



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 16.06.2004  
COM(2004) 353

**COMMUNICATION FROM THE COMMISSION**

**Science and technology, the key to Europe's future - Guidelines for future European Union policy to support research**

## **1. LISBON AND RESEARCH**

### **1.1. The European Research Area and the “3% objective”**

1. Scientific research, technological development and innovation are at the heart of the knowledge-based economy, a key factor in growth, the competitiveness of companies and employment. For this reason, the Commission has made strengthening European research a major objective in its Communication on the future financial framework of the Union<sup>1</sup>, proposing to increase the European Union’s research budget: taking all activities together,<sup>2</sup> the budget should be doubled.
2. Launched at the Lisbon European Council of March 2000, the European Research Area project has established a reference framework for research in Europe. At the Barcelona European Council of March 2002, the European Union set itself the objective of increasing the European research effort to 3% of the European Union's GDP by 2010, two-thirds coming from private investment and one-third from the public sector: at 2% of the European Union's GDP, the European research effort today lags behind the efforts of the United States (2.8%) and Japan (more than 3%).
3. In this context, to attain the Lisbon objectives, increasing research efforts at the overall European level is indispensable.

### **1.2. Strengthening the European research effort**

4. Research is becoming more and more expensive, owing to its increasing complexity: in 20 years, the cost of developing a drug has more than doubled, and that of a new microelectronic component has increased ten-fold. And there are many research needs which cannot be met efficiently by one Member State alone.
5. A European industrial policy, in particular in highly competitive sectors such as information and communication technologies, biotechnology and nanotechnology, aeronautics and hydrogen energy technology, requires integration of research efforts at European level.
6. And the Union's action has a recognised “European added value” which stems from its combined effects at several levels:
  - Establishing “critical mass” of resources, particularly in key areas for growth such as microelectronics, telecommunications, biotechnologies and aeronautics;<sup>3</sup>
  - Strengthening excellence through competition at European level and transnational collaboration: the NeuroPrions network, for example, links 52 laboratories for research on Transmissible Spongiform Encephalopathies;

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<sup>1</sup> “Building our common future – Policy changes and budgetary means of the enlarged Union 2007-2013”, COM (2004) 101 of 10.2.2004

<sup>2</sup> Therefore including actions in the fields of space and security.

<sup>3</sup> For example, a project on improving approach and landing technology.

- Exercising a “catalytic” effect on national initiatives and improving the coordination of the activities of the Member States in areas of interest to certain countries (such as natural hazards), or of interest to all (such as climate change).<sup>4</sup>
7. Increasing European funding would also help to achieve the “3% objective” which the Union is trying to attain through an “Action Plan”<sup>5</sup> consisting of a series of complementary measures, most of which are intended to boost private investment in research.<sup>6</sup>
  8. First, through the combination of additional European co-funding with national public funding (in certain fields and certain countries, European Union support represents the equivalent of national “additional funding”). This requires by definition that national funding will not be reduced in proportion, a possibility against which both the political commitment taken by the Member States, and the effect of the Union’s example play.
  9. An increased effort at European Union level would above all have a powerful and specific leverage effect on private investment in research. European companies invest less in research than their American and Japanese counterparts. When they do invest, it is often outside Europe.<sup>7</sup> European Union funding can encourage these companies to invest more in Europe by contributing to:
    - the establishment of a framework for major technological projects which would bring enterprises and universities together at European level, and which can only be conceived at this level;
    - increasing human resources: one target which corresponds to the 3% objective is to increase the number of researchers in Europe to 8 for every 1 000 of the labour force (it is currently 6 for every 1 000), as in the United States;
    - the creation of “centres of excellence”<sup>8</sup> of critical mass capable of attracting private investment.

### **1.3. Excellence and innovation, the key to European industrial competitiveness**

10. One condition for the Lisbon agenda to be realised is the emergence of “European centres of excellence” with a high level of visibility, open at international level and which will attract the best researchers from all countries. This is essential to strengthen Europe’s role on the world technology scene and in research initiatives on

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<sup>4</sup> With funding of €2.2 million, an action in the field of plant genomics coordinates 12 national programmes representing a total of €133 million; the corresponding figures are €2.5 million and €139 million for an action in the field of micro-nanotechnologies.

<sup>5</sup> “Investing in research: an action plan for Europe”, COM (2003) 226 of 04.06.2003.

<sup>6</sup> Measures regarding the taxation of research and innovation, for example, like the “research tax credit”, which it is possible to imagine being applied at European level.

<sup>7</sup> European pharmaceutical companies, for example, tend to concentrate their research investment in the USA, in particular around the large universities on the east coast.

<sup>8</sup> See the Commission Communication “The role of the universities in the Europe of knowledge”, COM (2003) 58 of 5.2.2003.

global issues. The Union must help to create such centres by boosting excellence through support for collaboration and competition at European level.

