

Parallel Session 2: Governance Issues and Links with the Lisbon Strategy

Discussant Paper

Prepared by Walter Mönig

Commissioner for EU affairs, Federal Ministry of Research and Development, Germany

The ERA-Green Paper and the re-launched Lisbon Strategy as the Conceptual Framework

1. The current *Green Paper on the European Research Area* provides the right approaches regarding the future of European research. This is particularly important because the main governance issue of European research policy continues to be unsolved: How should research policy in a European multi-level system be organized more *systematically*? This means that we have to talk about
 - priorities and their appropriate political levels and arenas,
 - and the topic of *policy coordination*.

The merit of the present Issues Paper consists in the fact that it links the questions for the legal basis and the corresponding political players with current challenges and proposals for better coordination tools within the *framework of the renewed Lisbon Strategy* and, in doing so, tries to draft a new conceptual framework for R&T policy.

Opportunities and limits of political coordination of research policy

2. Since both the players at European level and those at Member State level have responsibilities and resources to shape research policy ("*shared competence*"), the central topic of governance has for years been this: *Better policy by improved coordination*. However, a thorough analysis of the topic of coordination is lacking - also in the Issues Paper -, in particular as regards its *benefit* and its *costs*. Before calling for more coordination we must first clarify the question what *degree of policy coordination* is reasonable and feasible.
3. At first glance, the call for more coordination seems to be so positive that everyone should be able to agree. This has something to do with the basic constellation in European research policy,

which is determined by the following characteristics, among others:

- a. a constantly growing number of political players in R&T policy (also due to the EU enlargement)
- b. a political system with a highly vertical (multi-level) system and horizontal differentiation
- c. the erosion of traditional nation state coordination mechanisms
- d. the pressure caused by the global economic competition
- e. the occurrence of new cross-border or cross-sectoral constellations of players.

All this promotes the desire for more coordination in research policy, if only to ensure a certain degree of coherence in basic political goals and to provide researchers in Europe with a coherent funding system and framework conditions which do not constantly change along national borders but are as uniform and efficient as possible across Europe (*vision of the European Research Area (ERA)*).

4. Although the vision of a European Research Area is highly attractive, it does not automatically lead to a need for more coordination and is, by no means, self-explanatory. The term political coordination can summarize a host of options for actions towards realizing the European Research Area. Each individual case requires a sound *empirical analysis* and a clear *definition of the added value*. Coordination causes *costs* from the procurement of information to time-consuming agreement processes between a large number of players and a reduction of the possibilities for action to reduced reaction speed and a loss of flexibility when new challenges arise. At first sight, this may seem trivial and negligible, which it is not if the costs are set off against the expected benefit of coordination.

5. The benefit of political coordination in the sense of centralization or of concerted actions agreed in negotiations cannot be taken for granted if we take into account that alternative governance systems, such as *competition*, often have the advantage of better distributing risks and opportunities. As search processes for innovative solutions, they can be more rapid and effective.

In many areas of life, coordinating a difficult-to-limit number of players through the market has proven to be a superior form of organization. Maintaining competition and guaranteeing fundamental freedoms in an internal market are therefore among the core aims of policy in the EU. In recent years, many areas of life which had previously been organized by the state and were thus fragmented along national borders have been converted into an open EU-wide market under conditions of competition. Why shouldn't research funding agencies at regional, national and European level also compete for funding of the best research projects? This has long been the case for individual grants. The ERC constitutes another step in this direction and was deliberately set up as a further "independent" player in science funding.

6. The Commission, the Council and the European Parliament decided to create new European instruments both for the *Marie Curie actions* and for the *ERC* which are to compete with the already existing national ones, rather than opting for better coordination of the diverse institutions and measures of the Member States by means of the *open method of coordination (OMC)*. In both cases, the attractiveness and quality of research in Europe is to be increased. An open, Europe-wide competition of researchers for funds awarded exclusively on the basis of scientific excellence is to lead to more cutting-edge research results.

As international rankings of universities, for example by the Institute of Higher Education of Jiao Tong University Shanghai, show, European universities are lagging behind the US research universities in particular in the field of cutting-edge scientific performance. Almost all Member States are reforming their universities in order to strengthen top-class research. Why not assume that a European funding measure could speed up the necessary reforms of universities in this field, too, although it competes with national measures? The EC reform treaty, which is currently being negotiated, includes a new target for research policy by creating a European Research Area which will facilitate measures of this kind (amended art.163). The establishment of the ERC was already an anticipation of these

new possibilities. Community action would not limit the room for manoeuvre of Member States ("*shared competence*").

7. The traditional answer of politicians to a research policy fragmented by national borders is *coordination by delimitation of responsibilities*, in particular by corresponding regulations in the EC Treaty. Two principles are playing a role here: *Subsidiarity* and *European value added*. As a rule, the Member States make an effort to maintain the principle of subsidiarity in order to retain their scope for action in research policy, while the Commission and the European Parliament often see a European value added in project proposals for community action where the majority of Member States take a different view. In this context, the Issues Paper correctly points out that the perspective of larger and smaller Member States naturally varies and that fragmentation naturally plays a far bigger role for a small country. Additional criteria for an allocation of responsibilities at European level are therefore also disputed along the same lines, above all the criterion of a *critical mass*, e.g. when talking about research infrastructures of European relevance.
8. In addition to vertical and horizontal coordination of different players, there is also the problem of the *coherence of research policy* at all levels of research policy in Europe. On the one hand, this problem is linked to the evolutionary process of greater differentiation of research policy and the path dependence of political measures; on the other hand, it is linked to the cross-cutting character of research policy. Those conducting research in science and industry find that many regulations and measures are contradictory, or at least require optimization. New measures should therefore close identified *gaps* in the research funding system and not lead to duplication or *overlaps* with existing measures. New instruments in such a political environment make sense only if they provide a so-called "*unique selling proposition*". After all, the political task consists in developing a *coherent overall system* which is coordinated with the research systems of other players (Member States) and generally optimized. I do not have to tell you that this is an illusion in view of the dynamically changing challenges, the split of responsibilities in the European multi-level system and the framework conditions set up by other policy fields which are difficult to control by means of research policy arguments, e.g. regional policy, immigration and residence law, labour and social law, to mention but a few.

