other scientific fields as for example nanotechnology and aerospace are still dominated by highly industrialized countries. Hence, peers that are regarded as interesting for European researcher are mainly to be found in industrialised countries. Through having the responsibility shifted to the thematic areas it is easier to promote and actively engage with third countries to coordinate activities in whatever level is perceived as appropriate. The challenge that occurs for developing countries is that the instruments of the seventh FP relay mainly on market factors and interests. Because of this it is likely to enhance the interest of European researchers to collaborate with industrialised countries, but less developed countries – due to their economic disadvantages – cannot compete within these instruments. For third countries to be able to access knowledge of others

[106] cp: ibid: pp. 878-880
[107] cp: ibid: pp. 878-880
[108] cp: Archibugi/Pietrobelli 2003: pp. 878-880
[109] cp: Wagner et al. 2001: p. 37

at least a minimum of training is necessary to be able to learn and develop skills, this is why developing countries need a clear focus on capacity building also in collaborative research.[110] In the Interview with Dr. Barbara Rhode it became clear that the Directorate General on Research is passing on the responsibilities for capacity building and partnerships in and with developing countries to DG Development, DG Enlargement, and the neighbourhood policy of the EU. Where yet a clear focus on science collaboration is not to be found. In the Framework Programme the DG Research is "not doing any kind of investment" and especially does "not deliver infrastructure".[111] The DG Research itself rather concentrates on actual scientific benefits.[112] Hence a shift from the focus on fostering collaborative research with developing countries to an overall approach can be noticed.

Summarising, this section outlines some arguments why it seems important to engage with developing countries and suggested that the European Union should have a more active approach for example through mentoring South-South cooperation and capacity building. While DG Research is turning away from these responsibilities and concentrates on scientific benefits, cooperation with other directorates, as for example DG Development or DG Enlargement. Measures to support developing countries do not have a strong focus and are rather marginal. And as it already was criticized above that the general role of third countries is not clearly spelled out, the future role of developing countries in European R&D policy is even more uncertain, as they seems to slowly disappear from the research agenda.

[110] cp: Chassériaux 2005

[111] Rhode 2006a: Annex C

[112] cp: ibid

# 7 International Collaboration – Globalisation or Europeanisation?

The last main chapter of this paper is analysing future developments and the possible trend of collaborative R&D in Europe (Sub-Question 8). Firstly addressing the focus on European R&D and a diminished interest in the rest of the world (Europeanisation) in contrast with the European Research Area's opening to third countries to encourage a global collaborative scheme from European efforts (Globalisation).[113] This is presented in the context of trends highlighted within in this paper so far, and with the Lisbon and the Barcelona Targets in mind - as these two goals of the European Union steer the focus of Europe's research policy.

Reviewing the analysis of this paper, indicators for Europeanisation are characterized through a turn away from specific INCO measures. Especially the former strong emphasis, in the Commission's working papers and communications, including international collaboration in R&D as part of Europe's foreign policy and Development Aid is decreasing. Instead the upcoming Framework Programme incorporates the aspects of international collaboration in all aspects and despite an enormous increase of the total budget the budget for specific international activities decreases. It is left open for the specific Commission's coordinators how to include third countries. There is no special stimulation to drive international collaboration, besides policy dialogues on the government level. In the future international collaboration will need to have an even more active bottom up drive to be successful. Nevertheless it needs to be considered that if the demand for international collaboration is existent it has good chances to increase. An active promotion and the ways to include the international aspect are in the responsibility of the coordinator. Especially in fields where the EU is lacking expertise or needs co-funding opportunities, activities to foster and promote international collaboration will enhance. Nevertheless, the previous section outlined that, especially for developing countries, the purely competitive approach does not suit the needs of these countries as they can hardly compete with Europe's economic interests and the aspect of international collaboration does not seem to be top priority for top-down initiatives. A more active policy to foster collaboration is necessary, through the shifting away from specific measures projects with developing countries might decrease. Another factor that needs active policies and shifting of the European Union are administrative and legal obstacles for incoming researchers. Visa issues and very complex bureaucratic processes (in the EU and the Member States) are only partly tackled through a step-by-step management reorganisation of the Commission.[114] Ongoing concerns on Intellectual Property Rights also ask for a progressive European solution. In the

