

**FIVE-YEAR ASSESSMENT OF  
THE EUROPEAN UNION  
RESEARCH FRAMEWORK PROGRAMMES  
1999-2003**

**December 15, 2004**



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# THE FIVE-YEAR ASSESSEMENT PANEL

We, the undersigned, the Five-Year-Assessment Panel (1999-2003), are pleased to present our report to the European Commission

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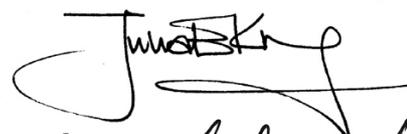
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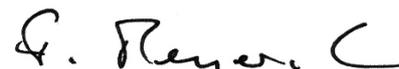
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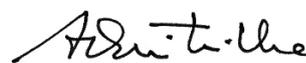
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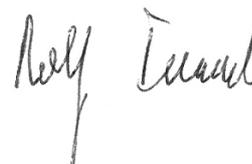
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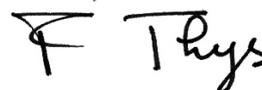
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## ***CHAIRMAN'S INTRODUCTION***

We were asked by the Commission to review the implementation and achievements of the EU Research Framework Programmes over the period 1999 – 2003, at a time which is in many respects very challenging for EU research policy in general and the Framework Programmes, in particular. European institutions are going through a fundamental change at the same time as Europe's economic and research landscape is facing unprecedented challenges as a result of dramatically increasing global competition for prosperity and talent. The Lisbon process is under mid-term review. Europe is, indeed, at a crossroads.

We were excited about the task and inspired by the rich fabric of evidence available analysing the European challenge. We were very pleased to observe that all previous expert work and policy studies pointed to one fundamental conclusion: research and innovation are at the core of all responses to the European policy challenge. This observation gave us a great deal of confidence in our argument that Europe needs to mobilize its financial resources and intellectual capacity to promote science, technology and innovation. This is a precondition to all the other social and political aspirations we want to pursue in order to be able to maintain and develop economic prosperity and quality of life for all European citizens.

We hope that our report will help to improve the performance of the current Framework Programme as well as contributing to the emerging debate on Framework Programme 7 and the future of the European research policy.

We wish to thank the Commission for an exciting assignment and the continuous support in providing additional evidence of the conduct and performance of the Framework Programmes. We were certainly not short of relevant materials. We wish also to thank all the eminent experts who helped us to understand better the European landscape and the implementation of the Research Framework Programmes. Their contributions to our panel's discussions were invaluable, indeed.

I felt very privileged to be able to work with my fellow panel members. Without their profound insight and experience the work would simply have not been possible. I learned a great deal from our discussions and I am deeply grateful for the openness and honesty during the whole process. Without such a spirit the outcome would certainly be much more modest. Maybe we from our small part were able to promote the new understanding of the importance of transparency and trust that we find so important in future collaborations involving people from different backgrounds.

Finally, I wish to thank our rapporteur who made miracles in consolidating our wild discussions into a consistent report.



## *EXECUTIVE SUMMARY*

The current Treaty of the European Union identifies two core strategic objectives for the European Research Framework Programmes: (i) strengthening the scientific and technological bases of industry to encourage its international competitiveness and (ii) supporting other policies of the European Union.

This Report, the third Five-Year Assessment of the Research Framework Programmes (European Community, Euratom), reviews the implementation and achievements of the Framework Programmes over the period 1999-2003. The recommendations cover the remainder of the Sixth Framework Programme, to 2006, and suggest improvements to the nature and direction of future Framework Programmes. In making these recommendations, the objective is to provide well-informed input to strengthen the quality, relevance and impact of current and future Framework Programmes.

### *The Challenge*

During the period covered by this Report the European policy landscape has changed significantly as a result of the introduction of the Lisbon and Barcelona objectives and the establishment of the European Research Area (ERA).

Moreover, the overall European economic and research landscape is in flux. Global knowledge-based competition is changing fundamentally the environment in which European research and industry operate. Europe and the rest of the industrialised world can no longer take their technological leadership for granted. Whilst Europe still maintains leadership in certain industrial areas, supported by a well-educated workforce, concern about the future arises from the rapid expansion of European industry research and technological development and demonstration (RTD) outside Europe and the inability to attract the best talent into Europe from around the world. The increasing availability of high-quality, industrially relevant knowledge, efficient innovation environments, and easier access to markets outside Europe are contributing to a gradual loss of European competitiveness.

Europe is, increasingly, falling behind its main competitors. Europe's performance, in terms of growth, productivity and job creation is not sufficient to maintain prosperity in the future. These developments, and the challenges they raise, are reported in some detail in recent reports, such as those by Sapir (2003) and Kok (2004). The broad consensus is that research, education and innovation are at the heart of any response to these challenges.

European universities and research institutions have traditionally been able to develop and maintain the European knowledge base. In many fields this is still the case. However, only a few European universities are recognised as global leaders. This is, at least in part, a result of insufficient resources combined with the fragmented nature of the European RTD landscape. European universities and institutes are yet to fully respond to global competition for knowledge and talent.

In a knowledge-based economy innovation depends critically on collaborative networks involving academic and business enterprise research. The conventional view of a linear process of academic-based knowledge creation subsequently picked up and exploited by industry has given way to a new practice of interactive innovation facilitated by public/private partnerships, knowledge sharing and mutual learning.

Meanwhile, the new Member States are in the process of transition. They must, simultaneously, create an enterprise-friendly environment whilst building conditions for the knowledge-based economy. Institutional reforms and the allocation of sufficient resource to knowl-

edge creation and sharing are both necessary steps in building a sustainable economic future. The intelligent use of structural funds combined with other EU and national instruments could provide solutions to these challenges.

The general public in Europe is becoming concerned about the social and economic impact of scientific and technological advances, as well as about how decisions relating to these developments are taken. In some areas the lack of public support is clearly apparent. For Europe to achieve the leadership in science and technology that is crucial for future prosperity, these concerns have to be addressed at both European and national levels.

In order to reverse the trends, Europe – the EU and the Member States together – must take coordinated actions to meet four key challenges to:

- attract and reward the best talent
- create a high-potential environment for business and industrial RTD
- mobilise resources for innovation and sustainable growth
- build trust in science and technology

The Commission's proposal to substantially increase the European research budget in the future is a welcome step in the right direction. This provides an opportunity to strengthen, significantly, the European knowledge base and European competitiveness. However, it can only succeed if this increase is accompanied by increases in the RTD budgets of the Member States. The signals are clear: the European Union as a whole must invest more in RTD to respond appropriately to these challenges.

#### *Assessment Conclusions*

The Panel concludes that the EU Research Framework Programmes have played an important role in developing the European knowledge base over the period of the review (1999-2003). The Framework Programmes have corrected some of the deficiencies in the European RTD landscape and have contributed significantly to bridging the gap between RTD and innovation. The strong emphasis on information and communication technologies and on life sciences has, for example, been instrumental in strengthening European capabilities. There has been strong interest from industry, universities, and other research institutes. The Framework Programmes have played an important part in the generation and diffusion of new knowledge and the formation and reinforcement of inter-organizational networks, both amongst European players and including players in associated States. All reports seen by the Panel, whether at Community or Member State level, consistently emphasised the significant additionality and European added value for the Framework Programmes.

Despite notable successes, however, the achievement of the Framework Programmes has been more modest in terms of direct contribution to innovations with the potential to deliver dominance in global markets. There has been much discussion of this apparent 'weakness'. However, evaluations and impact studies are generally conducted too early for major economic impacts to be evident. Moreover, the production of specific innovations has never been the core focus of the Framework Programme, which has been the strengthening of the European research system as a whole. Given the budgetary limitations of the Programme – less than five percent of the total government RTD expenditure in the EU area – we consider the achievements of the Framework Programme in this 'structural' role very important indeed.

## *Panel Recommendations on the Framework Programme*

Based on the review detailed in this Report, the Panel makes the following recommendations to strengthen the relevance and impact of the Framework Programme, and to improve user-friendliness:

1. ***The aspiration for European RTD must be better articulated and clearly reflected in the Framework Programme.*** *The Framework Programme would benefit from a better focus at the overall priority level and reduced specificity at individual programme level.*
2. ***The Framework Programme should primarily promote European leadership at a global level in science and technology.*** *This requires excellence in research, longer-term research agendas, and more emphasis on radical innovation and risk-taking research in the projects supported by the Programme*
3. ***The industrial orientation and participation in the Framework Programme must be enhanced.*** *This requires restoring industrial relevance and leadership in programmes aimed at innovation and competitiveness. In particular, high-tech SMEs should be able to find direct participation more attractive.*
4. ***A simple and robust definition of European Added Value is needed for the design and implementation of future Framework Programmes.***
5. ***The administration of the Framework Programme should be streamlined and simplified.*** *The streamlining and simplification of the application procedure, management and financial control of the projects must be vigorously pursued. There is a need to improve procedures, including the establishment of permanent panels in some thematic priority areas or actions for the evaluation process throughout the duration of a Programme.*
6. ***The selection of instruments should be made more flexible to facilitate the specific characteristics of the funded RTD.*** *The new instruments should be maintained in the next Framework Programme, not least for stability. Research proposers should have the freedom to select the appropriate instruments.*
7. ***Human resources and mobility programmes should be extended in scale and scope.*** *Links to national/regional programmes should be encouraged for greater leverage. Programme design must ensure that industry finds it attractive to participate. Stronger emphasis on mobility between the public and private sectors and from and to third countries is needed.*
8. ***The Framework Programme must continue to address the issue of trust and legitimacy of science and technology in Europe.*** *Science and society issues must continue to be addressed in a separate programme whilst also being embedded in all other programmes. Action is needed both at EU and Member State level.*
9. ***The Commission should launch a consultation with the main stakeholders in order to improve the IPR procedures within Framework Programmes.*** *However, the basic principles on IPR rules for the Framework Programme seem appropriate.*
10. ***The assessment of the Framework Programme should be further developed systematically and should reflect the new understanding of the interactive nature of innovation.*** *Assessment should also address the structural impact of the Framework Programme on the European economic and research landscape.*

### *Future Perspectives – Framework Conditions*

The challenges for European research and innovation policy can only be addressed by a systemic approach reflecting the interactive nature of innovation and the complexity of the European innovation system. RTD policy should be coordinated with other socio-economic policies that affect the European innovation environment. These include competitiveness, intellectual property protection, competition, state aids, human resources, education, gender, and ethics. Demand-side policies, especially public procurement of RTD and innovative goods and regulation, also have a critical role to play in promoting innovation and the emergence of lead markets. We would like to see the Commission (i) address more clearly the contribution of the Framework Programmes to the broader EU policy formulation process; (ii) examine ways to enhance pull-through of innovative technologies through demand-side actions; and (iii) intensify efforts together with Member States to train more researchers and to retain them by making research careers more attractive.

We strongly advocate the swift implementation of the European patent with the requirement of a single language. The patentability of computer implemented inventions and of genetically modified organisms must be swiftly resolved. Fast and appropriate IP protection is an essential support for innovation and investment in RTD.

The Community State Aids rules are under revision. RTD networks, involving companies of all sizes with academia, and the new understanding of the interactive nature of innovation, challenge the traditional funding rules. Those limiting public funding to pre-competitive RTD and defining the level of support depending on the recipient firm should be reviewed. Europe's development should not be inhibited by the application of stricter rules than those of its main competitors.