11. Furthermore, Europe does not have sufficient capacity to transform knowledge into products and services, in particular commercial ones, making an economic success of them. European companies apply for 170 patents each year per million inhabitants, compared with 400 for American companies. And the Union's commercial deficit for high-tech products is approximately €23 billion per year.<sup>9</sup>
12. The Union is today conducting a number of activities to support research in SMEs and for their benefit; for the development of risk-capital funds, science parks, incubators and regional innovation policies; for technology transfer and the management of intellectual property and patents. These activities need to be rationalised and regrouped to form a coherent whole with a critical mass. A process will be launched in this respect as part of preparations for the next Framework Programme.

#### **1.4. Adapting the European Union's Research Framework Programme**

13. There has been a massive response to the Union's Sixth Research Framework Programme 2002-2006. To date, taking all actions together, 28 000 research proposals have been submitted involving 150 000 institutions in 50 countries. 200 major transnational research networks and projects in particular have been launched in areas such as "post-genomic" drug-targeting methods and nanometre-scale microelectronic components, as well as 55 programme networking actions on subjects such as food safety and rare diseases.
14. However, the Framework Programme has been the victim of its own success. Out of the thousands of proposals received, only 1 in 5 has been able to be supported due to the lack of funding. In particular, just under 50% of projects considered to be of a very high standard were able to be financed.<sup>10</sup>
15. With a few instruments, the Framework Programme also has to meet different needs: strengthening both collaboration and competition; support for both basic and industrial research; support for both spontaneously proposed projects and initiatives based on political choices, etc. And despite the progress recently made, such as the simplification of contractual terms, the implementing conditions can still be improved.

## **2. SIX MAJOR OBJECTIVES**

16. In order to increase the impact of the European Union's action, it is proposed to organise it around six major objectives. To launch the corresponding activities with a significant effect, the Union's research budget needs to be increased by the proportions indicated. Funding would be allocated according to three principles: a balance between current and new activities; between research for the advancement of

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<sup>9</sup> European Commission, Statistics on science and technology in Europe, 2003 edition.

<sup>10</sup> In budgetary terms, the rates of utilisation of commitment appropriations and payment appropriations were 99.98% and 96.9% respectively.

knowledge and its industrial application; and between support for human and material research capabilities.

## **2.1. Creating European centres of excellence through collaboration between laboratories**

17. Programmes to support transnational collaboration between research centres, universities and companies have an observable impact on:
  - the quality of research in Europe, which they are helping to improve, whilst increasing its visibility, in key areas for growth;
  - the dissemination of knowledge and results within the Union, and the ability of researchers to become involved in high-level projects.
18. With the Sixth Framework Programme, formulas have been added to the range of possibilities – the “networks of excellence” and the “integrated projects” – which are having the effect of making research in Europe more structured by helping the development of “European centres of excellence”.<sup>11</sup>
19. Researchers must be able to fully exploit these opportunities – including the possibility of projects of a smaller size – according to their interests and needs.<sup>12</sup> A panel of experts for a mid-term evaluation of the efficiency of the instruments of the Sixth Framework Programme has been set up. After carrying out a review on the basis of a survey by questionnaire and hearings of participants or candidates taking part in programmes, it will shortly put forward its suggestions.

## **2.2. Launching European technological initiatives**

20. At the initiative of the Commission and industry, “technology platforms” are being set up, which bring together companies, research institutions, the financial world and the regulatory authorities at the European level to define a common research agenda which should mobilise a critical mass of - national and European – public and private resources.
21. This approach has been, or will be, adopted in areas such as energy (hydrogen technology, photovoltaic solar energy), transport (aeronautics), mobile communications, embedded systems and nanoelectronics. This entails in particular identifying the legal and regulatory conditions needed in order to implement the common research agenda.
22. Often, it will be possible to implement the agenda by means of “integrated projects”. In a limited number of cases, a “pan-European” approach appears appropriate, involving the implementation of large-scale “joint technology initiatives”. An

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<sup>11</sup> Like the bioenergy excellence network which has now been launched, involving 24 institutions in 13 European countries, or the European research project on new combustion engine systems which brings together all the major European motor vehicle manufacturers.

<sup>12</sup> Support for networks of excellence, for example, should be provided where the capacity and motivation exist to integrate the activities of a small number of departments in a quasi-institutional manner.

appropriate framework for their implementation is that of structures based on Article 171 of the Treaty,<sup>13</sup> more specifically a joint undertaking.

### **2.3. Stimulating the creativity of basic research through competition between teams at European level**

23. Open competition between individual research teams and support for them at European level would boost the dynamism, creativity and excellence of European research whilst increasing its visibility. The discussion on basic research and the “European Research Council” which has been ongoing for two years in the scientific community, and which was raised to the political level by a Commission Communication of January 2004,<sup>14</sup> has highlighted the need for:

- an increased effort on basic research in Europe given the increasingly clearly recognised impact of this type of research on economic performance, as stressed by industry;
- increased support for this type of research at European level through the setting up of a support mechanism for research projects conducted by individual teams which are in competition with each other at European level.