9. Courageous decisions are characterized by the fact that they focus on an important issue and accept overlaps with existing measures. Scientific progress takes place when better theories replace weaker ones; similarly, better forms of organization in politics often replace obsolete measures, whereas the winding-up of inefficient institution or measures before introducing new ones often takes too much time or proves to be impossible in a complex governance systems with autonomous players. The search for a coherent overall system is somewhat static and cannot live up to the dynamism of our society. I therefore plead for a greater readiness to try out something new in research policy.
10. There is a second reason why the governance problem cannot be solved by more and better coordination alone: the *information and transaction costs*, which grow with the size of the coordination task. According to my observations, the potential of *coordination through the market* is therefore rated much higher today than it was a few decades ago. The reduction of state involvement in important areas of services of general interest, the organization of such services under private law and the implementation of competitive processes – from CO₂ emission trading to grid-bound sources of energy to post and telecommunication services – confirm this trend. The same applies to policy approaches on which decisions for an ERC or an EIT are based.
11. There is yet another reason why we must be careful when calling for more coordination through political processes: the need to *compromise*. Some of the participants in a decision-making process will have to give in if an amicable solution (voluntary coordination) or a majority decision (Community method) is to be reached. As a rule, they have to be paid off with concessions in other matters. Whether this approach always leads to better results than “un-coordinated” decisions is questionable. Furthermore, the popular mandate in the Member States binds politicians to act in the interest of their respective country. A “common European interest” is often quoted in public speeches but practical politics as well as the EU's legal basis often speak a different language.
12. I would therefore like to stress that an open discussion, which is free of taboos, on the benefits and the costs of coordination in research policy would be helpful in achieving a more efficient distribution of responsibilities between the Member States and the Community.

The Framework Programme as highest form of coordination in research policy

13. The Framework Programme is to be seen as a powerful pooling of resources to foster research and –by this – to coordinate research policy. Its budget increases over the years are considerable compared to the R&D-budgets of the Member States. It has been rightly stated that this is a major step to realise the ERA. But, have we already exploited the full potential of this instrument and, where are the limits for further budget increases of future framework programmes?

The classical argument for stronger European coordination is the *transnational character* of research. The spill-overs of research are obvious but do not occur in all research activities. Therefore a shared competence of the EU and Member States is appropriate. The border line is difficult to define. A certain grey area where we should find solutions in a trial and process is unavoidable. One option is the setting-up of joint programmes of the EU and Member States, another would be independent programmes targeting the same group of research activities, as in the case of ERC and national funding agencies. A sound evaluation of these kinds of joint or competing programmes may lead to improvements by fine tuning of the relevant features of the programmes.

14. The potential of the Framework Programme for research policy coordination is often underestimated. The Framework Programme is the most important *best practice example* in European research policy. Not only the thematic priorities but also the instruments and funding conditions have an impact on the development of research policy in Member States. And in addition to that the 7th Research Framework Programme contains powerful approaches to mobilize the funds of national, regional and private players focussing on a common objective (Joint Technology Initiatives (Art. 171 EC Treaty), Joint Programmes (Art. 169 EC Treaty)). Measures such as ERA-Net, ERA-Net plus and the funding of COST etc. are further examples of possibilities of coordination using the Framework Programme as a catalyst.
15. There are good reasons for highlighting the excellent performance of the Framework Programme in the upcoming review of the long-term perspective of the EU budget and to call for a considerable increase in funds. The Framework Programme does not only contribute to the 3% objective of Lisbon/Barcelona but also to realizing the European Research Area. In

addition to the Framework Programme, the Competitiveness and Innovation Programme, the Structural Funds, the EIT, and even technology projects like Galileo, play an important role in maintaining or increasing the competitiveness of Europe. Of course, the question of these programmes' coherence will have to be answered when deciding about more funds for competitiveness and their distribution along individual budget lines.

Approaches to improve the OMC for ERA and the Lisbon Strategy

16. Considering the status quo of distribution of responsibilities in Europe, the OMC has the advantage over the Community method of not requiring a shifting of responsibilities to the European level. When compared to a purely intergovernmental approach, it has the advantage of greater stringency, which was increased further by the renewed Lisbon Strategy with the Integrated Guidelines and the National Reform Programmes. However, its results remain below expectations so far. This is convincingly presented in the Issues Paper. The *weaknesses of the OMC in research policy* are based, *inter alia*, on the fact that people in Europe do not really consider the 3% objective a priority, and that it is difficult to evaluate the contributions which the different measures can make to achieving this objective. The annual OMC report and its evaluation is therefore often considered a compulsory exercise for bureaucrats which hardly plays a role in the political arena. But we should not forget that the remarkable success of the European integration is to large extent the work of technocrats backed by some eminent politicians.
17. The Issues Paper rightly refers to the *interdependence* between ERA and the Lisbon Strategy. However, both concepts are not the two sides of a coin. Measures taken within the framework of the Lisbon Strategy are to contribute to *increasing investment in research and development*, while the ERA concept aims at *reducing the fragmentation of research policy*, i.e. at changes of the institutional framework. The EC reform treaty with an amendment of Art. 163 (EC Treaty) and the shared competence provides some new possibilities. Governance models with more competitive elements should be examined.
18. Even if the population at large will not give research policy the same attention as, for example, climate and environmental policy, I still believe that greater *visibility* can be achieved. To achieve this, it would be useful to work with

more *quantitative indicators* besides the 3% objective. There are quite a number of studies and statistical data available (from scientific citation indices to migration of scientists to patents, etc.) which show the relative position of Europe in the world. The so called league tables of Member States and of Europe compared to its main competitors are often used in ex ante evaluations underpinning proposals for new programmes. To agreed to a set of indicators - as for instance in the work programme of the education ministers – may help to make progress more transparent and an issue for public debate. *Rankings* as the Shanghai ranking for universities can also contribute to promoting a general interest in research policy and lead to political action.

19. The Commission has triggered a broad discussion on new perspectives by presenting the Green Paper on the ERA. However, the *vision* presented in the paper still needs in-depth elaboration to develop a more convincing appeal for people in Europe. This does not only concern the envisaged *structure* of the ERA, which has so far been described by a few elements only, but also a suitable *policy mix*. As the Commission rightly stresses, a balance must be found between competition and cooperation. In analogy to the internal market concept, an action plan could be the outcome of the consultation process. This action plan could be a *long-term guideline* for European research policy and help to make Europe the most competitive and dynamic knowledge-based economic area in the world.