Finally, based on the evidence reviewed, the Panel offers a few recommendations on future EU research policy:

- I. ***The ERA process must continue.*** *The coherence between national science and innovation policies and the Framework Programmes must increase. The Framework Programme should cover high European value RTD activities, with tailoring for local effectiveness and take-up occurring at national and regional levels. We endorse the actions in the Commission's communication on the future EU Research Policy. The actions must be appropriately designed to develop high-quality, internationally competitive research environments in Europe. They should provide Europe with a policy response to the key challenges identified above.*
- II. ***Europe must strive for the best integration of the New Member States.*** *Inclusion in all EU policies and instruments is a prerequisite for effectively tapping the significant human and economic potential of these countries to build a more competitive and cohesive Europe, enjoying sustained development. The Framework Programmes should help accelerate the process of integration.*
- III. ***We support the establishment of a European Research Council.*** *The Council needs sufficient resources to make a difference to the European science base. It must promote excellence in science, be cost efficient and encourage the development of world-class research environments. Scientific fields with potential for long-term impact on competitiveness and innovation should also be strongly supported.*

- IV.** *We support the idea of establishing a limited number of ‘technology platforms’, with the objective of establishing European leadership in key emerging technologies, thereby increasing private investment in RTD. These large collaborative programmes should be industry-driven, with public/private partnerships for both funding and execution. They should involve academic institutions, large and small companies and, often, participants from outside Europe. Excellent management of pooled resources, from Framework Programme, national sources and industry will be needed to make an impact.*



## 1. INTRODUCTION – PANEL MANDATE

This Report, the third Five-Year Assessment of the Research Framework Programmes, reviews the implementation and achievements of the Framework Programmes over the period 1999-2003. The Report makes recommendations for the remaining part of the Sixth Framework Programme up to 2006 and suggests improvements over the nature and orientation of future Programmes. The Report is intended to help improve the quality and relevance of European research at present and provide input to the formulation of proposals for subsequent Framework Programmes.

The Five Year Assessment was carried out by a Panel of 13 independent, high level experts from a range of different fields in science, technology and the social sciences and coming from different Member States including the New Member States. Most of the Panel members hold senior management, advisory and research positions in the private and public sectors, with many also actively involved in research and teaching activities. The Panel undertook its assessment on the basis of a very comprehensive and extensive range of evidence that was organised for the exercise including specific studies; analyses by independent experts; presentations from independent experts; presentations from European Commission staff; and a specially developed database of evaluation and policy documents covering Community and Member States' research activities. Panel members also undertook their own research and data gathering including interviews with European Commission staff and discussions within their own countries and constituencies. The reports of the studies and analyses prepared for the Panel and the database of documents have been made publicly available and can be accessed at <http://forum.europa.eu.int/Public/irc/rtd/fiveyearasskb/library?!=/&vm=detailed&sb=Title>. A full list of the written documentation and information used by the Panel is provided in Annex 5.

The Panel carried out its work between June and November 2004 and held six, one or two-day meetings in Brussels.

Following its mandate to appraise the implementation, achievements, evolution, and future perspectives of the Framework Programme for Research, the Panel decided to report findings on the basis of overarching horizontal issues that underlie the logic of the Framework Programme and ultimately determine its success in meeting the overall policy objectives of the European Union. Several such overarching issues were identified:

- Overall Orientation and Tendencies of the Framework Programme
- Industrial Orientation and Participation
- University / Public Research Organisation Participation
- European Added Value
- Implementation
- New Instruments
- Barriers to Participation
- Human Resources
- Science, Technology and Society

The Panel also found it useful to consider the Framework Programme within the more general context of European research including issues such as basic research and education, competitiveness, intellectual property protection, and competition policy and state aids.

## 2. CONTEXT AND CHALLENGES

The period covered by this Report reflects significant developments in Europe:

- The Lisbon European Council of the Heads of State and Government (March 2000) set the target for the Union over the next decade “to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion”. RTD policy was attributed a key role in the transition towards a knowledge-based society.
- The Barcelona European Council of Heads of State and Government (March 2002) reviewed progress towards the Lisbon goal and determined that RTD investment in the European Union should be increased to approximately three percent of gross domestic product (GDP) by 2010, up one percentage point from its 2000 level. The private sector was called to contribute two-thirds of total EU RTD investment.
- The concept of the European Research Area (ERA) was introduced, aiming at the creation of an area of free movement of knowledge, the restructuring of the European research fabric, and the development of a European research policy in coordination with the policies of Member States.
- The Sixth Framework Programme (2002-2006) was launched, designed to promote ERA while fulfilling the two core objectives set out in the Treaty, namely to strengthen the scientific and technological bases of industry to promote its international competitiveness and to support other policies of the Union such as education, employment and social cohesion, health, and the environment.

Such developments in the policy arena must, however, be seen as part of wider changes in the economic and research landscape.

### 2.1. The Changing Economic Landscape

The main thrust of economic policy in Europe during the past three decades has been towards a generally more market-oriented approach encapsulated by trade liberalisation, deregulation of financial markets, privatisation, and labour market reform. This has been accompanied by attempts to focus government policies on framework issues and less on direct interventions. Policy developments have been influenced by the process of globalisation, observed in the form of increasing interdependence of economic activities and increasing global mobility of economic actors, investment capital, and skilled labour. In this increasingly fluid environment, the well-being of a country or region depends significantly on the localisation decisions of companies which, in turn, depend on the knowledge infrastructures and other location-specific assets.

Global knowledge competition is today changing fundamentally the environment in which both European research and industry operate. In addition to the traditional competitors – the United States and Japan – Europe is facing increasing competition from new emerging economies such as China, India and Brazil. Europe and the other industrialised countries can no longer take their technological leadership for granted, as evidenced by the rapid expansion of RTD expenditures in some European industries outside Europe. The recipients benefiting from this expenditure provide more innovation friendly RTD environments than Europe. They seem able to assemble a better package in terms of location-specific assets including the availability of high quality, industrially relevant knowledge, highly trained labour, a strong innovation environment, and access to markets.

Meanwhile, the New Member States are in a process of transition. They face simultaneously the challenges to create a friendly business environment and build conditions for a knowledge-based economy. Institutional reforms combined with sufficient resource allocations to knowledge creation and sharing are necessary steps to build a sustainable economic future. The intelligent use of structural funds combined with other EU and national instruments could provide solutions to these challenges.

## **2.2 The Changing Research Landscape**

Over the past few decades there has been a strengthening of the link between science and innovation, characterised also by ever faster rates of scientific and technological advance and the search by the private sector for increasing levels of economic competitiveness. This has given rise to a policy debate that has been heavily influenced by our growing understanding of the innovation process.

Modern innovation research rejects the idea that innovation simply flows from some earlier process of scientific or technological discovery – the so-called ‘linear model’ of innovation. Instead, it stresses the interactive and dynamic character of innovation. Innovation is pervasive, including not only the relatively small group of high-tech manufacturing sectors but also sectors traditionally regarded as mature or low-tech that use technologically advanced products and processes. Knowledge-based services are recognised as important drivers of innovation. Innovation is highly uncertain and relies on collaborative networks and interactive learning. Finally, innovation is systemic. In addition to the independent decision-making at the level of the enterprise or the network, it depends critically on broader factors including the institutional and organisational framework, regulatory systems, infrastructures, the processes which create and distribute scientific knowledge and, not least, the social and cultural context.

In this milieu, universities and other public research organisations are core institutions, strategically placed at the intersection of research, educational and regional development policies at both the national and European levels.

European universities and research institutes have traditionally been able to develop and maintain the European knowledge base. In many fields this is still the case. The latest evidence based on scientific publications indicates however that, although in terms of overall volume of publications Europe has surpassed all other regions, if quality is taken into account only a few European universities have been able to reach global leadership. This is partly due to lack of resources, isolation and the high level of fragmentation of the European RTD landscape.

There are however some positive signs. European countries have embarked on extensive reforms of their higher education sectors in an attempt to reform university governance trying to make universities more responsive to economic or social needs. Moreover, and in parallel to ERA, the new ‘Bologna process’ seeks to create a European Higher Education Area across forty countries by the end of this decade, thus contributing to Europe’s transition to a knowledge-based society.

### **2.3. The Changing Social Landscape**

The most critical resource of knowledge-based societies is their people. The performance of a knowledge-based economy is founded on the quality of available human resources, on their knowledge competences, on their abilities to learn. Strong human resource policies, from education to research and to the understanding of the culture of science, are key to success.

It is widely recognised that Europe's ageing population and low birth rate will lead to labour shortages in the decades ahead. It must, therefore, take full advantage of all available human resources. With women now representing the majority of new university graduates in most Western industrialised countries and forty percent of all new PhDs, any remaining barriers to female entry in science and ascendance to senior positions represent an unaffordable waste of human resources and a distortion of the relationship between science and society.

The general public in Europe is concerned about the social, economic and ethical consequences of scientific and technological advances as well as about how the choices are made. Indeed a certain public reluctance to support some of these developments is apparent. The Eurobarometer survey (2001) of European attitudes to science gives a mixed picture, ranging from confidence and hope to lack of interest in scientific activities or even fear regarding some of their impacts. Industrial hazards and ethical issues are widely highlighted in the media, raising questions and reinforcing the public's desire for closer monitoring of progress.

## **3. STRUCTURE AND ACHIEVEMENTS OF THE FRAMEWORK PROGRAMME 1999-2003**

### **3.1. Overall Orientation and Tendencies of the Framework Programme**

The Framework Programme for Research (FP) has undergone significant changes during the past decade and a half, reflecting developments in the European socio-economic context. FP3 (1990-1994) was developed against the background of efforts to extend the Internal Market; FP4 (1994-1998) took place during the period of the Maastricht Treaty and the White Paper on Growth Competitiveness and Employment; FP5 (1998-2002) reflected increasing interest in socio-economic values; and FP6 (2002-2006) has the European Research Area. Meanwhile, the size of the Community has doubled in terms of numbers of member countries.

FP5 and FP6 research activities and goals are broadly consistent with the originally defined higher-level socioeconomic goals of the Programme. The Framework Programme has by now established its position as a key element of the European RTD landscape contributing to the competitiveness and competence base of the Union. Organisations from all Member States participate in the Programme extensively in proportions that are more or less in line with the States' size and RTD capabilities. This also applies to the New Member States, the organisations from which have accounted for a share of participations commensurate to their population.

All in all, the Framework Programmes for Research have played an important role in developing the European knowledge base during the period in question (1999-2003). The Framework Programmes have corrected some of the deficiencies in the European RTD landscape and have contributed to bridging the gap between RTD and innovation.

Thematic priorities have evolved over the years and budgets have risen substantially. Early Framework Programmes had placed a lot of emphasis on information and communication technologies and energy technologies. The share of both these technology areas has decreased more recently in favour of industrial and materials technology, life sciences, environment, transport, and training of researchers. Several other areas are funded at significantly lower levels. The Panel could not identify any major thematic gaps in the parts of the Framework Programmes examined.

However, members of the Panel expressed their concern with what they view as extensive fragmentation of the Framework Programme and over-determination of its lower-level thematic areas. Further fragmentation would lead to marginalisation, declining industrial interest and increasing frustration in the research community. There have been reports of calls for proposals so detailed that effectively address the interests and capabilities of only a few research teams around Europe (e.g., in Life Sciences). Industry reports of declining interest, general complaints about proposal costs, and heavy over-subscription of certain programmes may reflect, in part, excessive fragmentation and thematic specification.

A better focus of thematic priorities of the Framework programme is necessary. More focus in terms of priorities at the higher level can, in fact, be combined with less specificity at the individual programme level. In order to succeed, this process requires foremost the existence of a strong, clear 'vision' for the Framework Programme as a whole that can be easily communicated across all stakeholders. It would also help to (i) better connect the broad socio-economic goals at the higher-level with the more specific technical objectives at the lower level and (ii) more clearly justify public intervention at the European level.