[113] cp: Smeby/Trondal 2005

light of the Lisbon Goals and Barcelona Targets, which are focused on Europe's economic performance and R&D spending[115] international collaboration needs to be discussed from a new angle.[116] It might be assumed that this will cause a decrease of collaborative activities with third countries on the one hand, and an increase of intra-European activities on the other hand. If the attraction of foreign capital investing in European research is aimed for to reach Lisbon and Barcelona, the 'mutual interest' that is emphasised by the European Union cannot be maintained. Apart from the scepticisms mentioned above, small initiatives of the European Commission show that the importance of a global network of partners is acknowledged. The planned inclusion of third countries in the ERA-Net, which coordinates national and regional policies on R&D, is one example. As well as the establishment of international contact points, and as the case may be the creation of organisations along the example of Australia's FEAST.

**Table 4 – Indicators for Europeanisation and Globalisation in R&D Collaboration**

| Europeanisation | Globalisation |
|---|---|
| • Decrease of strong formulations promoting international collaboration with third countries<br>• Strong emphasis on European goals (Lisbon Strategy and ERA)<br>• Research policy is shifting away from specific measures in international collaboration<br>• Responsibility in the hands of thematic priorities: a general approach is missing<br>• Administrative obstacles and ongoing uncertainty about IPR minimises interest in collaborative activities | • Economic and global interest will open the ERA to the world – Europe cannot be competitive as an exclusive 'club' and global problems need global solutions<br>• Trends in collaboration in R&D show that researchers have increasing interest in international collaboration<br>• Establishment of Contact Points in third countries to promote European Programmes<br>• Restructuring of management might facilitate procedures for Member States and third countries, and enhance interest in collaboration |

Source: Own Display

Interests, goals and actual measures are interwoven and do not give a clear picture of where the European Union wants to go. It is clear that the aspect of international collaboration cannot be ignored and is definitely considered as one aspect of European R&D policy. It is stated that the "FP must become a strategic programme to serve both global and European needs to enhance each other."[117] The trouble is that at the moment none can say where the actual trend in international collaboration goes. Weighing the indicators against each other, the European Union wants to engage internationally with its R&D expertise, but Europe has first priority, and neighbouring countries follow with a relatively high priority. In the near future the

[114] cp: Rhode 2006a : Annex C

[115] *3% of GDP before 2010 – means an increase of R&D spending of at least 1% in the ERA*

[116] cp: Chapter 3.2.

[117] ERAB 2006: p. 10

number of participating third countries in European activities will probably not increase especially, not while the new Framework is introduced. But in a few years when the budget of FP 7 is rising and more administrative responsibilities are handled by specialized agencies[118], international collaboration might increase and possibly lead to a more active approach.

[118] cp: Rhode 2006a: Annex C

# 8 Conclusion

From the discussions presented within this paper, a relatively informed outlook for International Collaboration in R&D can be formulated. Given a concrete definition of International Collaboration in R&D, which in the context of this paper is the collaboration between EU Member States (collectively) and so-called 'third countries', the primary policy instrument the EU uses to influence this collaboration is the Framework Programme. The analysis of the sixth Framework Programme, and the change in policy reflected through the seventh Framework Program provides a fundamental basis for insight in the future policy directions.

International collaboration is generally regarded to be important to solve global problems and has certain economic benefits, thus current policies continue to reflect a significant interest in fostering international collaboration. On a national level the Member States acknowledge the importance of international collaboration in different ways. Because of the diversity of R&D systems and interests, measures and funding schemes of the Member States are still very different. The fact that the EU is not one homogenous entity is well recognised, and continuing EU initiatives should help to improve this, thus international collaboration should also see corresponding improvement. This improvement will most likely be reflected through an improved understanding from all fronts of European procedures and R&D systems.

The sixth Framework Program attempted to support this through opening the thematic priorities for third country participation. Through a shift away from only specific measures for international collaboration mainly preferring developing countries (INCO target countries), the Framework Programme was providing international collaboration funding, half independently in specific INCO activities and half distributed within the thematic groups - but with only limited success. Budget allocated to thematic groups was not utilised and eventually re-distributed elsewhere, reasons for this include: administrative obstacles, lack of corresponding thematic priorities, and miscommunication of the European Commission to third countries by failing to emphasise the budget potential for INCO funding within thematic groups. It is interesting to note that although the Framework Programmes provide a main source of International R&D policy, they are not the only instrument which enables International R&D. Other instruments – such as COST and EUREKA will continue to provide an alternate opportunity for third countries.