Parallel session 4: Researchers

Discussant Paper

Prepared by Hugues-Arnaud Mayer
VP French Business Confederation (MEDEF)
Business Europe

funds to submitted projects led by young searchers. However, MEDEF would not approve any form of quotas (as proposed for women-led research), while would prefer positive initiatives, such as special funds to help female researchers in their personal and familial lives, incentives to dual career opportunities, special events supported by the EU Commission to make the research jobs attractive for women, etc.

The Interim Report rightly highlights the need for a systematic approach to human resources of the ERA in order to make it more operational. Although this approach is easier to implement in the public rather than in the private sector, both need a European labour market for researchers for a wide range of economic and strategic reasons. Researchers are one of the best developed European communities, because of many years of EU Framework Programme practice, and we should take advantage of this when building up the new ERA.

1. Researcher recruitment and careers

In such a complex patchwork of countries, statuses, systems, MEDEF consider as appropriate the proposal to elaborate and adopt detailed and widely recognised standards in recruitment, but only in the public sector. Private companies could not afford any standardisation of their procedures, but would anyhow be interested in knowing results of such a policy. The proposal for "user friendly and easy-to-input database" of open positions for researchers receives full support by MEDEF.

2. Making ERA attractive for young talents, for women and ... more

Private companies have been improving since several years their gender balance policies as well as conditions for attractive career paths of young workers (not only for researchers' positions). MEDEF share the proposal to support the youngest stratum of the research population, especially in reserving EC

3. Mobility

MEDEF support any action aimed at fostering both physical and virtual forms mobility, which can be seen as complementary. Of course, mobility should become an integral part of a researcher curriculum, and any proposal for financial incentives for that purpose will receive our support.

Concrete measures must be taken to make sure that talents attraction is not practiced to the detriment of any Member State: as often these measures are national, sometimes local, to improve their own attractiveness for researchers, better co-ordination should be ensured.

4. Career development, life long training, transferable skills

MEDEF approves the idea that good public-private interaction should not be reduced to industry sponsoring the lab. We have to build a strong bridge between the EHEA and the ERA (the private sector included), through for instance the integration of doctoral candidates and post-docs in FP7 integrated programmes.

To improve that integration, we propose to create a "ERASMUS in enterprises" programme, to help students (non only doctorates, but also other students in schools in engineering and technical institutes) to find a 6 months candidate position in a company abroad (through a database, supported by the EU Commission and with private funds) . All the partners (students, labs and companies) could be very

receptive to this action, which would inter alia help reinforce networking at EU level.

implementation rules, the role of funding agencies and the Charter and Code Label.

5. The demography paradox

Private companies approve the clever proposal referring the role of retired scientists.

6. The Charter and the Code

Every player should contribute to increasing the level of knowledge and implementation of the Charter & Code for researchers. MEDEF, therefore, agree on the proposals for actions on C&C awareness,

Parallel Session 9 – International Cooperation

Interim Policy Options Paper of the ERA Expert Group "Opening to the World: International Co-operation in S&T"

Paper presented by
Daniele Archibugi, Expert Group Chair

1. Introduction

One of the things that differentiate the *Green Paper on the European Research Area: New Perspectives* from a long series of similar political documents released at the national level is that it does not constrain the benefits that science, technology and innovation promise to deliver to a geographically restricted area. If we read similar policy-oriented documents generated by national authorities, it is rather common to find that the justification provided to support and fund scientific and technological activities is related to the national interest, competitiveness, security and other advantages for territorially delimited political communities. These nationally produced documents somehow implicitly assume that countries live in a world of rival states and each state has to develop its own capabilities, including S&T, to compete, survive and flourish in an unfriendly environment. It seems that not even science and technology policy can ignore what Thomas Hobbes long ago noted, namely that “kings and persons of sovereign authority, because of their independency, are in continual jealousies, and in the state and posture of gladiators, having their weapons pointing, and their eyes fixed on one another; that is, their forts, garrisons, and guns upon the frontiers of their kingdoms, and continual spies upon their neighbours, which is a posture of war”.

The *Green Paper*, as well as many other EU official documents, uses a different attitude and language. An inexperienced reader might believe that there is no competition among states in the realm of knowledge

and that the European Union is a benevolent political institution whose main target is to provide the fruits of science and technology to everybody through fair cooperation. The language of the *Green Paper* may be diplomatically exaggerated, but it is not fully hypocritical. For example, it does not raise the issue of intellectual property rights infringement, nor does it treat to use the World Trade Organization to sanction violations. In fact, it corresponds to the policies that the EU has implemented inside and outside. I claim that this language is the outcome of three factors: the political structure of the EU, the nature of knowledge, and the limited resources for S&T in the hands of the EU.

First, the EU is a special kind of institution that political scientists are still trying to categorize and interpret. But one of the most obvious characteristics of the EU is that it works through agreement among an increasing number of countries. When countries as diverse as Sweden and Portugal, Greece and the United Kingdom, do agree on something, it is likely that such an agreement is not interfering with what they perceive as vital interests. For many years the European Commission has tried to identify and promote what was labelled “pre-competitive” research and this was largely an attempt to skip the rival reasons that induce member states to foster knowledge. It is therefore not surprising that the bulk of activities carried out in the field of S&T are basic research, infrastructures and general purpose technologies. In each of them, the benefits associated to join the EU club are higher than the costs.

Second, knowledge is often a rival and proprietary asset, but it has also some important components of a public good. Only those who master the state of the art can successfully generate new knowledge. Strong interactions among different players are therefore a necessity more than a choice. In many areas, the

advantages associated to sharing knowledge with others are much higher than those associated to keep it secret. To promote international cooperation in the field of knowledge is much easier and less controversial than in international trade since it is more likely to produce a win-win outcome. Diplomatic negotiations for S&T are much less controversial than those concerning the trade of agricultural products, fossil fuels or subsidies to the aircraft industry. The good predisposition of the EU to knowledge sharing is therefore also facilitated by the very nature of knowledge.