***Recommendation 1:*** *The aspiration for European RTD must be better articulated and clearly reflected in the Framework Programme. The Framework Programme would benefit from a better focus at the overall priority level and reduced specificity at the individual programme level.*

FP6 has encouraged risky research through the implementation of the NEST programme, which supports and anticipates scientific and technological needs. Although welcome, this is still a narrow approach. The Panel emphasises the importance of encouraging high-risk research in all thematic priorities of the Framework Programme (raise the degree of risk of the average project funded by the Programme). In other words, the support of long-term RTD should be enhanced; the Framework Programme is not the most appropriate policy mechanism to promote short-term problem solving. An ambition to fund more risky projects should be embedded in the Framework Programme objectives, instruments and implementation as well as in the assessment of achievements and impacts.

***Recommendation 2:*** *The Framework Programme should primarily promote European leadership at a global level in science and technology. This requires excellence in research, longer term research agendas, and more emphasis on radical innovation and risk-taking research in the projects supported by the Programme.*

Framework Programmes have traditionally focused on topic-based research support in science and technology without paying sufficient attention to the institutional setting and to structural and organisational issues. The Framework Programme should encourage the ongoing institutional reforms of public research in the member countries by increasing European-wide competition among universities and research institutions and by creating a functioning European labour market for researchers.

### 3.2. Industrial Orientation and Participation

The Panel encountered significant evidence of industrial discontent and reports from different regions of industry dropping out in unusually high numbers from the Sixth Framework Programme. Available aggregate numbers do not, however, bear out this phenomenon. The overall industrial participation in FP6 up to July 2004 amounted to about thirty percent of all participations, or a little higher when Networks of Excellence (NoE) are excluded. This is about the same as the FP5 level. In financial terms, industrial participation in FP6, i.e., the percentage of EC financial contribution earmarked for industrial participants, was in the same period somewhat higher than in FP5, approaching one-third of the total.

Industrial participation has been relatively higher in information society technologies (IST), nanotechnology, aeronautics and space, and sustainable development. It is relatively lower in life sciences (also including food quality and safety). Looking across the two Programmes, industrial participation has increased in FP6 both as a percentage of participation and budget share in life sciences, has decreased somewhat in IST and in aerospace and transport, and has remained about the same in environment and energy.

Among FP6 instruments, the share of industrial participation is highest in Integrated Projects (IPs), followed by Specific Targeted Research Projects (STREPs) and at a substantially lower level by Coordinated Actions (CAs), Specific Support Actions (SSAs), and last by Networks of Excellence (NoEs). The differences among instruments are even more pronounced in financial terms (industry share of Framework Programme funds absorbed).

With the exception of NoEs, available aggregate evidence does not entirely concur with anecdotal reports that the Panel repeatedly heard of a rapidly declining interest in FP6 (compared to FP5 and FP4) of small and medium-sized enterprises (SMEs). On the basis of the first calls for proposals, the level of SME financial participation in FP6 actions was estimated by the Commission to be about thirteen percent for all instruments. The level of SME participation was most favourable for STREPs and most unfavourable for NoEs. While not reaching the pre-set target of fifteen percent, this is not a very negative picture given the unfamiliarity of new instruments and new, stringent financial regulations that were introduced at the same time.

The discussion on SMEs generally misses the point in that the vast majority of these are low-to medium-tech companies that would not find it particularly useful to participate directly in research-intensive consortia funded by the Framework Programme. Some of these companies find it preferable to work as sub-contractors, or participate in cooperative research (CRAFT) projects and collective research projects that support outsourcing of research by groups or associations of SMEs. Even so, there is still a specific portion of the SME population – the small technology-based firms and high-tech start-ups with strong growth potential – that could be natural partners in research consortia. For these companies, the ease of Framework Programme participation and utilisation of results are essential.

In spite of the successes, the Panel felt that the original target of the Framework Programme to strengthen European competitiveness has over the years been complemented with a number of socio-economic objectives which have expanded the scope of the Programme and may have inadvertently decreased its industrial focus. Industrial participation should be raised above its current level.

***Recommendation 3:*** *The industrial orientation and participation in the Framework Programme must be enhanced. This requires restoring industrial relevance and leadership in programmes aimed at innovation and competitiveness. In particular, high-tech SMEs should be able to find direct participation more attractive.*

The Framework Programme is building research networks. Network analysis reveals the existence of a relatively small core of organisations participating multiple times and across several Framework Programmes, frequently as Prime Contractors. They are estimated to account for about one-fifth of all participants. They are surrounded by many other organisations that participate occasionally and infrequently. Not surprisingly, the core participants also tend to be the most enthusiastic about the Programme in surveys to appraise it.

A recent broad survey produced significant evidence for private sector participants in all FP5 thematic areas except IST. Research projects funded by the Framework Programme were reported to be of relatively high scientific and technological complexity, high strategic importance for the respondents, but of relatively low commercial risk. These projects tended to have similar characteristics to the respondents' overall research portfolio. The primary benefits to the participating teams were in terms of enhanced knowledge base, skills, the development of new tools and techniques and networking. For the organisation as a whole, the most important achievements relate to enhanced competitiveness and reputation. SMEs appeared more critical than their larger counterparts when estimating costs and benefits. Many companies, however, and especially SMEs, attributed their market success in part to their participation in Framework Programme projects. Many respondents considered both FP5 and FP6 unsatisfactory in terms of the likelihood of a proposal's acceptance (over-subscription), the extent of encouragement for ambitious, risky projects, and in terms of flexibility in altering research content and composition during the lifetime of the project. Such evidence broadly agrees with earlier similar surveys.

### **3.3. University / Public Research Organisation Participation**

European Commission data indicate that the Framework Programmes examined have had more participants from higher education institutions and other research institutes when taken together than from industry. Each of these three types of organisations roughly accounted for one third of total participations. As in the case of industry reported above, analysis indicates a relatively small set of universities and research institutes playing a core role in the network of Framework Programme supported organisations. They tend to participate many times and across several Framework Programmes, frequently as Prime Contractors.

The recent survey of participants in all FP5 programmes mentioned in the previous Section also produced several important observations for universities and other research institutes. The majority (more than two-thirds) of them engage in relatively small projects. While again the projects in question tended to have similar characteristics to the respondents' overall research portfolio, universities tended to believe that they are doing relatively more applied research for the Framework Programme than the rest of their research activity. University respondents stressed publications, doctorates, enhanced career prospects, and enhanced reputation as prominent goals in Framework Programme projects. The major benefits were in the form of knowledge enhancement and networking opportunities. University respondents reported small likelihood of proposals being selected and high perceived barriers to setting up projects. Importantly, respondents considered that the new instruments of FP6 discouraged risky projects relative to FP5 and considered that the levels of administrative effort in participation had increased.

Compared to industry, university and research institute respondents appear most satisfied with the overall benefit/cost ratio of the Framework Programme projects. Even though reported levels of satisfaction were adversely affected by the new financial rules and the new instruments of FP6, the importance of research funding through the Framework Programme has grown for them. There is a need to guard against the possibility that some of these organisations become so dependent on EU funds that they perceive Framework Programme funding as a substitute to their basic research budgets. This would run counter to the subsidiarity princi-

ple. On the other hand, recent reports of universities from certain Member States threatening to decrease their Framework Programme participation due to new national accounting requirements forcing them to track the full economic costs of their research are very worrying.

### 3.4. European Added Value

The Panel received significant input on European Added Value from the 5-Year Evaluation Appraisal of the IST Programme, from Member State appraisals of the effect of FP5, and from surveys of Framework Programme participants. Such evidence consistently points at higher levels of additionality for FP5 relative to earlier Framework Programmes. The reported sources of European Added Value include the augmentation of national RTD funds for research infrastructures, pooling of resources to raise RTD investment on Europe-wide issues, access to foreign resources and capabilities, facilitation of international mobility of researchers, and support to EU policy including regulation, health issues, and so forth.

The survey of Framework Programme participants mentioned in the previous two Sections also produced information on the added value of the Framework Programme. The majority of respondents stated that they would not have undertaken their projects in the absence of Framework Programme funding, while arguing overwhelmingly that the specific projects were of high strategic importance. The rest of the respondents would have continued their research but on different terms (smaller project, fewer partners). Importantly, respondents with low RTD capabilities (often SMEs) were significantly more likely to abandon a non-funded project than organisations with at least moderate capabilities. Moreover, projects directed towards new science/technology areas were more likely to have been abandoned in the absence of EU funding.

The reported benefits notwithstanding, the Panel found it appropriate to emphasise the importance of explicitly defining the added value of Framework Programmes in a more consistent manner than has been the case until now. The concept of European Added Value has been evolving. Many of the conventional benefits identified in project-level evaluations imply such value: networking, especially international networking; facilities sharing; knowledge sharing; attaining bigger scale (critical mass) than is possible at the national level. There has, however, been very limited concerted effort at systematic measurement. Research is needed to develop guidelines, concrete criteria and, perhaps, checklists to be used in assessing European Added Value. The Commission should take a leading role in developing a simple and robust definition of European Added Value taking into account the latest research on the need for government intervention and the need to develop lead markets for European solutions, which often involve measures from other policy domains such as common standards and easy access to the Single Market.

***Recommendation 4:*** *A simple and robust definition of European Added Value is needed for the design and implementation of future Framework Programmes.*

The principle of subsidiarity precludes the Framework Programme from supporting activities that would be better conducted at the national level. The continuation of the ERA, the possible establishment of a European Research Council, and the ability to facilitate technology platforms can raise the added value of future Framework Programmes and will increase the importance of a clear definition of the European Added Value even further.

The Panel wishes to stress, however, that extended budget allocations to the Framework Programme will not make sense if Member States decrease their own commitments. There is unfortunately some anecdotal evidence of such behaviour in old and New Member States and in specific areas such as human mobility. If true, such behaviour must stop or it will risk making the whole exercise of European RTD meaningless.

### 3.5. Implementation

FP6 was designed to help integrate, structure, and strengthen ERA, aiming for rationalisation and better use of European research capabilities. Thus, by definition FP6 should have a structuring effect on research and technological development in Europe. These ambitious goals inevitably complicated the transition from FP5 to FP6 and challenged the Commission in its role as manager of the Programme.

One of the key challenges in translating the different objectives into day-to-day management procedures has been to maintain the delicate balance between accountability in spending public funds, on one hand, and simplification and flexibility, on the other. Public money must be properly spent, which tends to increase checks and controls. But the control elements and administrative requirements must be set at such a level to avoid excess bureaucracy, barriers to participation, and obstacles to the actual research. Today the procedures are out of balance in favour of financial control. The rules should be harmonised throughout the Commission and the Framework Programme. Different practices in different programmes are highly confusing for the participants.

A second challenge relates to the clarity and transparency of information regarding the Framework Programme that is communicated to all potential users. The transparency, accuracy and user-friendliness of the information from the Commission in relation to the implementation of FP5, particularly in the transition from FP4, have repeatedly been criticised. And although significant efforts were taken to improve the communication, transparency, and quality of the information for FP6 there is still room for improvement. A second concern has been the dissemination of information regarding the new instruments. The clarity of the instruments individually as well as part of the overall instrument portfolio has not been sufficient in the early stages of the Programme. Clearer guidelines are needed.

A third challenge relates to the need for evaluation and response to all incoming proposals in a fair, transparent and efficient fashion. The large number of proposals and the limited resources for their assessment means that the evaluation process must be planned well in advance. The evaluations of project proposals involve many evaluators from all over Europe with significant turnaround every year and requests for confidentiality and quality feedback to proposers. The available evidence from Monitoring Reports on FP5 and FP6 and from independent observers regarding proposal evaluation indicates generally high quality standards. In its recent report, the Marimon Panel urged the Commission to improve the assessment process in relation to the New Instruments. It recommended the development of the two-step procedure as a solution to the problems of over-subscription, high costs of proposal preparation, and quality of feedback to the proposers.