The seventh Framework Programme provides a more pragmatic approach to International Collaboration – specific INCO funding has been reduced (whilst the overall FP budget grows). This funding has been re-distributed and integrated within program budgets without being

specifically allocated. This integrated approach goes a step further than the sixth Framework Programme – third countries can now participate in all parts of the seventh Framework Programme, as long as it is in the mutual interest of the third country and the EU. However, there is no longer a specific budget for international activities. Additionally the seventh Framework Programme has restructured the geopolitical groupings and thus better reflects the geopolitical reality. This could be a positive step, but whether or not this provides any real advantages will depend on how the Framework Program is implemented.

In the beginning of the Framework Programmes the EU saw international collaboration mainly as an instrument of its foreign policy and part of development aid. The seventh Framework Programme shows that the trend towards a more competitive role of international collaboration is continuing and that collaboration is welcome, but primarily on the premise that it adds value to European research and hence results in economic benefits. Developing countries, which always played an important role in the history of the Framework Programmes, should continue to be part of European policies, but appear to becoming marginal in EU policies. The current trend of DG research moves towards competitive research, thus these countries will hardly stand a chance to be part of European collaborative projects. A new scheme will need to be devised, which includes scientific research for example in a European Technical Assistance, where besides relevant scientific expertise from Europe can be communicated also relevant infrastructure can be supported.

As always, it is never possible to predict exact outcomes, and there are numerous variables as discussed which could affect future developments, but the overarching future trends appear quite clear. In order to achieve outcomes in line with strategies such as Lisbon and Barcelona, the EU will need to continue with a priority on European integration. As well as focussing on the economic value presented in collaboration with third countries. Thus the immediate future should result in better aligned R&D policy between Member States (Europeanisation) – but will also naturally lead to an increase in Globalisation of R&D due to economic realities. Given the growing importance of knowledge within a global economy, and the EU's desired global position, it can be expected that this competitiveness combined with economic interest will continue. The ultimate outcomes will depend heavily on how effectively thematic groups can implement International Collaboration initiatives, and how effectively outcomes of this collaboration can be measured.

What is certain is that International R&D efforts have, and will continue to play an important part in Europe. Combining this with current globalisation trends and their potential impacts simply confirms that International Collaboration in R&D will continue to be important and valuable within the European Community and that effective supporting policy in this area is essential.

## Further Research and Reflection

The field of International Collaboration in research and development is multi-faceted. Whilst this study has primarily explored the geopolitical grouping of countries and the role of developing countries in EU policies in R&D, nevertheless there are many other aspects that would be interesting to look at. For example, the entities of interest could be considered, such as exploring the role of private research institutes and enterprises (small, medium and large). Alternatively, the efficiency and benefits of international collaboration projects could be explored, perhaps addressing areas such as quantification, administrative costs, additional financial contributions and the effects of cultural differences. Further investigation in these areas would help to isolate some of the significant gaps in information and variables which were difficult to quantify or justify whilst performing literature reviews and analysis on this subject matter. Work which addresses these grey areas would certainly prove useful, and provide significant contribution to this area of research.