Third, the EU has limited resources, also for S&T. In comparison to the amount of resources available at the national level, only a minority is actually distributed through European channels. It is true that these resources have increased over time will still increase with the 7th Framework programme and that they play a strategic role since most of them are project-specific. But member states know that when they have to defend their vital interests, they have also available much more powerful national instruments. To distribute resources or S&T, the EU has to make sure that they are not leading rivalry, benefiting a specific state and disadvantaging another one.

The EU also plays an important role not just distributing money, but also introducing regulations and standards. Standards and regulations are crucial for the making of a general environment conducive to S&T, although they are effective if they are voluntarily applied by member states. So far, the EU has managed to be rather successful up to the point that its regulations and standards have also attracted neighbours. This seems to confirm that exclusion from these standards and regulations is itself a deterring penalty.

It is therefore not surprising that the key science and technology policy adopted by the European Union is cooperation. And the *Green Paper* is simply following this generous tradition. But a crucial issue has repeatedly been raised, and it is now explicitly addressed in the *Green Paper*: what are the boundaries of international cooperation? And, more precisely, is there a conflict between intra-EU cooperation and cooperation of the EU with other parts of the world? The section of the *Green Paper* devoted to “A Wide Opening of the European Research Area to the World”, is certainly not neutral and explicitly assumes that ERA should not become a closed fortress. On the contrary, it argues that it is beneficial for the EU to exchange information, agreements, and projects with close and distant states and therefore that international cooperation should be further nurtured and reinforced. This seems to be a rather important addition to the Lisbon Strategy outlined seven years ago. To explicitly take into account the external landscape, and suggesting that

the various forms of cooperation should be strengthened, offers a new perspective.

Some evidence about International Cooperation: bibliometric indicators and technological alliances

First of all, let us remember that international cooperation in science and technology is not necessarily the outcome of deliberate public policies. Much of this cooperation, in fact, occurs without policy inducements and incentives, but simply because scientists and engineers are willing to share their experiences and knowledge with their colleagues. Public and business institutions have further fostered international cooperation since they have followed, rather than anticipated, the needs and wishes of scientists and engineers. Let me say that non-induced international cooperation is likely to be the most productive.

Thanks to S&T indicators it is now possible to quantify the recent trends. I will report data on two indicators only: co-authored scientific papers and international inter-firm technology agreements. In spite of their imperfections, these indicators provide some information on what is happening in the two broad communities involved in the generation of knowledge: academia and industry. Note that these indicators inform about cooperation among “equals” and therefore do not inform adequately on other activities associated to international cooperation such as training and assistance.

The first indicator refers to scientific articles co-authored by people living in two or more countries. Not surprisingly, the number of co-authored scientific articles has progressively increased: new social conditions such as increased travelling and the development of ICTs have made it easier to collaborate. In spite of all these, it may be surprisingly that before Internet a scientific article had on average three co-authors (1988), while now (2003) it has “only” 4 co-authors.

The available data also allow us to single out “international” cooperation, showing that it has increased at a much greater pace: back in 1988, 7 per cent only of the scientific literature was the outcome of international cooperative ventures while in 2003 it has become nearly 20 per cent. A policy promoting international cooperation in science is therefore helping to reinforce an already ongoing trend.

What is the European position? The EU – 15 has always been the area with the larger number of collaborations: more than 60 per cent of the international co-authored articles involve at least a European partner. This is partially an artefact due to the small size of individual European countries: a paper written by a Dutch and a Belgian is classified as “international” while a paper by a New Yorker and a Californian is not. Still, there is evidence that a

European Research Area somehow already exists and impinges on the ancient tradition of the often evoked *res publica literarum*.

The same data also show the geography of European academic collaboration outside Europe. Not surprisingly, the largest European partner is the United States: nearly 40 per cent of the internationally co-authored EU – 15 scientific articles have an American partner. This data reflects the size of scientific activities carried out in the USA: qualified colleagues only are eligible to become partners. It is also significant that the high preference of European scientists for American colleagues has, in relative terms, slightly decreased over time: 50 per cent of European internationally co-authored paper had an American partner in 1988, but only 40 per cent in 2003. In spite of this decline, EU – 15 has a solid and indisputable propensity to search partners in the US. Second in the line come the countries of the so-called European Neighbourhood, including those who have become members of the EU – 27 after 2003.

I will now turn to inter-firm technology alliances. Let me say that economists were surprised to discover more than 20 years ago that so many companies were keen to share their know-how and expertise with actual or potential competitors. Some scholars interpreted these alliances merely as collusion among firms and claimed a more active anti-trust policy to contrast them. Others more experienced with the process of technological innovation, on the contrary, were rather inclined to see these alliances as an expression of the vital need to share knowledge among those who have it. Today we got used to the phenomenon and have learnt that companies prefer to cooperate to share the risks and costs of uncertain, long and expensive innovative projects. And also that these cooperation often helps to disseminate knowledge to a larger community of users

But the geographical distribution of inter-firm technology alliances is very different from that of academic collaboration. In fact, this form of generating, transmitting and diffusing knowledge developed within the United States and only slowly involved European companies. The single largest entity of this form of developing industrial knowledge is not “international” but rather internal to the USA: American companies are keener to find a partner within their own country rather than outside it. Partnership with European companies is ranking second. But looking at the same data from the European perspectives, it emerges that in the Old continent companies are much keener to collaborate with USA companies rather than with other Europeans. Not only: since the 1980s, intra-European technology agreements have substantially declined, in spite of the policies carried out at the EU level to foster, finance and induce greater collaboration among European companies. It seems that the EU

policies to generate a single market had the effect to increase competition among European companies, and they reacted by searching partners to innovate outside the continent.

The differentiated nature of international cooperation in science and technology

The evidence I have reported is still tentative and my colleagues and I plan to make more systematic analysis of it in the Final Report of our Expert Group. But two major trends cannot be ignored. First, Europe is a strong centre of gravity for international cooperation in academically oriented activities but much less in those directly promoted by the business sector. Some may argue that by its nature, technological developments in industry are less likely to follow a cooperative path. But the evidence for the United States disproves this hypothesis. It also seems that the policies carried out at the EU level through the various Framework Programmes had a larger impact in academia rather than in business.