A final challenge relates to the negotiation process for the projects retained for funding. This process is reported to have been less smooth and efficient until now than would be desired, featuring long delays in 'time to contract' and 'time to payment'. This problem seems to have afflicted SMEs more than others. The administrative procedures and financial rules have apparently become too complicated, preventing efficiency and flexibility in the management of the instruments. Despite efforts by the Commission to improve negotiation procedures, the legal, financial and administrative requirements are still overwhelming. The Commission is aware of the problem and is trying to find ways to reduce 'time to contract' delays and to improve the general regulatory and administrative environment.

The Panel concluded that the implementation of the two Framework Programmes under consideration has not been entirely smooth. Oversubscription, increased management burden, complexity in preparation of proposals, and long and arduous negotiations have discouraged

prospective applicants. One of the basic underlying problems in implementation seems to rest with the frequent changes in the Framework Programme thrust and objectives.

The proposal evaluation process is basically well respected. The Panel, however, heard reports of decreasing willingness of the best European scientists or industrialists to serve as proposal evaluators. The high turnaround of evaluators may affect quality and raise costs. There also seems to be significant diversity of evaluation criteria across time. Some standardisation of criteria is warranted. The Panel recognises that frequent change in evaluation criteria has been largely exogenous: criteria are modified to reflect the changing priorities across Framework Programmes. The Panel also recognises that there is significant experience in Member States that the Commission may want to consider. For example, national research councils have permanent panel structure for the duration of the programmes managing the funding and evaluation of the projects in specific disciplines. This arrangement has significantly improved the consistency and quality of the proposal evaluation and selection process.

***Recommendation 5:** The administration of the Framework Programme should be streamlined and simplified. The streamlining and simplification of the application procedure, management and financial control of the projects must be vigorously pursued. There is a need to improve procedures, including the establishment of permanent panels in some thematic priority areas or actions for the evaluation process throughout the duration of a Programme.*

### **3.6. New Instruments**

The Sixth Framework Programme has responded to the challenge of ERA by introducing two new instruments in the range of tools available to implement the Programme's priorities: Networks of Excellence (NoEs) and Integrated Projects (IPs). The effectiveness of the new instruments during the first two years of implementation has recently been reviewed by an independent Panel of high-level experts, chaired by Professor Ramon Marimon, which praised the continuity preserved by the new instruments in following the long tradition of transnational collaborative research in Europe. In addition, these instruments make it possible to set more ambitious goals in objective-driven research (IPs) and in research integration (NoEs) through consortia that have the necessary critical mass.

However, the Marimon Panel also pointed out several areas for improvement. One such area is the costs and risks of participation in the new instruments that seem to be unreasonably high for prospective industry participants, most notably SMEs and other small and emerging groups. SMEs have found it almost impossible to be involved in NoEs and have been disadvantaged in IPs. In contrast, SMEs have fared well in STREPS and CRAFT projects. Another area that requires improvement was said to be the goal for enhancing flexibility and simplification. Processes such as consortia-building, proposal submission, proposal evaluation and contract negotiation can be improved.

On the basis of the available evidence and consultations, this Panel finds the Marimon report findings and recommendations quite appropriate and subscribes to them. A greater future budgetary allocation would be appropriate for STREPs and small consortium IPs given that such instruments are better adapted to risk-taking, industry, participants from new Member States, and to smaller players in general. The efforts to attract emerging research groups and the most innovative firms in Europe must be enhanced. Administrative procedures and financial rules should be significantly simplified and further improved to allow more efficiency and flexibility in implementing participation in the new instruments.

- Integrated Projects (IPs) are more appropriate for managing ambitious large, industrially relevant public/private partnerships.

- Networks of Excellence (NoEs) could be conceived as mechanisms more suitable to the improvement of the institutional setting of European RTD. NoEs can stand in between the short-term RTD projects represented by STREPs and long-term research activities represented by the Joint Research Centre. In their medium-term role, say 5-10 years, and their relative strength in building collaboration platforms involving academic institutions, NoEs should also be able to support research and help create innovative research agendas.

**Recommendation 6:** *The selection of instruments should be made more flexible to facilitate the specific characteristics of the funded RTD. The new instruments should be maintained in the next Framework Programme, not least for stability. Research proposers should have the freedom to select the appropriate instruments.*

### 3.7. Barriers to Participation

Barriers to participation can be created by inefficient management processes, ineffective communication from the Commission, inadequate information channels, and lack of experience in application procedures. To the extent that application costs and risks of participation are unreasonably high in FP6, SMEs will suffer the most. Apart from these generic barriers, the effort to increase the impact through substantial funding of larger projects in FP6 may create biases in favour of research groups with proven track-record and well-accepted, objective-driven research. New, higher risk approaches and emerging research groups may be excluded.

Such concerns had been expressed prior to the launch of FP6. They proved to be somewhat justified in retrospect. The majority of National Contact Points (NCPs) perceive FP6 to be attractive to public researchers, but not so attractive to industry and SMEs. Several find FP6 less attractive to SMEs than FP5. Regarding efficiency in establishing cooperation between public and private organizations FP6 is thought to be doing at least as well as FP5. Intermediating institutions such as NCPs and local information centres can play important roles in alleviating barriers to participation as the complexity of the Framework Programme increases with size, variety of instruments, and thematic reach.

The integration of New Member States (NMS) and Candidate Countries into the Framework Programme presents a challenging set of issues. Concern was expressed in the 2002 Monitoring report that potential participants from these countries were facing important barriers to enter FP5 and FP6. Recent Commission data, however, shows that organisations from all Member States participate in the Programme at rates that are more or less in line with the States' size and RTD capabilities.

To the extent that organisations from New Member States are facing increased barriers to participate, these barriers are of more general nature and do not only pertain to Framework Programme procedures. They are due to relative lack of experience in competitive tendering, lack of established networks with EU researchers, lack of capital and research equipment, and lack of associated industrial infrastructure, high tech companies, and industry associations in those countries. They may also reflect differences in tax systems and accounting systems. Such barriers should naturally decrease with the progressive harmonisation of NMS governance systems with the rest of the Union.

Europe must strive for the best integration of the New Member States and their inclusion in all EU policies and instruments as a prerequisite for effectively tapping their potential in building a competitive and cohesive Europe enjoying sustained development.

### **3.8. Human Resources**

Mobility programmes represent about ten percent of the FP6 budget. Key among them is the Marie-Curie Fellowships activity supporting the training and mobility of young researchers, the transfer of knowledge towards less favoured regions of the Community and, to some extent, between industry and academia. Individual fellowships account for the majority of Marie Curie Fellowships. SMEs account for only one quarter of the minority host fellowships. Nationals of France, Spain, Germany and Italy (in that order) topped the list of funded proposals. The UK was the most favoured Member State of applicant destination.

Recent in-depth evaluations of Marie Curie Actions were not available at the time of this assessment. One study for Marie Curie Fellowships in FP4 and FP5 was ongoing and another for the Research Training Networks was planned for late 2005. Nonetheless, the importance of this Programme may be gauged from the significant interest of the scientific community. While the budget available for Marie Curie Fellowships increased by almost seventy percent between FP5 and FP6, the rate of increase of submitted proposals has exceeded all expectations. Over-subscription is, in fact, considered the major problem of this Programme at present.

Marie Curie Fellowships would seem to be a fundamental programme for the achievement of the Lisbon objectives and for ERA. In order to build a knowledge-based society, Europe needs to train more researchers from within and from outside – an estimated 500,000-700,000 researchers for this decade alone. To retain them, Europe must make research careers more attractive by giving researchers more autonomy and responsibility, providing science careers with greater visibility, making it easier to move across disciplinary lines and across geographical lines, and by paying researchers better.

On the basis of the broad assumption that Marie Curie Fellowship activity has been an overall success, and given the very severe shortages of qualified personnel expected in order to meet the needs of Lisbon and Barcelona, the Panel found it reasonable to call for increased attention to this activity in future Framework Programmes. In addition, Europe should be creative in using the existing instruments in new ways:

- Marie Curie Fellowships should be complemented by national/regional programmes for greater leverage. The Panel was met with anecdotal evidence to the contrary: accusations that Community funds have substituted local fellowship funding in several Member States. Such practice must be stopped.
- Available data indicates that Marie Curie programmes are mainly used towards enhancing mobility between academic institutions. More balance should be introduced in terms of also promoting mobility between the public and private sectors.
- There may be value in linking Networks of Excellence to the Marie Curie Fellowship programme.

***Recommendation 7:*** *Human resources and mobility programmes should be extended in scale and scope. Links to national/regional programmes should be encouraged for greater leverage. Programme design must ensure that industry finds it attractive to participate. Stronger emphasis on mobility between the public and private sectors and from and to third countries is needed.*

### 3.9. Science, Technology and Society

While leadership in science and technology remains crucial for future prosperity, public perception of scientific research and innovation should be addressed more effectively at both the European and national levels. We must seek to promote greater public engagement and interaction with ethical dilemmas; more awareness and better understanding between researchers, regulators and the public; more consistent evaluation of research at local, national, European and international levels that also takes into account social, ethical and cultural issues.

FP5 promoted the use of social sciences and humanities alongside natural sciences to a much larger scale than before. FP6 introduced Science and Society as a horizontal activity to embed social concerns across the whole Programme. An important part of this effort has been the ethical review process – first introduced in FP5. The increasing recognition of the relevance of broader social issues in science must be reflected in the level of resources available to this activity. Research in social sciences and the humanities can help reform the European landscape and help Europe respond more successfully to the challenges of the knowledge-based society and globalisation. Science and Society perspectives ought to permeate all Framework Programme activities in order to better focus research on the needs of European citizens. This would be a step toward building the necessary public trust in Europe needed to invest in a truly knowledge-based society.

Gender issues in science were also addressed for the first time in FP5. The Commission's targets regarding mobility actions and external advisory groups have almost been reached. Lesser success is reported with regard to participation in assessment and monitoring panels. The overall participation of women in research activities remains relatively low. It is important to develop awareness of the benefits of integrating gender into research activities. Resources will be maximised not just by using the variety of skills that women and men offer, but by ensuring that the needs of both are addressed. Continuing vigilance is necessary to transform European culture to raise gender sensitivity in science, technology and innovation. If the Barcelona investment goal is to be reached, the number of researchers in both European industry and academia must be increased drastically. Women who are already highly qualified are obviously the richest untapped potential.

***Recommendation 8:*** *The Framework Programme must continue to address the issue of trust and legitimacy of science and technology in Europe. Science and society issues must continue to be addressed in a separate programme whilst also being embedded in all other programmes. Action is needed both at EU and Member State level.*

## **4. INTERACTION WITH OTHER POLICY AREAS OF THE COMMUNITY AND OF MEMBER STATES**

Research and development promoted through the Framework Programme is not an end in itself. Rather, it is an important instrument for achieving a competitive European economy which, in turn, can provide the means to raise the standards of living of European citizens and improve their quality of life. Neither the Framework Programme nor its components can alone cause the major changes in the European research and innovation system that are envisaged in the ERA, Lisbon and Barcelona agendas. RTD investments and programmes are necessary, but they are not sufficient. The interaction of RTD policy with other policy areas is now more important than ever before.

RTD policy should be complemented by and coordinated with other socio-economic policies. These should include policies for competitiveness, intellectual property protection, competition and state aids, human resource policies, especially education and gender, and ethics. More appropriately, they should also include demand-side policies, especially public procurement of RTD and innovative goods and regulation which can be used creatively to promote innovation and the emergence of lead markets.

### **4.1. Competitiveness**

The importance of competitiveness, innovation and entrepreneurial culture as major drivers for growth cannot be overemphasised. Although RTD is a critical input, however, innovation and competitiveness depend on many other factors for success such as investment opportunities, the regulatory environment, the ability of economic actors to rapidly transform technology into economic goods, and access to markets for goods and services.