# Annex A –Third Country Groupings in the 6th FP

| Geopolitical Group | Associated countries | INCO Target Countries | Mediterran. Partner Countries | Developing Countries | Western Balkan Countries | Russia and the other New Independent States | Other | Countries with S&T Agreements | Other Third Countries |
|---|---|---|---|---|---|---|---|---|---|
| **Collaboration possibilities in FP 6 (funding)** | Treated as a Member State | | INCO, Specific Thematic Priorities<br><br>Marie Curie Fellowships | INCO, Specific Thematic Priorities<br><br>Marie Curie Fellowships | INCO, Specific Thematic Priorities<br><br>Marie Curie Fellowships | INCO, Specific Thematic Priorities<br><br>Marie Curie Fellowships | | Generally co-funding | Only co-funding |
| **Funding for Specific Research Areas through specific INCO measures** | - | | Environment; Protection and Conversation of Cultural Heritage; Health | Health and Public Health; Rational Use of Natural Resources; Food Security; | Environment; Health | Environmental Protection; Adjusting the System of Industrial Production and Communication; Health Protection; | | - | - |
| **Countries** | Candidate countries:<br>Bulgaria<br>Romania<br>Turkey<br><br>EEA countries:<br>Iceland, Liechtenstein<br>Norway<br><br>International S&T Association Agreements:<br>Israel<br>Switzerland | | Algeria<br>Egypt<br>Israel<br>Jordan<br>Lebanon<br>Morocco<br>Syrian Arab Rep.<br>Tunisia<br>West Bank and Gaza Strip | ACP Countries (91)<br>Latin America (18) and<br>Asia (18) | Albania<br>Bosnia-Herzegovina<br>Croatia<br>Federal republic of Yugoslavia<br>Former Yugoslav Republic of Macedonia (FYROM) | Armenia<br>Azerbaijan<br>Belarus<br>Georgia<br>Kazakhstan<br>Kyrgyzstan<br>Moldova<br>Russia<br>Tajikistan<br>Turkmenistan<br>Ukraine<br>Uzbekistan | | Argentina<br>Australia<br>Brazil<br>Canada<br>Chile<br>China<br>Croatia<br>Egypt<br>India<br>Japan<br>Mexico<br>Morocco<br>Russian Federation<br>South Africa<br>Tunisia<br>United States | All other countries except North Korea, Iraq, Iran, Myanmar and Libya |

# Annex B – Budget 6th FP

| | | | (EUR million) |
|---|---|---|---|
| **1. Focusing and integrating Community research** | | | **14 682** |
| Thematic priorities (1) | | 12 438 | |
| • Life sciences, genomics and biotechnology for health. (2) | 2514 | | |
| Advanced genomics and its applications for health | 1 209 | | |
| Combating major diseases | 1 305 | | |
| • Information society technologies (3) | 3 984 | | |
| • Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices | 1 429 | | |
| • Aeronautics and space | 1 182 | | |
| • Food quality and safety | 753 | | |
| • Sustainable development, global change and ecosystems | 2 329 | | |
| Sustainable energy systems | 890 | | |
| Sustainable surface transport | 670 | | |
| Global change and ecosystems | 769 | | |
| • Citizens and governance in a knowledge-based society | 247 | | |
| Specific activities covering a wider field of research | | 1 409 | |
| • Policy support and anticipating scientific and technological needs | 590 | | |
| • Horizontal research activities involving SMEs | 473 | | |
| • Specific measures in support of international cooperation. (4) | 346 | | |
| Non-nuclear activities of the Joint Research Centre | | 835 | |

| | | | |
|---|---|---|---|
| **2. Structuring the European Research Area** | | | **2 854** |
| Research and innovation | 319 | | |
| Human resources | 1 732 | | |
| Research infrastructures (5) | 715 | | |
| Science and society | 88 | | |
| | | | |
| **3. Strengthening the foundations of the European Research Area** | | | **347** |
| Support for the coordination of activities | 292 | | |
| Support for the coherent development of policies | 55 | | |
| | | | |
| **TOTAL** | | | **17 883** |

(1) Of which at least 15 % for SMEs.

(2) Including up to EUR 475 million for cancer-related research.

(3) Including up to EUR 110 million for the further development of Géant and GRID.

(4) The amount of EUR 346 million will fund specific measures in support of international cooperation involving developing countries, Mediterranean countries (including the Western Balkans), and Russia and the New Independent States (NIS). Another EUR 312 million is earmarked to finance the participation of third-country organisations in the “Thematic Priorities” and in the “Specific activities covering a wider field of research”, thus bringing the total amount devoted to international cooperation to EUR 658 million. Additional resources will be available under section 2.2 “Human resources and mobility” to fund research training for third-country researchers in Europe.

(5) Including up to EUR 218 million for the further development of Géant and GRID.

Source: http://cordis.europa.eu/fp6/budget.htm

# Annex C – Interview with Dr. Barbara Rhode: Transcript

The Interview with Dr. Barbara Rhode, Advisor of the Directorate RTD.T. of the European Commission Directorate-General for Research, was held on the 29th November 2006 in Canberra, Australia, at the FEAST Conference 2006 – "Research without Boarders".

Julia Leske: *Thank you for taking time for this Interview. Your name is Dr. Barbara Rhode, right?*

Dr. Barbara Rhode: Yes, correct.