Second, it appears that an innovation system open to cooperation does not really make a difference between “internal” and “external” partners: what are really sought are good partners. And any public policy aiming promoting some partners is unlikely to be effective if the partners involved have not the required capabilities.

In light of this, it seems clear that what the EU can provide and receive from different regions of the world is far from being homogeneous. It should clearly be acknowledged that what the European Union can get from the various countries is highly different and that this will involve also different policies. This seems to me an aspect that needs to be more explicitly recognized than currently it is in the *Green Paper*. I follow what has already been suggested by the Crest Working Group on Internationalization of R&D to differentiate among various large areas of the world:

- Non-EU OECD economies, including North America, Japan, South Korea, and advanced European countries such as Switzerland and Norway. The EU member countries have comparable scientific and technological expertise. These countries, together with the EU, generate the bulk of scientific and technological developments and they will continue to do so also in the near future. Within this area there is also a fierce next-to-neck competition for technological innovations and market shares, but there is also an abundant knowledge that could be developed in common. Regardless of what will be the policies implemented by national and European authorities, the bulk of international cooperation will continue to occur with this area for the simple reason that it is here that there is the largest share of scientific and technological advance.

But this does not imply that there is no scope for an active EU IC policy. In particular, any time the EU is willing to share some knowledge among its 27 member countries, it is difficult to find a rationale for not sharing it also with the OECD 30 member countries (as many as 19 states are members of both the EC and the OECD). It may be argued that the real European rivals in technological races are the United States and Japan, which is by all means true. But the evidence reported on international technology alliances do indicate how difficult it is to induce companies in the Old Continent to be part of a European Research Area, which may in turn indicate that the strongest economic competition is within Europe rather than outside it. And there is no evidence that excluding major competitors from institutionally-driven knowledge sharing agreements will improve the prospect of the ERA.

- Emerging economies such as China and India. In spite of the fast growth of the last years, the contribution of these countries to scientific and technological knowledge, as measured for example by bibliometric indicators and patents, is still limited. But in terms of creating new scientists and engineers the growth of these countries is impressive. We can predict that in the XXII century the large majority of scientists and engineers will be of Chinese and Indian origin. Not surprisingly, a recent UNCTAD survey on the internationalization of R&D has shown that multinational corporations plan to increase both their R&D investment in, and technological collaborations with, China and India. May be the European public policy makers, both at the national and Union levels, should meditate on these announced trends of business and try to increase considerably the links with these areas, allowing a greater number of students from developing countries to join European Universities and research centres.

More than 10 years ago, top American universities started to enrol a larger number of Asian students and this provoked a growing concern among USA policy makers. The School of Engineering of MIT was renamed Chinatown, and the government started to be worried that the United States was training its future competitors. Was it advantageous for the USA to train so many doctoral students born abroad? Policy analysts relaxed only when a survey showed that the large majority of doctoral students from China and India had firm plans to make their carrier in the United States. EU member countries have still a lower penetration of doctoral students from developing countries, in spite the fact that the demographic decline will make our societies even more dependent from foreign born qualified workforce. In light of the European demographic decline and the crisis in science as a vocation, a possible solution could be found in a smart migration policy which will guarantee access to promising students from Asian countries.

- A third group of countries comprises our neighbours. The science and technology system of the former Soviet Union is still in transition and the market economy has not yet managed to take over the previous centralized system. In Turkey there is also the need to upgrade the innovation system. It seems that the core role of European IC for these countries is to provide stability by associating the existing academic community to the European van. Cooperation seems to be important mostly for its socialization effect. It will be more effective if associated to broader EU policies such as free trade agreements and the overall cultural and political cooperation.

- Last but not least, there is the group of developing countries. The gap in terms of scientific and technological capabilities with the EU is still huge.

Once it is accepted that there are different regions in terms of S&T capabilities, it will come out that the justification and the scope of IC is very different. Likewise, it will emerge that S&T cooperation may be integrated in different aspects of the overall EU strategy. In the case of emerging economies, it may be linked to immigration policy, in the case of other developing countries to the overall development assistance, in the case of the European neighbours to trade negotiations and cultural cooperation. And in the case of the Triad, to the need to develop some common path-breaking S&T advances. But we should also be aware that in the Triad there will also be the greatest rivalry to exploit new knowledge to secure market shares.

The Tasks of the Expert Group "Opening to the World: International Co-operation in S&T"

The Experts have a wide range of professional background, ranging from economics, international relations, science and technology policy studies and policy implementation.

The starting point, for the Expert Group as well as for anybody who has read the Green Paper, will be the six basic questions raised in the session devoted to international cooperation:

“30. How can the European Commission and Member States work together to (i) define priorities for international S&T cooperation in close coordination with the other dimensions of external relations; (ii) ensure the coordinated and efficient use of instruments and resources; (iii) speak with one voice in multilateral initiatives?”

31. How can the European Commission and Member States work together to explore the potential of initiatives for international research programmes on

issues of a global dimension, involving the Community, Member States and third countries?

32. How should S&T cooperation with various groups of partner countries be modulated to focus on specific objectives? Should complementary regional approaches be explored?

33. How can neighbouring countries be best integrated into the European Research Area as part of the European Neighbourhood Policy?

34. How can the EU's bilateral S&T agreements be made more effective? Are there alternative or complementary instruments that can be used, such as joint calls for projects, involving where possible the Member States?

35. How can common European agendas for S&T cooperation be promoted in multilateral organisations and agreements as well as with regional organisations?"

However, as already stressed by the CREST Working Group on R&D internationalization, there are other parts of the Green Paper that are also relevant to IC. The need to attract "research talents" (point 8) is certainly relevant. The participation of third countries to research infrastructures (point 15) is also directly associated to IC.

It may also be useful to make it clear what will be the mandatory tasks of the Expert Group:

- TASK 1: review and assess the current situation regarding international S&T co-operation, providing an overview of recent initiatives, current challenges and existing trends;
- TASK 2: identify issues at stake which may require new policy initiatives on IC, in particular in relation to the European Neighbourhood Policy;
- TASK 3: identify and develop policy options and instruments to address these issues, as well as evidence justifying the need for such measures;
- TASK 4: assess the various policy options and their potential impact, including the S&T agreements;
- TASK 5: analyse international S&T co-operation issues arising from the ERA on-line consultation results;
- TASK 6: take account of debate and major outcomes arising from three workshops (see 3.3);
- TASK 7: oversight and assist the impact assessment activities for the international S&T co-operation section/communication resulting from the ERA Green paper consultations;
- TASK 8: play a leading role in the Stakeholders' Conference;
- TASK 9: summarise and integrate results from the various consultation activities and make final recommendations.