European industry is going through a phase of reorganisation, as mentioned in earlier Sections. In the past few years there has been a migration of high value-added activities such as RTD, design, and management to locations outside the Community. The danger of a sustained trend here constitutes a genuine threat to Europe's future and must be reversed. Reversing it, however, is not just an issue of Community RTD expenditures or even of the Community services alone. Rather, it is an issue that relates to the overall innovation environment, the related framework conditions, and the corresponding policies. It is also an issue for individual Member States who have very important roles as implementers of structural reforms and guardians of competitiveness.

Creating a business environment favourable to RTD, innovation, and entrepreneurship is of primary importance. Europe must be able to attract the most talented individuals from both within and from outside Europe. It must also become the best location for RTD for organisations from all over the world. This requires the willingness of the public and private sectors to work together, the former by providing an EU-wide framework favourable to business and by investing to remedy market failures, and the latter by investing the lion's share to achieve the Barcelona RTD targets. The integrated approach to competitiveness advocated in the research investment Action Plan proposed by the Commission is in agreement with the views of this Panel in terms of promoting a whole set of legislative, co-ordination and stimulation measures across several policy fields such as RTD, innovation, intellectual property protection, human resources, fiscal measures, product-market regulation, competition policy, and financial markets. A systemic view to the various policy dimensions involved here is absolutely crucial.

The coherent development of national and European policies through an open coordination process is similarly important. The Commission has advocated, and this Panel agrees with it, that the stimulation of RTD, innovation and entrepreneurship is largely in the hands of the Member States that must demonstrate commitment by taking the necessary decisions at the national level.

## **4.2. Socio-Economic Framework Policy Conditions**

Private sector RTD investment – at the core of the Lisbon strategy – depends also on many factors that lie outside the traditional realm of science, technology and innovation policy. They critically depend on key framework conditions including macroeconomic conditions, fiscal conditions, financial markets, and labour markets that induce and empower companies to invest. Private RTD investment is also influenced in important ways by other policy domains like those affecting competition, standards and regulations, entrepreneurship, intellectual property protection, human resources, and public research. Two of these policy domains directly relate to the organisation and success rate of the Framework Programme for Research and are dealt with below: intellectual property protection and competition policy and State Aids.

### **4.2.1. Intellectual Property Protection**

The IPR system in Europe currently faces very significant challenges. One of these is the lack of a European patent, a subject of discussion for no less than thirty years. The lack of a Community Patent disadvantages European organisations and individuals by raising the cost of protecting their inventions in distinct national markets with disparate IPR protection regimes. The overall cost for application, maintenance, and enforcement of a patent with European coverage remains significantly higher than the cost in competitor countries such as the United States and Japan. Europe still lacks an IPR regime that is simple, inexpensive, and efficient.

We strongly advocate the swift implementation of the European patent with the requirement of one language only. The issues of the patentability of Computer Implemented Inventions and the patentability and the Genetically Modified Organisms must be settled quickly. It is important that sufficient protection is provided to ensure innovation and investment in RTD. Uncertainty and low predictability about these IPR provisions are major hurdles to European RTD and innovation.

Another core issue is the increasing involvement of higher education institutions and other public research institutes in the commercialisation of innovation-related knowledge. The key here is the establishment of IPR rules to provide the appropriate balance and incentives to university and other public research institute personnel, especially in relation to collaboration with industry and to participation in public research programmes.

The European Commission has been very active in these matters. FP6 emphasises knowledge management. IPR provisions in FP6 grants govern knowledge ownership, knowledge transfer, knowledge protection, the dissemination and use of research results, and partner rights for knowledge access. In principle, IPR rules have been strengthened in FP6 in favour of knowledge owners: obligatory access rights to partners' knowledge are now limited to what is necessary for a participant either to carry out its own work under the project or to use its own results. Several useful features of FP5 have been maintained such as the progressive development of the plan for using and disseminating knowledge.

In practice, the Panel has identified IPR complications in FP6 projects and reported disputes among prospective collaborators about access rights to pre-existing knowledge. Contract ne-

gotiations, especially in projects involving a great number of participants, have occasionally turned out to be extremely complicated and time consuming.

***Recommendation 9:** The Commission should launch a consultation with the main stakeholders in order to improve the IPR procedures within Framework Programmes. However, the basic principles on IPR rules for the Framework Programme seem appropriate.*

#### **4.2.2. Competition Policy**

Competition policy promotes competitive markets. A new EU competition regulatory framework entered into force in May 2004 revamping antitrust and merger control regulations and intending to reduce regulatory uncertainty by replacing national standards by a single European rule. Competition policy also addresses State Aid regulation, currently under review. Community RTD funding alone does not constitute State Aid in the meaning of Article 87(1) of the EC Treaty; the Community framework for State Aid becomes applicable in cases of cumulation between Community and national funding. In such cases, the cumulative public support and its impact on competition are considered.

The present Community framework for State Aid rules, last modified in 1996, will expire at the end of 2005. Rules for renewal include all State Aid exemption regulations, the regional aid guidelines, the framework for RTD aid, and the risk capital guidelines. The environmental aid guidelines expire at the end of 2007. Combined to the beginning of the new programming period for the Community Structural Funds in 2007 and the recent enlargement of the Union, these provide an opportunity for a comprehensive review of the horizontal State Aid rules to account for the Lisbon objectives and the economic and social cohesion policy of the Union.

Meanwhile, the WTO rules for RTD subsidies have expired. In order to increase its international competitiveness, the Community must apply the appropriate economic rationale. The current system where the aid level is determined by the phases of research is outdated and not in compliance with the interactive model of innovation. Modern concepts of the interactive nature of the innovation process and of the importance of networking as a primary working mode for the various stakeholders should be adopted.

Justification of RTD funding is well established internationally and it is therefore important that EU State Aid provisions maintain a level playing field in comparison with Europe's main competitors. It has no reason to use stricter rules than they do. EU should have generic rules that sanction only fifty percent of business R&D aid intensity at the programme level with possible exceptions to allow even higher levels for SMEs or for participants from disadvantaged regions under certain conditions. Free access to public knowledge should not be regarded as a subsidy. The status granted to university and research institutions in the current RTD joint framework have proved effective and must be retained because university and research institutions fulfil a 'public mission'.

## 5. FUTURE EU RESEARCH POLICY

Framework Programmes have always had an effect on Member State RTD policies and investment behaviour. The effect has been less pronounced in States with long RTD policy traditions and more pronounced in States with less coherent RTD and innovation policy prior to Community membership. Framework Programmes are instrumental for the New Member States. Overall coordination between the Framework Programme and national RTD programmes, however, remains weak. Such coordination is at the heart of ERA.

The Framework Programme could be viewed as a catalyst/stimulator for the European science, technology and innovation system. To play that role effectively, however, it must be well planned and targeted. The tendency to expand the objectives (excellence, cohesion), thematic scope, and modalities/instruments of the Framework Programme should be resisted. Since the role of the Community research activities is different than the role of the national RTD activities and since the Framework Programme must demonstrate European Added Value, it would be reasonable to expect the Framework Programme to address the big European challenges with clear and transparent European value.

Europe must become a lead market for innovative new products. There are a great number of examples where the lack of technological leadership, regulatory barriers and inefficiencies in the internal markets has given global leadership to companies from outside Europe. Europe must be able to respond swiftly when substantial new economic opportunities emerge. The Framework Programmes for Research could explore and identify such opportunities, facilitate the development of lead markets, and provide the catalyst for European countries working together to lead major world developments. This would require better coordination within DG Research and other Directorates General.

We support the idea of establishing a limited number of 'technology platforms' in key technology areas. Industry has been active in developing large collaborative research programmes for such platforms. Ideally, they should be industry-driven and based on public/private partnerships in terms of both financing and execution. They should involve academic institutions, large and small companies and, when needed, participants from outside Europe. They should be designed to restore European leadership in key technologies and thereby increase private investment in RTD in Europe. In order to be able to make the intended impact, technology platforms must be adequately funded and managed by pooling resources from the Framework Programme, national sources, and industry.

Technology platforms are appropriate in areas where sufficient industrial commitment in terms of financing, intellectual resources and leadership is confirmed and significant economic potential on a global scale is identified.

Coordination with Member State policies is instrumental for such functionality. FP6 is the first Programme to explicitly address the need for coordination between Community and Member State science, technology and innovation policy and rationalisation in funding by creating a single European market for RTD. This (ERA) process must continue with vigour to increase the complementarities between national and European level programmes. The Framework Programme should encompass research activities with evident European value, leaving the tailoring for local effectiveness and take-up to the national or regional levels.

The Commission must improve the science, technology and innovation indicators, provide a transparent follow up of the developments at the EU and the Member State levels and report on the progress to the Competitiveness Council on a regular basis. These indicators should involve:

- National RTD funding (public and private)
- Regulatory burden which may create barriers to industry investment in R&D
- The resources of the Universities and other research organisations and their involvement in the mobility programmes and international R&D
- Science indicators, also reflecting attitudes towards science and technology and indicators of female participation in RTD
- The use of structural funds to RTD relevant activities
- The mobility of researchers and their participation in international collaboration

Such indicators would also promote the Bologna process.

Coherent and transparent actions of Member States can greatly assist in progressing towards the ERA. In turn, the instruments and funds towards the implementation of the ERA must be calibrated against the results of regular, well-structured evaluation exercises.

One area with traditional support from national governments has been basic research. The immense contribution of basic research to innovation and, more generally, to socio-economic development through both research results and training of highly-skilled researchers and scholars has been firmly established in the social sciences literature. Basic research, and the organisations responsible for it, are now the subject of intense debate in Europe: the twin objectives for the ERA and for a knowledge-based economy have brought to the forefront the notion of a European basic research fund and the possibility of setting up a new organisational structure to administer it.

Of course, international research is already being carried out in Europe through various channels including the networks and projects of the European Science Foundation, EUREKA, large basic research laboratories (CERN, ESO, EMBO, EMBL), and thematic areas of the Framework Programme for Research. Such support, however, is focused on a limited number of activities and its magnitude pales compared to the support for scientific research and graduate education provided at the national level. The compartmentalisation of national programmes and support systems among Member States may introduce three adverse effects at European level: insufficient competition among scientists and research teams; lack of sufficient cooperation and coordination activities; and, in some cases, lack of critical mass.

We support the idea of establishing a European Research Council. The Council needs to have sufficient resources to become a credible player in the European RTD landscape. The Council should promote excellence in science, be cost efficient and encourage the development of world-class research environments. In order to be able to make a difference sufficient resources should also be allocated to scientific fields which have a long-term impact on competitiveness and innovation. The Human Frontier Science Programme could be considered as a possible model.

All in all, the Panel urges the Commission more clearly to address the contribution of the Framework Programmes to the EU policy formulation process. EU research should play a significant role by providing new insight into the European innovation environment and the creation of lead markets for new innovations.

## 6. EVALUATING THE FRAMEWORK PROGRAMME

Finally, Panel members would like to make a few remarks about this evaluation process. Panels like ours are asked to fill a gap between, on the one side, evidence mainly collected at project level and, on the other side, the higher level socio-economic goals of research policy. However, at the moment the link is difficult to make due to the way the Framework Programme is planned. It lacks an explicit 'logic' connecting the highest objectives to the specific research and knowledge goals, to the amount of resources needed or the nature and general characteristics of the actors who should be involved. There is a need for better alignment among evaluation aims, evaluation techniques, data availability and evaluation timing.