*What exactly are you doing at the European Commission?*

A very difficult question at the moment: I've just changed my job, we have just undergone a big reorganisation, and I've been made adviser – which I do not like for the moment – and I'm working there with the new directorate. This is one of the policies already. I work with the directorate which is called T – so rather far advanced in the alphabet and it is the last directorate. There are the directorate S and the directorate T are both outsourcing directorates – they will not exist in the near future. Directorate S is the European Research Council which will be transformed into an executive agency and the same will be the directorate T which will I am working – which will become the executive agency for first of all the mobility programme, second for the Small and Medium Sized Enterprise Programme. And then short(?)afterwards new programmes which have not yet been established at Science Programmes before under the sixth Programme so they are new in the seventh – which will immediately will become part of the agency – and at present they are located at DG Enterprise. And this is the Security Research Programme and the Space Research Programme.

*They are all merging together in this agency?*

Yes, they all four will outsource their contract activities. Not the whole programme. In the future the Commission will stick to the policy domain and will keep in the hands the policies. Policy means also the relation to the Member States, and the inter-institutional [relations] and the strategy - [this] will all stay with the Commission. But all the contracts, the money business, which all has become very, very heavy handed; heavy administration will be outsourced. This has as background that we won't have any kind of staff increase anymore. But we have an enormous increase in budged – it is nearly a doubling. The first two years are rather similar to the past, but afterwards we will be going up and we will not be able to handle all these contracts. So this is a separation between the operational and the policy [level].

*Scientists who want to get funding would apply to this agency to get funding and it is handled through [it].*

And this is a new policy, and you can look through it, we will be only starting with these policies with these four programmes and then one after the other. And I guess if you look at the DG research at the end of the seven years [of the seventh Framework Programme] you will have a much slimmer and smaller DG Research but which is surrounded by the different executive agencies. An executive agency is very close to the Commission, it is not as we have the agencies under the different paragraphs of the treaty – so this is a kind of administrative [entity] but very close to the commission – it is not going to the private sector, it is not privatized, it is not outsourced to Member States but it is very close to the Commission.

*That's interesting, I haven't heard about that – a first interesting insight for me. As I said, I try to find out more about the view of the European Union on international collaboration, which means collaboration with third states. What I found out that the budgets for international collaboration are not as clear anymore as the used to be. In the sixth Framework Programme*

*you had, even in the Thematic Priorities, an allocated budget for international collaboration. What will this mean for third countries? It seems to be a little bit confusing for third counties – whether it is wanted that third countries are engaging more or is it - did you have trouble with the budget, or why is it changing?*

What you have been seeing is the change from the 5th Framework Programme to the seventh Framework Programme. And the sixth Framework Programme would consider some kind of a transformation period and is a real change of policy, a change of paradigm. In the past we had an international department that was handing [international cooperation]. Which [therefore] had somehow a little parallel Framework Programme with a certain emphasis on Health issues, environmental issues, [and] agricultural issues – so more developing country related topics. And smaller projects. Whereas in the meanwhile the European Projects have very much increased their budget and in potential - They have been growing. So there has been a kind of diversification that the [budget and potential for] international developing countries was very small and the other one was going up. What is now expected in the future? In the sixth Framework Programme, which was this intermediate phase, it was not clear and it was – I should not say that – but it was possibly also in the beginning not so well communicated so nobody was aware that the real budget for the – or the bigger budget – was within the Thematic Programmes and was not anymore in the international [department]. And I think you can see the international [Programme] is now also transformed – that this is the somehow more policy driven activities with very small budgets just for coordination and networking and for establishing certain offices of information and Networks. And this is really based on to advance the policies and networking. But the real budget - budgets with which you fund projects - it is in the Thematic Programmes and the Thematic Programmes have now become themselves responsible for their international policy. There is no earmarking anymore it is now up to [them] - also the international policy for the different topics looks very differently. If you look for the environment, the environment is a typical international programme. And they have established since long time world wide international collaborations. Whereas Nanotechnology is a typical program which is supporting European industries, the same is with Transport. This is a project/programme and there we are looking for of course excellent cooperation from around the world but depending on their excellencies and we do not look where they do come from. We know for incidence that we have excellent researchers in Russia, in former Soviet Union countries that do not have ht industrial base. And so they are really eager to come to Europe and collaborate with us. We have collaboration with China and India, the emerging economies. Then if you go to Biotechnology and Agriculture this is of course much more interesting for developing countries but it depends very much, [and] it is driven by the topic, because the topic creates different networks and different alliances. So this is the change of policy.