Once the framework about the justification and rationale for extra-EU international cooperation is set, it will become easier to provide useful discussion to the issues listed in the *Green paper*.

To conclude, the EU is a strange political animal, very different from the Leviathan described by Thomas Hobbes. This is strongly reflected in several of its policies, including the science and technology policy. As a "civilian power", to use Mario Telò's expression, the EU has an interest to promote knowledge not only to support competitiveness, but above all to foster cooperation. It is debatable what should be the boundaries of this cooperative knowledge area. One view is to reinforce cooperation within at the expenses of cooperation outside Europe. I have stressed that there is no reason to assume that this will serve the long term interests of the Old Continent. The alternative view is that the EU can try to become the core of the knowledge, integrating its own competencies with those of other countries.

Seven years ago, here in Lisbon, the European Council declared the ambitious goal of making the EU the largest knowledge economy in the world. We are still far from reaching such an ambitious target, but it seems that in order to achieve it, another target should be also achieved: the EU also needs to be the most receptive and open innovation system of the world. This seems to be the key justification for promoting international collaboration in the field of science and technology. Increase exchanges, invest in human resources, and recruit talents abroad are necessary steps to nurture the European Research Area.

Discussant Paper

Prepared by **Manfred Horvat**
Professor, Vienna University of Technology

Strengthening the coordination of Community and Member States' policies and programmes for international S&T cooperation¹

Globalisation has become an important issue also in S&T. It is well understood that science, research, technological development, and innovation are key factors for the knowledge society and economy. At the same time, new knowledge powers like China, India, Russia and Brazil are emerging. The global landscape of knowledge production is in a process of dynamic and fundamental change.

National initiatives to develop strategies for the internationalisation of S&T are rather recent activities only.

The European Commission has long-standing experience with supporting international S&T cooperation in the **EU RTD Framework Programmes** by targeted specific programmes

¹ This statement is partially building on the contributions to and the discussions during the Workshop "Strengthening the coordination of Community and Member States' policies and programmes for international S&T cooperation: Impediments and opportunities" organised in the framework of the activities of the ERA Expert Group "ERA –Opening to the World" in Brussels on 19-20 September 2007

(INCO) and as integrated parts of thematic programmes or of mobility schemes (Marie Curie) as well as recently also in the "Ideas" specific programme. There are also **S&T agreements** between the European Community and third countries. While the international cooperation activities in the Framework Programmes were successful the impact of the S&T agreements could be substantially improved by active promotion on the basis of concrete action plans and adequate tailor made implementation instruments.

However, Community funded S&T activities are only a fraction of European research efforts. Carefully designed **measures for coordination and cooperation of national policies, strategies and programmes** will create new opportunities for increasing the efficiency and effectiveness of the European S&T system in general and for strengthening its capacities for international S&T cooperation in particular.

The challenge will be to enhance the **international visibility of "European S&T"** as a globally competitive "brand". In the newly developing world-wide S&T arena Europe has to ensure to be heard as a "strong common voice" and not just as "noise" created by many relatively small actors.

Due to the different requirements of international S&T cooperation in different thematic and horizontal areas it will be important to develop communication, coordination and cooperation initiatives in respective **"variable geometry" arrangements** as appropriate while at the same time safeguarding also spaces for competition between member states.

International S&T cooperation activities are motivated by the potentials for

- accessing and utilising new and/or complementary knowledge resources;
- ensuring critical mass of intellectual and material resources for addressing major research challenges;
- access to, or sharing the cost of, major research infrastructures;
- addressing global challenges and problems of developing countries;
- accessing new markets;
- attracting researchers and research intensive organisations to Europe;
- Following specific historical, cultural, geographical, and geo-political reasons.

The **rationale for coordination and cooperation** of Community and member states' international S&T activities are negative aspects of the fragmentation of the European S&T system. In many cases, single, duplicated or parallel research efforts are neither efficient nor effective. In addition, many activities lack critical mass of complementary partners for addressing complex global research challenges and problems.

Modes for communication, coordination and cooperation between member states at policy, activity, and programme levels can be manifold, such as especially:

- exchange of information on national goals and objectives, and policies as well as initiatives, actions, and programmes in the area of international S&T activities;
- mutual learning;
- reducing complexity by joint S&T intelligence, analyses, diagnoses, and foresight;
- preparing the ground for coordination and cooperation by removing barriers as well as aligning legal and administrative frameworks;
- developing joint frameworks facilitating international S&T cooperation (e.g. Codes of Conduct for IPR, human resource management, mobility of researchers);
- joint support activities for international S&T activities, e.g. common European S&T houses in third countries, specific help desks (e.g. for IPR services in China), joint European missions to third countries;
- joining forces to ensure critical mass for coping with global challenges and specific problems of target countries or regions;
- developing differentiated coordination of objectives, policies, activities and programmes according to the specific requirements of different areas;
- joint calls for proposals;
- mutual opening of programmes and supporting excellence in research through competition;
- organising joint programmes (e.g. ERA-NET actions);
- Developing joint policies, agendas and integrated programmes (e.g. Art. 169).

As an example, in FP6, the remarkable response to the **ERA-NET scheme** by member states' programme owners and managers shows that there is an **obvious demand for and added value of coordination and cooperation**. In the area of international S&T cooperation, such a demand became particularly evident because such activities were not considered as part of the scheme from the outset but evolved in the course of the 'bottom up' approach. The ERA-NET actions addressing different regions such as the Western Balkan Countries, China and Latin America have successfully started and are now on the learning curve in different stages of implementation.

According to the first review ² of the ERA-NET scheme at the end of FP6 there is an urgent need for the member states in cooperation with the European Commission to ensure a favourable **common legal and organisational framework** for the evolving cooperative national programmes. The spectrum for possible ways towards achieving such a goal spans from commonly agreed guidelines or rules to an operational enforcement of Art. 165 of the Treaty and a joint implementation structure.