The future assessment processes should address, in addition to the direct impacts of the Framework programmes, is higher level socio-economic effects and implications for the structural reform of the European research landscape and economic competitiveness. They should seek answers to questions that cut across Framework programme activities and increase understanding of portfolio impacts. Ex ante appraisal of the future Framework Programme objectives should be connected to their ex post evaluation on a regular and systematic basis applying consistent criteria. Evaluation should cover and give sufficient attention to both long-term and short-term issues. Some evaluations are needed to give insight to immediate implementation issues while some others should concentrate on shaping the socio-economic environment. Evaluation must reflect the characteristics of the interactive nature of the innovation process by exploring the collaborative networks, knowledge flows and the roles played by various partners. Resources could be released by reducing formal and repetitive routine monitoring and evaluation, which can increase insight only marginally, to allow more ambitious long-term evaluation studies that could explore the structural and wider socio-economic issues in a more systematic way.

***Recommendation 10:*** *The assessment of the Framework Programme should be further developed systematically and should reflect the new understanding of the interactive nature of innovation. Assessment should also address the structural impact of the Framework Programme on the European economic and research landscape.*



## Mandate for the Five-Year Assessment

### Terms of reference for the experts in charge of the Five Year Assessment of the implementation and achievements of Community research activities (1999-2003)

#### CONTEXT AND RATIONALE

As set out in the Framework Programme decisions, the Commission shall, before submitting proposals for subsequent Framework Programmes, have an independent Five-Year Assessment of Community research activities carried out, covering the five years preceding the proposals<sup>1</sup>. The assessment accompanied by the Commission's observations will be addressed to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the Member States. It will also be a major point of reference in the discussions of other bodies on future research policy.

The aim of this assessment is to analyse implementation and achievements of past and current activities, in view of improving the relevance and quality of research initiatives and programmes at present and in the future. With the expiry of the Sixth Framework Programmes in 2006, and taking into account the duration of the co-decision process, the Five-Year Assessment 1999-2003 should be finalised in the last quarter of 2004.

Specific inter-institutional and Commission requirements further frame this assessment, in particular those related to ex ante impact assessment<sup>2</sup>, the Financial Regulation with its request for an ex-ante evaluation<sup>3</sup>, the Commission administrative Reform<sup>4</sup> and evaluation standards<sup>5</sup>.

The Five-Year Assessment covers the years 1999-2003, a period during which European research landscape has changed significantly:

- The conclusions of the Lisbon European Council on 23-24 March 2000 of the Heads of State and Government set the target for the Union over the next decade "to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion". In this context, research policy was attributed a key role in the transition towards a knowledge-based society.

<sup>1</sup> "Before submitting its proposal for the next Framework Programmes, the Commission shall have an external assessment carried out by independent highly qualified experts of the implementation and achievements of Community activities during the five years preceding that assessment.

*The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions"*  
Decision 1513/2002/EC of 27 June 2002 and Decision 2002/668/Euratom of 3 June 2002 (OJ L 232 of 29.08.2002 pp.1 and 34) (Framework programmes) (Article 6); Decision 2002/834/EC, Decision 2002/835/EC, Decision 2002/836/EC, Decision 2002/837/Euratom and Decision 2002/838/Euratom (OJ L 294 of 29.10.2002).

<sup>2</sup> COM (2002) 276 final of 5.06.2002

<sup>3</sup> Commission Regulation (EC, Euratom) No 2342/2002 of 23 December 2002 (OJ L357 of 31.12.2002 p.11).

<sup>4</sup> SEC(2000) 1051 of 26.07.2000

<sup>5</sup> C(2002) 5267 of 23.12.2002

- Since the European Commission proposed the creation of a European Research Area (ERA)<sup>6</sup>, in January 2000 and its endorsement by the Council and by the Parliament, the European Research Area has become the cornerstone of EU research, aiming at the creation of an area of free movement of knowledge, the restructuring of the European research fabric and the development of a European research policy.
- The 6<sup>th</sup> Framework Programme (2002-2006), launched at the end of 2002, was shaped with the aim at contributing to the integration, structuring and strengthening of the foundations of the European Research Area, while fulfilling the objectives set out in the Treaty, i.e. to strengthen the scientific and technological bases of Community industry and to encourage it to become more competitive at international level and contribute to other Community policies.

#### ISSUES AND QUESTIONS TO BE ADDRESSED IN THE FIVE-YEAR ASSESSMENT

The Five-Year Assessment covers all research programme activities during the period 1999-2003, i.e., Framework Programmes and the corresponding Specific Programmes. The period covered implies that this assessment encompasses a substantial contribution to the ex ante evaluation of options for future programmes beyond 2006 and for any other related policy initiative and provides an intermediate and ex post evaluation of implementation of current and previous Framework Programmes.

The exercise should provide substantive answers to the type of evaluation questions listed hereafter concerning implementation and achievements of current and previous Framework and Specific Programmes in the light of their respective rationales and objectives, as well as future perspectives.

- IMPLEMENTATION:
  - *Were the activities carried out efficiently and were they cost effective?*
  - *Did the activities constitute the best way of achieving the objectives set?*
  - *Were the overall legal framework (including rules for participation and contracts), policy instruments and the modalities for implementation clear, appropriate and effective?*
  - *Were the level of funding and other available resources adequate?*
  - *Were the targeted industrial and research communities, including SMEs, able to respond appropriately?*
- ACHIEVEMENTS:
  - *Did the activities attain their respective objectives and to what extent were there unexpected results?*
  - *What are the major results in particular in terms of scientific, technological, socio-economic and environmental outputs, in terms of international co-operation, knowledge transfer and innovation, pre-normative activities, accessibility, dissemination and uptake of research, human resources development, mobility and training, and in terms of supporting and enhancing co-ordination of research activities?*
  - *Were the results and their effects and impacts globally satisfactory from the point of view of direct or indirect beneficiaries and stakeholders? Were the relevant industrial and research communities, including SMEs, addressed satisfactorily?*
  - *How and how far have the activities contributed to improved EU research competitiveness at international level? Did EU research attain leadership in specific areas?*
  - *How and how far have activities contributed to EU policies in general and to EU's strategy for sustainable development?*

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<sup>6</sup> COM (2000) 6 final of 18.1.2000

- *Is there evidence of a structural change, including in particular networking, integration and co-ordination of research, at a national or at an international level as a result of Community research activities?*
- *Did the programmes provide value for money? Did the activities have lasting impacts?*
- *EVOLUTION AND FUTURE PERSPECTIVES*
  - *How did Framework programmes evolve in terms of rationale, objectives, thematic priorities, balance between bottom-up and top-down priorities and between fundamental and applied research, instruments, European added value and other impacts, in particular in the light of the emergence of the European Research Area (ERA) concept, the Lisbon objectives and major international economic and research benchmarks?*
  - *How did the Framework Programme achieve European added value and can this be achieved through other international or national mechanisms?*
  - *Are the programmes' policy objectives, priorities, instruments and lifecycle appropriate for the future?*

The Five-Year Assessment also assesses the follow-up and implementation of recommendations from previous evaluations.

## PROCESS

The global set-up of the Five-Year Assessment is based on a rigorous, independent evidence-based multi-dimensional process. It is carried out and provided with supporting analysis by independent highly qualified experts appointed by the Commission.

A high level panel of thirteen <sup>7</sup> independent highly qualified experts conducts a strategic peer review exercise covering all dimensions and research fields of Community research programmes. This single panel of functional size should provide a clear and authoritative overview and assessment, at a horizontal level, concerning the Community research activities addressed. It would include acknowledged experts in programme evaluation and management and the economics of science and technology policy and programmes. Given that the subject of evaluation represents a major programme of investment at European level, the panel is invited to examine the issues in-depth. The chairperson of the panel decides on the panel's working methods; s(he) is however requested to ensure that the panel members' and the supporting expertise is best exploited to allow for such in-depth analysis in all the areas covered by the Framework Programmes. The panel includes a highly qualified rapporteur.

The Panel is assisted by independent supporting expertise in the form of up to 4 evaluation experts. The supporting expertise provides independent information and analysis to the panel, including for example an analysis of changes to the European research landscape, an overall synthesis of the evaluation studies undertaken, or other information needed to strengthen the evidence base covering the various domains and global or targeted fields of research activities

A comprehensive set of studies<sup>8</sup> encompassing monitoring and impact assessments of previous Framework Programmes as well as Specific Programmes and contextual and methodo-

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<sup>7</sup> The experts cover overall the following areas: life sciences, information and communication technologies, industrial and materials technologies, transport, environment, energy, socio-economic research, international co-operation, innovation, human resources in research, JRC activities.

<sup>8</sup> - Impact survey of research under the third and the fourth Framework Programme (FP3 and FP4)  
 - Impact survey of research under the fifth Framework Programme (FP5)  
 - Case studies of 'high impact' research projects under FP4 and FP5  
 - Bibliometric study of research performance under FP3 and FP4

logical analysis is carried out or commissioned by the Commission and delivered to the panel progressively according to the availability of data from the various activities. The panel may appoint an expert from their midst or among supporting experts to follow the running studies, as appropriate. The studies provide the panel with a knowledge base to support its work.

The Commission will provide the panel with all necessary information, in particular:

- Reports from the above mentioned studies and ad hoc analyses;
- Report from the mid-term evaluation of new instruments under the sixth Framework Programme (FP6);
- Monitoring Reports and Commission services' replies, including in particular the 2002 report which includes a synthesis of the period 1999-2002;
- Previous Five-Year Assessment reports and Commission replies;
- Relevant policy documents and reviews, including the Framework Programmes, the spring reports to the European Council, annual reports on research activities, S/T indicators, benchmarking and mapping data;
- Targeted evaluations and studies carried out by Specific Programmes, including the Five-Year Assessment of the Joint Research Centre;
- Statistical information on the implementation of the activities.

In addition, National authorities may also provide national impact assessments and other national evaluation data, as appropriate.

This information base is to be made publicly available.

The panel is invited to establish contacts with national experts for the exchange of information and discussion.

The Commission may, at the request of the panel, convene ad hoc expert meetings on emerging issues.

The panel is requested to address to the Commission an independent assessment report, which includes an analysis of findings and a set of conclusions and clear recommendations on the basis of evidence.

The report is to be made publicly available.

The panel starts its work mid 2004 and its final report should be addressed to the Commission by November 2004 at the latest.