*It is basically trying to get [the emphasis] more [on] the topics.*

Yes.

*The topics are actually more driving themselves?*

Yes, they are the drivers. So you have a kind of two different areas. The topics are driving the real participation in the projects and they look also which country has what capacity and can come in. Where as the international department – the INCO Department – there you have a kind of policy approach looking: what do we want to do with what country? And there you have also a very clear division of the world we distinguish between industrialised countries that normally will get no money from us they pay themselves – [for example] Australia. This is equal footing and they come to us and work to us if they think there is something interesting in them and we accept them if there is something interesting. There is mutual interest. Then we have the emerging economies – this is very clear – the emerging economies are built something like a sandwich: they have a broad developing countries [characteristic] but they are also very competitive and on a cutting edge in new technologies. If you look of ICT

Technologies with China or India you cannot have better collaborators. The patent is then the big issue, and how to arrange who gets what out of the project.

*How do you sort out IP problems? Do you talk about it on a bilateral basis or do you have a general approach of the European Union? Do you say: If we are involved and [provide] money to a project we want to have all IP, or share it? Or is it more a case to case basis?*

It is a case to case basis, we [as the European Union] keep out. We give them the framework and in the rules of participation. The Rules of Participation is a very important document for each Framework Programme, because that really spells out who is entitled to get what. And I would recommend [to you to] also study that, because the nitty gritty in International Property Right, who is entitled to participate, how many partners, who are the partners, what is the legal entity – its all defined there and it is s long document. Important! And also what is the status of a country: with which country do we have agreements.

*- It is all listed by country?*

Yes, we have an overview what is our relation to what country, to some countries we have bilateral agreements, Australia is the first agreement we ever have concluded. And [others] have come very close to us and is an important policy this is our neighbourhood policy, because Europe has historically now enlarged [and] involved into its neighbourhood. Many countries that where before behind the Iron Curtin are now all new Member States since 2004, 10 new countries, by the end of this year another two countries. The neighbourhood policy is defining the Northern African countries and the Eastern countries - so those countries surrounding the European Union - to give them preferential relations to the Union and to encourage them and support them to avoid that we have a too high difference in wealth and economic growth.

*To avoid for example a migration flow into the European Union?*

Yes, exactly. Not we have harsh borders but to also to care for our neighbours and to attract our neighbours to us. We do not want necessarily that they are all become our members but nevertheless we want to establish a very positive and good neighbourhood policy. - But we were talking about the IPR: The IPR is laid down in the rules of participation that we would like each consortium that they agree on an IPR arrangement. And they are encouraged and we do not really look into that because this is part of the partners. Beforehand it is clarified what comes out of the project, [and] who is entitled to what. This is an arrangement, and each project has its very own arrangement.

*That's interesting – The last question is related to [issues] you said before. [I noticed] kind of twofold objectives in international collaboration which is - of course - on the one hand side trying to engage with industrialised countries and their scientists because they have a higher excellence. And than on the other side there are a lot of documents which state that international collaboration [in R&D] is part of European Development Aid policies. These are terms that I found in documents.*

This is also terms of shifting a little bit.

*And that's what I was wondering, where can you get these two together in a way that actually both are benefiting. Because I imagine in an industrialised country has completely different expectations and is a completely different way to work together with them to work in comparison with development countries. Because I can imagine that a scientist from Europe with high excellence is of course looking for other people on his level and is not as much into collaborating with someone in Sub-sahara Africa.*

[That] depends on the topic.

*That's the other thing – do have anything to distinguish these two or is it because of the topic science that everyone is actually going together in this policy.*