Building on experiences from different areas of policy and programme coordination it is possible to identify some **conditions for success** of initiatives towards coordination and cooperation of policies and programmes:

- agreement between member states' representatives on rationale for coordination and cooperation of international S&T activities;
- clearly defined terms of reference – agreed goals and objectives;
- recognising the existing different contexts of policies, structures, regulations and actors as well as the multitude of aims of international collaboration;
- involving the core national actors and developing a common understanding of the expected added value of coordination and cooperation activities considering the benefits for the policy and management level as well as – most importantly - for the S&T communities;
- considering existing schemes like and ensuring complementarity and added value of new activities;
- acknowledging the different coordination needs of different scientific and problem areas including the different adequate levels and extents of coordination;
- agreeing on modes of implementation and “enforcement” (e.g. informal exchange of information, mutual learning; assessment of policies and programmes by means of peer review; naming and shaming or other “sanctions” for non-delivery);
- considering monitoring and evaluation based on agreed criteria from the outset;
- providing sufficient administrative capabilities; and
- Balancing benefits against costs of coordination and cooperation – and of non-coordination and -cooperation.

The further development of international S&T activities in the European Research Area (ERA) will be characterised by the co-evolution of regional, national, intra-European and Community policies, strategies and programmes within a **multi-level system of S&T governance** in Europe. Well conceived and differentiated coordination and cooperation measures in the course of this complex process will be essential but will require an adequate operational and organisational framework. Therefore, establishing joint structures between member states and the Commission, such as a **“European Strategy Forum for International S&T cooperation”** as proposed by the CREST Working Group on Internationalisation of R&D would be an appropriate approach for addressing these challenges.

A coordinated international approach and appearance of European S&T will certainly contribute to the Lisbon objectives and the strengthening of the European Research Area.

² M. Horvat, K. Guy, J. Engelbrecht, V. Demonte, R. Wilken: ERA-NET Review 2006. The Report of the Expert Review Group. Brussels 2006

challenge in a global frame that is a frame of strong interdependence, and **(3)** it should consider tackling the given challenges thinking at a scale that is big enough to talk to the entire globe.

The three need the backing of a political protagonist naturally projected onto the worldwide stage. **The EU can be the political force able to build up the necessary framework for cooperation** among European companies and between European and third-country companies, and thus among their researchers.

Strong EU backing would serve **three main sets of results**: **(A)** it would enhance the benefits of a sufficient level of coordination between independent national strategies, **(B)** it would help building a cooperation package to offer to neighbours, and **(C)** it would enhance European ability to establish worldwide standard.

If the EU is the right political actor to enhance European ability to innovate, **European companies are natural counterparts**. Overall, it is private companies that in Lisbon have been invited to participate with two thirds of the 3% target in national budget for R&D.

Notably it is only private companies that can effectively bring new technology to the market. **It is companies that can transform economic potential in economic strength and economic success**. From establishing an open and stable dialogue among European undertakings we shall all profit.

The EU is on the right track with understanding both its role and the role of European companies in this respect. StatoilHydro experience is such that we can say so. Thinking goes in particular to **two initiatives** StatoilHydro has been involved in.

The first is the **Zero Emission Platform**, the second is the **European CO2 Test Centre Mongstad (TCM)**. They are both cases of public-private cooperation but they exist at two different stages of a process that could potentially lead to fruitful cooperation.

One works as an advisory body bringing together representatives from the industry and at the service of the Commission, the other is a successful case of public-private partnership initiated by the Norwegian Government and Statoil. Both have to do with the development of Carbon Capture and Storage, a technology that is fundamental for the future of fossil fuels and also a technology of which the EU cannot do without if it is serious about reaching the 2020 and 2050 target for CO2 emissions. The first one is an initiative entirely sponsored by the EU, the second has received high appreciation by the Commission and we hope that with appreciation concrete support will follow.

Discussant Paper

Prepared by **Arve Thorvik**
StatoilHydro EU Affairs Vice-President

Improving International Cooperation in S&T

Science knows no boundaries but science is embodied in people and people do experience what barriers can mean. International cooperation in Science and Technology is what we have and what we need to overcome these barriers.

This topic is here tackled **exclusively from the angle of a European company** and linked to a shared willingness to increase European competitiveness. This statement is built first by briefly looking at the importance for EU to show leadership in steering research activities and secondly by looking more extensively at how the EU can help European companies to better serve its priorities in this area.

Globalisation exists on three levels: actors, challenges, solutions. This is true when we talk about any of the issues currently at the top of the political agenda in any given country or region.

Any strategy willing to properly address the matter it has been called for and willing to be successful **cannot but deal with all the three at the same time**. **(1)** It should talk to actors able to partake into a global arena, **(2)** it should understand the given

One strong reason why these two experiences can be successful is that they reflect a pragmatic coincidence of interest shared by both StatoilHydro, and other participating companies on one side, and the EU on the other side. All future initiatives should be looking at this coincidence of interest as a key element for cooperation. Also, this should serve as a useful hint for all experiences that might want to bring together the EU, European companies and governments and companies from third countries. We need to overcome a common prejudice and understand that research is a business opportunity that needs to be treated as such in order to deliver.

With this in mind, StatoilHydro contribution to the consultation launched by the European Commission with the Green Paper *The European Research Area: New Perspectives* of which this conference should dedicate a final say turns around three main aspects.

Science and Technology research in fast evolving sectors needs to be accompanied by a **solid regulatory framework**. Economic and social progress is not only related to technological research, but also to rules. This we would like to see as informing the EU strategy on innovation. We in StatoilHydro believe that a balanced combination of private endeavour and regulatory effort is the correct driver for sound growth. *International cooperation for the development of new technology can be established if actors can walk on a known territory.*

Secondly, given the large size of the investment required in any sector with high technological content **state aid, or public aid, can play a pivotal role**. It can do so both by providing indispensable financial resources, but also by helping companies to prioritise within their portfolio of research activities. For this to happen public aid must be framed within stable, sustainable, and transparent rules, and not fought for at any given annual budget review. *Incentives have to be there and have to be clear.*

Finally, the **EU should enhance its role as “door opener”** to *build bridges towards partners anywhere in the world* as technology can win only if markets are accessible. To this end the EU should become accustomed to the habit of associating delegations of the business community to any of its bilateral forum with strategic partners, in particular with those fast growing economies like China and India. Inviting business representatives to participate to bilateral summits or sit in joint committees established under S&T agreements could be a way to do so. This of course should be done granting an open and equal access to all European leading actors.