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- Ex-post impact assessment studies carried out by various Specific Programmes
  - Monitoring of the Framework Programmes and of the Specific Programmes

## COMPOSITION OF THE FIVE-YEAR ASSESSMENT PANEL

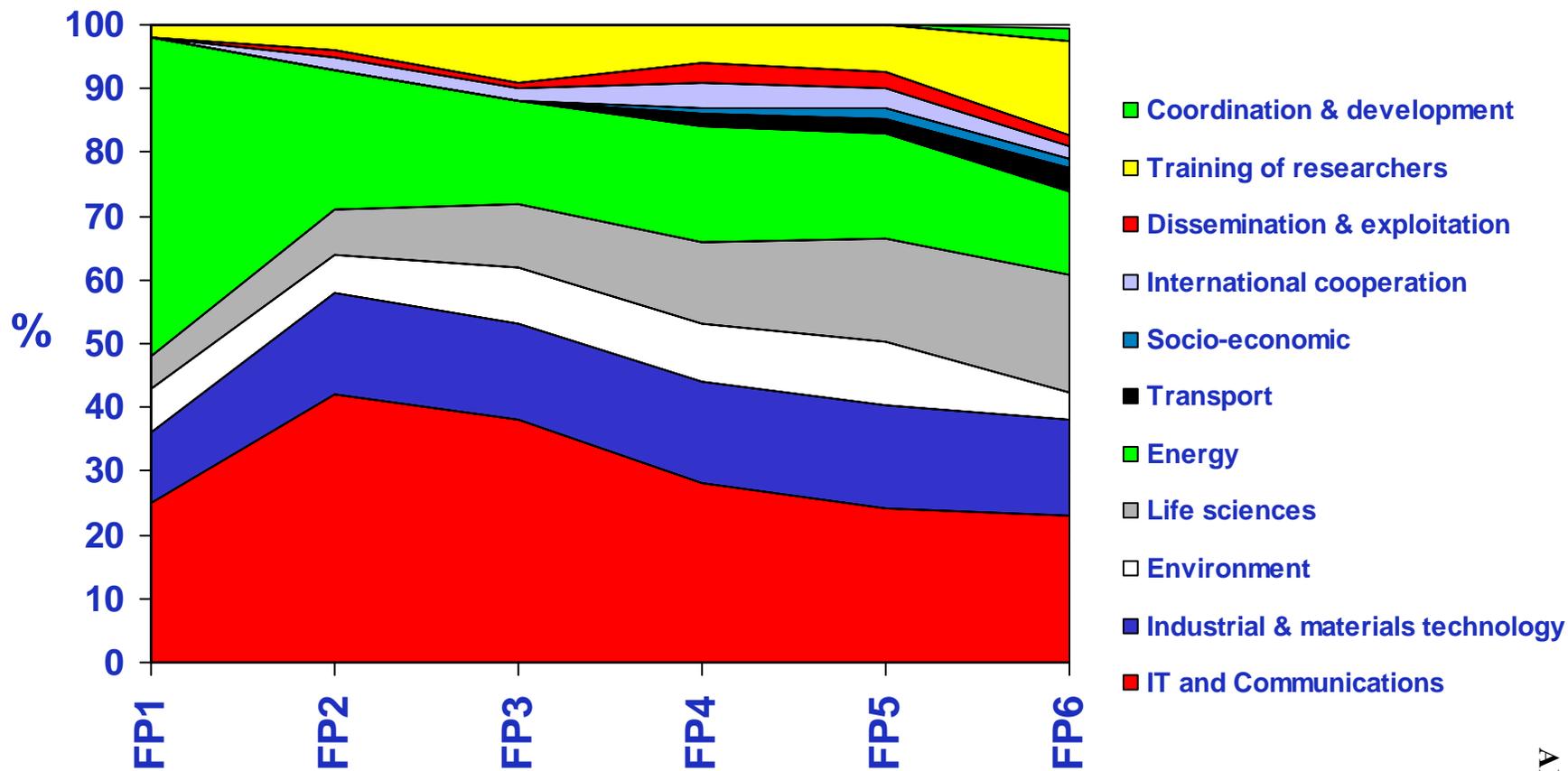
<b>Dr. Erkki Ormala (Chairman)</b> Vice President, Technology Policy, Nokia Corporation	Finland
<b>Prof. Nicholas Vonortas (Rapporteur)</b> Professor of Economics and International Affairs and Director, Center for International Science and Technology Policy, The George Washington University	Greece
<b>Dr. Ségolène Ayme</b> Director of Research, INSERM (Institut National de la Santé et de la Recherche Médicale), SC11 "Gene mapping and Clinical Research"; Director of Orphanet	France
<b>Dr. Lucija Čok</b> Rector, University of Primorska, Former Minister for Education, Research and Sport	Slovenia
<b>Prof. Dervilla Donnelly</b> Chair of the Dublin Institute for Advanced Studies; Emeritus Professor of Organic Chemistry, University College, Dublin	Ireland
<b>Dr. Julia King</b> Principal, Faculty of Engineering, Imperial College London	United Kingdom
<b>Prof. Christoph Mandl</b> Faculty of Business, Economics and Computer Science, University of Vienna; Director of Mandl, Luethi & Partner	Austria
<b>Prof. Frieder Meyer-Krahmer</b> Director, Fraunhofer Institute for Systems and Innovation Research (ISI)	Germany
<b>Prof. Elzbieta H. Oleksy</b> Dean of the Faculty of International and Political Studies, University of Lodz; Founding Director of Women's Studies Centre, University of Lodz	Poland
<b>Prof. Alexandre Quintanilha</b> Professor in Biophysics, University of Porto	Portugal
<b>Prof. Nicoletta Stame</b> Professor of Sociology Università di Roma "La Sapienza"; President of the European Evaluation Society (EES)	Italy
<b>Dr. Rolf Tarrach</b> Professor of Theoretical Physics at the University of Barcelona - Dept. ECM; Former President of the Spanish Council for Scientific Research	Spain
<b>Prof. Françoise Thys-Clement</b> Chairperson of the Erasme Hospital Council; Professor and Director of the Centre of Economics of Education at the ULB	Belgium

## EVALUATION EXPERTS

<b>Dr. Erik Arnold</b> Director of Technopolis Group	United Kingdom
<b>Prof. João Carça</b> Director Science Dept. of Calouste Gulbenkian Foundation, Lisbon, Professor Science Policy, Universidade Técnica de Lisboa	Portugal
<b>Dr. Karen Siune</b> Director of the Danish Institute for Studies in Research and Research Policy	Denmark
<b>Dr. Keith Smith</b> Support to the European Research Area Unit, Institute for Prospective Technological Studies - IPTS, Seville	United Kingdom

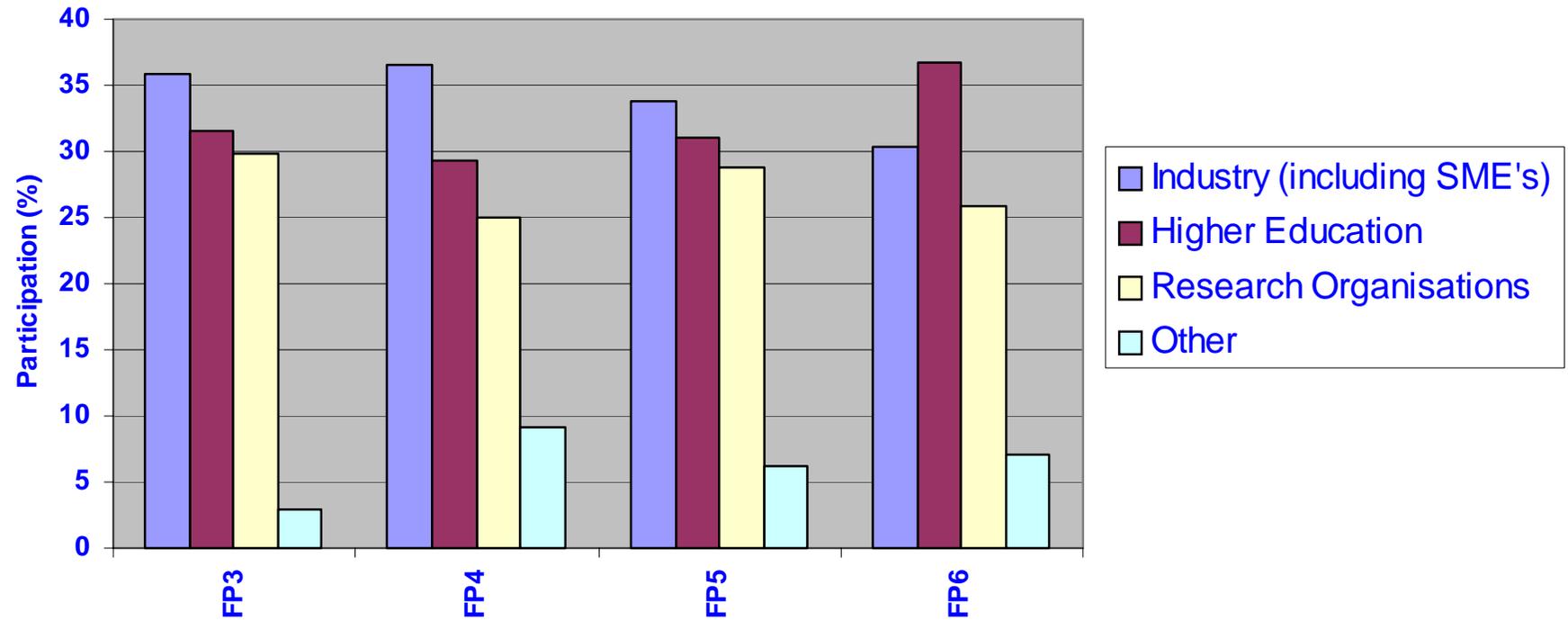


### EU Research: Changing Priorities





## Participants in Research Framework Programmes





<b>KNOWLEDGE BASE FIVE-YEAR ASSESSMENT 1999-2003</b>	
	<i>Verbal Evidence</i>
	Current Community research activities, presentation by the Commission
	Intellectual property rights within the Framework programmes, presentation by the Commission
	IPR and innovation issues in European research policy, presentation by the Commission
	State aids and research activities, presentation by the Commission
	Presentation by Prof. R. Marimon, Chairman of the High-level Panel of the Report on the Evaluation of effectiveness of the New Instruments of Framework Programme VI
	"An agenda for a growing Europe", presentation by Prof. André Sapir, Chairman of the Independent High-Level Study Group on the EU Economic System
	JRC Five-Year Assessment Report, presentation by Prof. David Fisk, Chairman of the JRC Panel
	IST Five-Year Assessment interim report, presentation by Prof. José Mariano Gago, Chairman of the IST Panel
	Analysis of Europe's changing research landscape - economics, presentation by Dr Keith Smith, IPTS
	Analysis of Europe's changing research landscape – policy, presentation by Dr João Caraça, Director of Science Department of Calouste Gulbenkian Foundation
	High Impact Research Assessment, presentation by The European Evaluation Consortium
	Bibliometrics study, presentation by Technopolis and OST
	FP5 Impact Study, presentation by Atlantis
	Analysis of the implementation and management of the Framework programme, presentation by Dr Karen Siune, Director of the Danish Institute for Studies in Research and Research policy
	Evaluation of proposals in FPs, presentation by the Commission
	Direct measures, presentation by Prof. L. Georghiou, Director of PREST
	Analysis and synthesis of findings, conclusions and recommendations from evaluations of Community research, presentation by Dr Erik Arnold Managing Director of Technopolis
	Science and society, presentation by the Commission
<b>4</b>	<b><i>Commission Assessments or Evaluations (Codes refer to the CIRCA Database <a href="http://forum.europa.eu.int/Public/irc/rtd/fiveyearasskb/library?l=/iii-">http://forum.europa.eu.int/Public/irc/rtd/fiveyearasskb/library?l=/iii-</a>)</i></b>
<b>4.0</b>	<b><i>General</i></b>
4.0-01	Assessment of the impact of the actions completed under the 3rd and 4th Community Framework Programmes for Research; survey for the Five-year Assessment of Community research activities (1999-2003), 2004
4.0-02	Assessment of the impact of the actions completed under the 5th Community Research Framework Programme; survey for the Five-year Assessment of Community research activities (1999-2003), 2004
4.0-03	Analysis of "high impact" research activities under Community Research Framework Programmes
4.0-04	Future priorities for Community research based on bibliometric analysis of publication activity
4.0-05	2002 Synthesis Monitoring report on the activities conducted under the European Research Area and the EC/Euratom Research Framework Programmes, 2003
4.0-06	Evaluation of the effectiveness of the New Instruments of Framework Programme VI, 2004
4.0-07	Five-Year Assessment of the Joint Research Center, 2004
4.0-08	Five-Year Assessment of the IST programme, Interim Panel Report, 2004
4.0-09	COM(2004)574 and SEC(2004)1057 Communication from the Commission responding to the observations and recommendations of the high-level Panel of independent experts concerning the new instruments of the 6th Framework Programme
4.0-10	Analysis of Europe's changing Research Landscape, J. Caraça, 2004
4.0-11	The Framework Programmes and the Changing Economic Landscape, K. Smith, 2004