I think we have very clear out spelled policies in the Thematic Programmes. Environment would go where ever climate change takes place and collects data for that. What kind of data is accessible worldwide? And how can we build a model that is helping us? There we are part of a global system. But we also develop environmental technologies and this is of course for the European Market. We are very happily inviting those ones to collaborate with us who can contribute. And we are also interested to explore these technologies. But of course if you look into aeronautics this is a different field. And the policy of Aeronautics would be the best scientists of the world who ever they are where ever they are located, be that in Brazil, be that in Russia, be that in maybe also the United States [if] they whish to collaborate – who knows – or in Space, or in Security policies, Nanotechnologies – this is much more related to excellence. If you are coming to life sciences – Health – of course Sub-Sahara Africa plays an important role: Tuberculosis, HIV, Malaria – these are outspoken programmes of ours which we want to develop because we have also a global responsibility. Europe is not everywhere, but we are contributing to advance the research on Tuberculosis and Malaria. And I think if you want to have Malaria research you go into the countries [where these diseases are present]. The EDCP – European Developing Countries Clinical Trial Partnership which is also a kind of co-funded [activity] under Article 169. It is also kind of co-funded 200 milllions of the Commission and other millions from the Member States, depending on their 'Menu' [and] on their willingness. We are coming more and more to mixed funding, the Framework Programme has changed the landscape of science in Europe. We have started with the Framework Programme in 1984 – this is not when the science cooperation started this is still in the old coal and steel and later under Euratom and ESPRIT was before – but this is somehow were and organised science collaboration started and meanwhile I think you cannot – all researchers meanwhile are collaborating in Europe across the boarders. And now we are also breaking more and more into the national domains and collaborating with our Member States to open their programmes also for researchers of other countries. There is an Europeanisation from research programme to research programme and of course we are in the world. The mandate, as you may know, is to support European industry and also to follow European policies where ever other policy is. And this is contributing to developing country policy, but we are not doing any kind of investment. This is [the field of] DG Aid. We offer the Software. We want to work with the brains and work also with the countries on their problems, but we do not deliver the infrastructure: Infrastructure comes with projects but not [from our side].

*That's the area of European development aid. What you do is collaborate with people who are already in this field and are experienced so you can work together and find solutions together with them.*

Capacity building – a very important term – is then mainly in DG Development or Enlargement and also neighbourhood policy is capacity building. This is also a little bit internally also our countries are on different levels in research and when we had the enlargement into the south, I think we build a lot of research capacities. This was then through structural funds. The structural funds are the investment into infrastructure: Labourites, hard material, buildings - in collaboration with the country itself. The research is more the software.

*Do you have another five minutes for a very last question? Because another thing that is really hard for me to follow is how do actually measure or monitor what is going on in international collaboration. Because it is a topic that is very hard to define and secondly to see how can we actually follow what is happening. Do you have any instruments to [do so]?*

With many countries we have dialogues. To each science agreement we have a joint committee, what we were holding here [in Canberra] on Monday. There we had a meeting with the Australians. We have been reporting from both sides what is happening. Where do we see opportunities and where would we like to take joint initiatives. Errorlink for instance would be

now something. Or this question know with co-funding of research fellowship programmes. We are really looking into the different items and see what we can do together and where is a particular project. We have of course not bilateral meetings with all countries around the world. This would be far too much. But we have also regional dialogues. There we have countries in a regional format who we are meeting, this would be MERCOSUR for Latin America or ASEAN for Asian countries. Of course with the emerging economies we have research agreements. And my former field was in particular Russia. There we have defined four common spaces, because Russia did not want to come into our Neighbourhood Policy, [and of course] we cannot define a policy on them, we are two independent entities. We have defined four common spaces of EU-Russian collaboration. The fourth space was Culture, Science and Education. And of course you always deliver statistics before you go for a meeting, you sum up all the statistics. We have a kind of good overview on normally what is happening. We have science counsellors in several countries – as for instance here in Australia Lynn Hunter is a local science counsellor, in other countries we sent science counsellors from Brussels. We are issuing every two years a kind of monitoring report where we are analysing all the statistics and data and there is always an international dimension in this. We have very many mechanisms. But I think it is reorganising, we are in the middle of a transformation process.

*It is still transforming and the seventh Framework Programme is the next step.*

Yes.

*Well, it is probably hard to tell because the seventh Framework Programme is just about to start and is going to run for 7 years, but is transforming further?*

I have never seen that the Framework Programme was a standstill. There will be a midterm review. We are analysing and we have monitoring systems, we have assessment systems, we have the IPTS – the Institute for Science and Technological Prospective - in Sevilla which is doing a lot of studies for us. I think they are also contributing to our knowledge and brain and intelligence, we have in principle in each programme the first unit there is the policy unit. I think there are quite a number [of mechanisms].

*There are lots of different antennas trying to see what is actually happening and on the base of this there are going to be new decisions and new policies.*

The Errornet is something you should look into. The Errornet is something where we try to collaborate better with the Member States, and also on the international [level] we will establish Errornets - there will be a call for Errornets, that will be very important.

*Thank you very much.*

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