On this third point I would like to add a few more comments. European Technology Platforms could in theory become alternative forums to speak to third countries. Despite so I fear that extending the mission

of ETPs would not be feasible unless further substantial financial contribution is provided. Moreover, ETPs are not forums for doing business and should not be. They have been established with a different function that is aligning EU research priorities to industry's needs and should stick to this.

Differently Joint Technology Initiatives (JTIs) do have the potential to absolve a bridging function between European companies and third country companies in a business oriented manner. This can be, provided that their establishment is simplified and, clearly, that the requirement that research should be performed in Europe only is treated with some degree of flexibility.

To these three suggestions, a *caveat* needs to be added. Scientists and researchers are by no means different from any other human being. Competition makes them work better. Notably, scientists and researchers are also jealous of their findings. These two elements should tell us that cooperation is something we should not misunderstand or misplace. With this in mind StatoilHydro believes that a financially sound, transparent and open **system of public tendering and contracting organised at the European level**, involving on equal footing companies, vendors, public bodies and research institutes, and informed by the priorities outlined by the Commission, together with a reliable and clear **system of attribution of intellectual property rights** could work as decisive drivers for technological innovation. These measures have to exist as pre-conditionals and be understood as the ABC of successful R&D.

Discussant Paper

Prepared by **Sophie Thoyer**

Professor of Agricultural Economics, ENSAM – Ecole Nationale Supérieure Agronomique de Montpellier, France

Responding to global challenges³

One of the questions raised by this conference concerns the priority area which should be targeted by a policy of international cooperation in science and technology. There are three reasons why specific challenges should benefit from concentrated global scientific efforts.

1) The first reason is economic. When a scientific challenge requires heavy human and financial investments in research and technology, which cannot be supplied by one country alone, it is rational to seek international cooperation in order to share fixed costs, and to benefit from economies of scale through effort synergies and adequate division of labour.

2) The second reason is when the challenge is to prevent, repair, or mitigate global issues, resulting from a global phenomena or from the global effects of local actions. For such issues, solutions cannot be

³ A workshop organized by DG Research and entitled « Responding to global challenge – the role of Europe and of International Science and Technology Cooperation » (4-5 October 2007) is dedicated to this question. Its conclusions are not available at the time of writing.

effective if they are implemented by one single country, independently of other countries' strategies and choices. There is a need therefore to coordinate research and technological responses at the global level.

3) The third reason is when there is scientific controversy on the causes of the global issue at stake or on the solutions. Helping to establish an international epistemic community on this issue is the first step towards a shared strategy.

Beyond concerns of mere assistance and technological transfers, international cooperation in research is justified for economic reasons, for coordination purposes or for consensus-building.

Without wanting to provide an exhaustive list of these challenges at this stage, I would like to highlight a few research priorities:

- There is an urgent need to understand better the structure and the dynamics of global environmental, social and economic issues. It requires interdisciplinary and systemic research, based on a very thorough analysis of facts and primary data. Reliable data base at the world scale have become an essential input into good quality research. Although the maintenance of such data base is often under the coordination responsibility of UN organizations, the EU could improve its contribution by initiating data collection or by improving the quality of existing data bases. The EU has a long tradition of setting standards for data collection and of managing data base at the European level for its policy needs. Such experience could be used profitably at a greater scale.

- It is absolutely crucial that response strategies to global challenges include both science and technological aspects as well as policy aspects. Two types of research have to be pursued together: how to change incentives in order to promote individual behaviour, social and economic organization, which are more compatible with sustainability objectives? How can scientific progress help in reaching these objectives more rapidly, at lower financial, human and environmental costs? It is essential that research efforts be put on those two dimensions together: how to design policies ensuring that technological answers are made more effective, are readily adopted and do not produce backlash effects? The example of biofuels (inducing price increases, massive deforestation in Brazil, and hunger in food-importing countries) illustrate the necessity to promote the two facets of research. Policy-oriented research requires international collaboration because it needs a thorough understanding of national specificities.

- The third challenge is to organize research in the face of new risks. The humanity is facing rapidly evolving issues, with increasingly interdependent risks of major failure, be they economic crisis or natural disasters. The research community – public and private - needs to react in emergency and to deal with irreversible effects of these crisis. Only genuine

international cooperation based on team networks can help research and technology to produce workable results. The EU therefore needs to promote such networks, capable of pooling human resources rapidly and efficiently to respond to an emergency situation.

Another question concerns the organization of collective action for research. Do all research areas require the same model of international cooperation? By analogy with the literature on global public goods, I suggest to distinguish three forms of S&T cooperation, according to the type of knowledge, innovation and technology required.

- for some research issues, the knowledge production function is additive. In other words, each research effort adds identically and cumulatively to the overall level of knowledge on this issue. Synergy effects⁴ are insignificant. What is important here is to ensure that countries do not free-ride and other countries' efforts. The role of the EU here is to encourage the development of research elsewhere through research assistance and technological transfers.

- Another archetypical production function is the "weakest-link" scenario. Effective knowledge is limited by the level of effort of the smallest contributor. This is mostly the case for situations of technological transfers such as the control of epidemic diseases. Their eradication depends mostly on the effort of the least stringent country. The question here is to foster research and technological transfers in these countries through assistance.

- The third situation is the "best-shot" scenario. The level of knowledge is determined by the greatest individual efforts. It is the case when research requires huge initial investments. The countries /research centres that have invested the most are more likely to make a breakthrough whereas all smaller contributions to research will be made redundant and will yield only marginal benefits. Gains in effectiveness then depend on the capacity to pool resources and to direct them towards the efficient S&T producer in this area.

Such typology, although quite coarse at this stage, could be useful to help designing more efficient cooperation agreements in S&T..

⁴ There are positive synergy effects when the cost of producing knowledge A and knowledge B together is lower than producing it separately