4.0-12	Implementation and Management of the Framework Programme, K. Siune, 2004
4.0-13	Analysis and Synthesis of findings, conclusions and recommendations from evaluations of Community Research, E. Arnold, 2004
<b>4.1</b>	<b><i>Life Sciences</i></b>
4.1-1	Assessment of the Commercial Success of the AIR Programme (1990-96) in the Area of Biomaterials and Green chemicals, 2003
4.1-2	Impact Assessment of the Biomedical and Health Research Programmes-BIOMED 2 ( <i>paper version only</i> )
4.1-3	Analysis of genomic research supported under FP5 ( <i>paper version only</i> )
<b>4.5</b>	<b><i>Environment</i></b>
4.5-1	Impact Study of Result Dissemination in the Field of Environment and Sustainable Development, 2003
<b>4.6</b>	<b><i>Energy</i></b>
4.6-1	Impact Assessment on Non Nuclear Energy, 2003
<b>4.7</b>	<b><i>Socio-Economic Research</i></b>
4.7-1	EU Research on social sciences and humanities, 2003
4.7-2	Gender Impact Assessment of the specific programmes of the 5th FP, 2001
<b>4.8</b>	<b><i>International co-operation</i></b>
4.8-1	Impact assessment of the S&T agreement between EC and USA, 2003
4.8-2	Impact Assessment Report on the Specific Programme for research and Technological Development in the field of Confirming the International Role of Community Research in FP4, 2001
<b>4.9</b>	<b><i>Innovation</i></b>
4.9-1	Assessment of the Regional Innovation and Technology Transfer Strategies and Infrastructures (RITTS), 2000
<b>4.10</b>	<b><i>Human resources in research</i></b>
4.10-1	Marie Curie Fellowships in FP5 (1999-2002), Final Report
<b>5</b>	<b><i>National impact assessments or evaluations</i></b>
<b>5.1</b>	<b><i>Austria</i></b>
5.1-1	Evaluation of Austrian participation in the 4th EU Framework Programme, 2001
<b>5.2</b>	<b><i>Belgium</i></b>
5.2-1	Flanders in the European Fourth Framework Programme for Research (1994-1998), 2001
5.2-2	Belgian Report on Science, Technology and Innovation, 2001
<b>5.5</b>	<b><i>Denmark</i></b>
5.5-1	Danish research co-operation in EU, 2000
<b>5.7</b>	<b><i>Finland</i></b>
5.7-1	Finnish participation in the EU Fifth Framework Programme and beyond, 2004
<b>5.8</b>	<b><i>France</i></b>
5.8-1	Le positionnement de la France dans le 4ème PCRD "dix faits d'analyse majeurs" (available in French only), 2000
5.8-2	Analyse des participations françaises au cinquième Programme Cadre (available in French only), 2001
<b>5.9</b>	<b><i>Germany</i></b>
5.9-1	European Framework Programmes in Germany (available in German only), 2001

<b>5.12</b>	<b><i>Ireland</i></b>
5.12-1	The 4th Framework Programme in Ireland, 2001
<b>5.23</b>	<b><i>Sweden</i></b>
5.23-1	Qualitative aspects of Swedish participation in EU research, 1999
<b>5.25</b>	<b><i>United Kingdom</i></b>
5.25-1	A study of the impact of the EU Framework Programme in the UK, 2004
5.25-2	The Impact of the EU Framework Programmes in the UK, 2004
<b>6</b>	<b><i>Evaluation policy and methodology</i></b>
6.1	COM(2002)276 Impact Assessment
6.2	Focus on results: Strengthening Evaluation of Commission Activities SEC(2000)1051
6.3	Evaluation standards and good practice C(2002)5267
6.4	Detailed rules for the implementation of Council Regulation (EC, Euratom) on the Financial Regulation applicable to the general budget of the European Communities
6.5	Assessment of the Socio-Economic Impact of the Framework Programmes (ASI), 2002
6.6	Socio-Economic Evaluation of Public RTD policies (EPUB), 2002
6.7	Proceedings - US-European Workshop on Science and Technology Policy Evaluation, 2001
<b>7</b>	<b><i>Policy documents and reviews</i></b>
<b>7.1</b>	<b><i>Research policy/ERA / Framework Programmes</i></b>
7.1-01	COM(2004)29 Report to the Spring European Council
7.1-02	COM(2003)5 Report to the Spring European Council
7.1-03	COM(2002)14 Report to the Spring European Council
7.1-08	COM(2000)6 Towards a European Research Area
7.1-09	COM(2000)612 Making a reality of the European Research Area: guidelines for EU research activities (2002-2006)
7.1-10	COM(2004)101 Building our common Future: Policy challenges and Budgetary means of the Enlarged Union 2007-2013
7.1-11	COM(2003)226 Investing in research: an action plan for Europe
7.1-12	COM(2004)9 Europe and Basic Research
7.1-13	COM(2002)499 More research for Europe: Towards 3% of GDP
7.1-14	COM(2002)565 "The European area: providing new momentum - strengthening, reorienting, opening-up new perspectives"
7.1-15	COM(2003)58 The role of the universities in the Europe of knowledge
7.1-16	A Comparative Analysis of Public, Semi-Public and Recently Privatised research Centres, PREST 2002
7.1-17	COM(2004)72 On the implementation of the Preparatory Action on the enhancement of the European industrial potential in the field of Security research
7.1-18	COM(2003)17 Green Paper - European Space Policy
7.1-19	COM(2003)673 White Paper - A new European frontier for an expanding Union - Implementing the European Space Policy
7.1-20	COM(2004)65 Global Monitoring for Environment and Security (GMES): Establishing a GMES capacity by 2008 - (Action Plan (2004-2008))
7.1-21	Raising EU R&D Intensity: Mix of Public Support Mechanisms, 2003
7.1-22	Raising EU R&D Intensity: Guarantee mechanisms, 2003

7.1-23	Raising EU R&D Intensity: Risk capital, 2003
7.1-24	Raising EU R&D Intensity: Direct measures, 2003
7.1-25	Raising EU R&D Intensity: Fiscal measures, 2003
7.1-26	Management of intellectual property in publicly-funded research organisations: Towards European Guidelines, 2004
7.1-27	COM(2004)353 Science and Technology, the key to Europe's future - Guidelines for future European Union policy to support Research
7.1.-28	An Agenda for a Growing Europe, July, 2003
<b>7.2</b>	<b><i>Life Sciences</i></b>
7.2-1	COM(2002)27 Life sciences and biotechnology – A Strategy for Europe
7.2-2	COM(2003)96 and SEC(2003)248 Life sciences and biotechnology - A Strategy for Europe - Progress report and future orientations
7.2-3	COM(2004)25 and SEC(2004)438 Life sciences and biotechnology - A Strategy for Europe - Second progress report and future orientations
<b>7.4</b>	<b><i>Industrial and material technologies</i></b>
7.4-1	MANUFUTURE 2003, European Manufacturing of the Future: role of research and education for European leadership, 2003
7.4-2	Vision 2020: Nanoelectronics at the centre of change, 2004
7.4-3	COM(2004)338 Towards a European strategy for nanotechnology
<b>7.6</b>	<b><i>Environment</i></b>
7.6-1	COM(2004)38 Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union
7.6-2	COM(2004)416 "The European Environment & Health Action Plan 2004 - 2010" (Volume I and II)
<b>7.9</b>	<b><i>International co-operation</i></b>
7.9-1	A Worldwide vision for European research - Perspectives for International Cooperation in Science and Technology, 2003
7.9-2	Water for Life: EU Water Initiative, 2003
<b>7.10</b>	<b><i>Innovation</i></b>
7.10-1	COM(2003)112 Innovation policy: updating the Union's approach in the context of the Lisbon strategy
7.10-2	Entrepreneurial innovation in Europe, 2003
7.10-3	Innovation tomorrow, 2002
7.10-4	Competitiveness 2003
<b>7.11</b>	<b><i>Human resources in research</i></b>
7.11-1	COM(2003)436 Researchers in the European Research Area
7.11-2	SEC(2004)412 Second Implementation Report on "A Mobility Strategy for the European Research Area"
7.11-3	SEC(2003)146 First Implementation Report on "A Mobility Strategy for the European Research Area"
7.11-4	COM(2001)331 A Mobility Strategy for the European Research Area
7.11-5	High-Level Scientific Conferences Annual Report 2002, July 2003
7.11-6	Gender and Excellence in the Making, 2004
7.11-7	Women in industrial research: A wake up call for European industry
<b>8</b>	<b><i>Previous Monitoring Reports and Commission replies</i></b>
8.1	<b><i>Framework Programme Monitoring</i></b>

8.1-1	Report 2003
8.1-2	Report 2002
8.1-3	Report 2001
8.1-4	Report 2000
8.1-5	Report 1999
<b>8.2</b>	<b><i>ERA Monitoring</i></b>
8.2-1	Report 2002
8.2-2	Report 2001
<b>8.3</b>	<b><i>Specific Programmes Monitoring</i></b>
8.3-1	Reports 2002
8.3-2	Reports 2001
8.3-3	Reports 2000
8.3-4	Reports 1999
<b>9</b>	<b><i>Previous Five-Year Assessment reports and Commission replies</i></b>
<b>9.1</b>	<b><i>FYA Framework Programmes 1995-1999</i></b>
9.1-1	FYA of the EU RTD Programmes, 1995-1999
9.1-2	Comments of the Commission
<b>9.2</b>	<b><i>FYA Specific Programmes 1995-1999</i></b>
9.2-1	Quality of Life Report and Commission's comments
9.2-2	User-friendly Information Society Report and Commission's comments
9.2-3	Growth Report and Commission's comments
9.2-4	Energy, Environment and Sustainable Development Report and Commission's comments
9.2-5	Confirming the International Role of Community Research Report and Commission's comments
9.2-6	Innovation-SME participation Report and Commission's comments
9.2-7	Improving Human Research Potential Report and Commission's comments
9.2-8	Nuclear Energy Report and Commission's comments
9.2-9	JRC Report and Commission's comments
<b>10</b>	<b><i>Annual reports on research activities (art.173)</i></b>
10.0	Annual Report 2003
10.1	Annual Report 2002
10.2	Annual Report 2001
10.3	Annual Report 2000
10.4	Annual Report 1999
<b>11</b>	<b><i>Indicators and Statistical information</i></b>
11.01	Third European Report on Science and technology indicators 2003
11.02	Trend Chart on Innovation annual report 2003
11.03	SEC(2003)1255 European Innovation Scoreboard
11.04	SEC(2002)1349 European Innovation Scoreboard
11.05	SEC(2001)1414 European Innovation Scoreboard

<b>12</b>	<b><i>Framework programmes - legal base and guidelines</i></b>
12.01	Framework programme 6 (FP6) (CE)
12.02	FP6 Euratom
12.03	FP6 rules for participation
12.04	FP6 Rules for participation-Euratom
12.05	Specific Programme under Framework Programme 6 (SP6)"Integrating and strengthening the ERA"
12.06	SP6"Structuring the European Research Area"
12.07	SP6 - JRC
12.08	SP6 Nuclear Energy
12.09	SP6 - JRC Euratom
12.10	Guide for Proposers
12.11	Guidelines on Proposal Evaluation, 2004
12.12	Guide to Intellectual Property Rights for FP6 projects, 2004
12.13	FP5 CE
12.14	FP5 Euratom
12.15	FP5 rules for participation
12.16	FP5 Rules for participation-Euratom
12.17	Commission Regulation on the implementation of the rules for participation (CE - FP5)
12.18	SP5 "User-friendly information society"
12.19	SP5 "Quality of Life and management of living resources"
12.20	SP5 "Competitive and sustainable growth"
12.21	SP5 "Energy, environment and sustainable development"
12.22	SP - JRC
12.23	SP5 - JRC Euratom