24. The Commission suggests the creation of such a mechanism. Projects would be proposed by researchers on their own initiative, without thematic constraints, on subjects of their choice. Projects would then be selected, without any obligation for transnational collaboration, on the basis of their scientific excellence, as assessed by peer review.<sup>15</sup>

### **2.4. Making Europe more attractive to the best researchers**

25. The European Union’s objective is to promote the development of European scientific careers<sup>16</sup>, at the same time helping to make sure that researchers stay in Europe and attracting the best researchers to Europe. Against the background of growing competition at world level, it is necessary to strengthen the “Marie Curie” actions which are being conducted for this purpose by placing emphasis on:

- attracting young people to science and the initial training of researchers through support for the structuring of training, in particular transdisciplinary training;
- the role and place of women in science and research;
- the transfer of knowledge, for the benefit in particular of the technologically least advanced regions and SMEs;

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<sup>13</sup> “The Community may set up joint undertakings or any other structure necessary for the efficient execution of Community research, technological development and demonstration programmes.”  
COM (2004) 9 of 14.01.2004.

<sup>14</sup> See point 5.1.2 for the conditions for implementing this action.

<sup>16</sup> As indicated in the Commission’s Communication “Researchers in the European Research Area, one profession, multiple careers”, COM (2003) of 18.07.2003.

- the international dimension of training and mobility through increased exchanges with other parts of the world;
- life-long learning and career development.<sup>17</sup>

## **2.5. Developing research infrastructure of European interest**

26. With the creation of the ESFRI Forum,<sup>18</sup> an important step has been taken in the field of research infrastructures in Europe. Until then, EU activities had been mainly confined to support for transnational access to infrastructure and for research projects helping to raise their performance.
27. It is proposed to strengthen this action through the introduction of support for the construction and operation of new infrastructure of European interest in the form of a mechanism like that used for the trans-European networks (TENs<sup>19</sup>), based on the model used to support a free electron laser and nanoelectronics facilities in the framework of the “European Growth Initiative”.
28. This approach would also be adopted to support essential services for the European scientific community: distributed communication infrastructures (GEANT projects for the interconnection of electronic research networks and GRID architecture), or electronic archiving systems for scientific publications; bioinformatics databases.

## **2.6. Improving the coordination of national research programmes**

29. Efforts have successfully been made to improve the coordination of national research programmes in the context of the Sixth Framework Programme and these efforts must be strengthened. This involves increasing the resources allocated to the ERA-NET activities for the networking of national programmes, extending the financial support they offer to research activities, and an increased effort towards mutual opening-up.
30. The aim of the Union's participation in national programmes carried out jointly under Article 169 of the Treaty<sup>20</sup> is to ensure their genuine integration. The example of the clinical trials platform for poverty-related diseases, while it has a number of special features, nevertheless enables a certain number of lessons to be drawn. The implementation of activities based on Article 169 would appear to be easiest in areas where the Member States are starting to introduce programmes. But it is in the fields where established national structures exist that this provides most benefit. It would seem to be appropriate to use this formula:
- in areas in which the Member States have firmly displayed their willingness to commit themselves financially;

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<sup>17</sup> See point 5.1.2 for the conditions for implementing this action.

<sup>18</sup> ESFRI: European Strategy Forum on Research Infrastructure.

<sup>19</sup> TENs: Trans-European Networks.

<sup>20</sup> “In implementing the multi-annual framework programme, the Community may make provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes”.

- as an instrument to support “variable-geometry” cooperation between a limited group of Member States;
- with the most effective decision-making mechanisms: “packages” of actions to be agreed upon at the same time by the Council and the European Parliament; or a “framework regulation”.

31. At the same time, it is necessary to strengthen the ties between European intergovernmental research organisations and the Union. Today, these organisations<sup>21</sup> can respond to calls for proposals. The Union should be able to provide direct support for some of their activities which Europe would benefit from their being conducted at Union level.

### **3. RAISING RESEARCH PERFORMANCE THROUGHOUT THE UNION**

#### **3.1. Realising the potential of a Europe of 25 and more**

32. To achieve the Lisbon agenda, all research institutions of the enlarged Union must be given the means to take the road to excellence. The opportunity to take part in projects of limited size in small partnerships with excellent laboratories in other countries will enable young teams and less powerful institutions to benefit from transnational cooperation, whilst acquiring the experience necessary to become involved in complex projects. The transfers associated with the projects will help to strengthen the knowledge base of all European Union countries.

33. In the spirit of the action carried out in recent years to support centres of excellence in the then candidate countries, consideration should be given to the possibility of strengthening excellence and making it more visible where further development is needed by means of specific initiatives in the regions concerned covering measures relating to human resources, exchanges and networking, the development of equipment and evaluation.

#### **3.2. Taking full advantage of complementarity with the Structural Funds**

34. Part of the Structural Funds is allocated to supporting the development of research capability: local research infrastructure, human resources, the creation of intermediary bodies between universities and SMEs. The proposal for reform of cohesion policy makes the “Lisbon agenda” one of the main bases for Structural Fund intervention in the “Convergence” Objective regions, and a basis which must be covered by the programmes in the “Regional competitiveness and employment” Objective regions.

35. In order to take full advantage of this trend, it is necessary to:

- strengthen complementarity between the use of the Union’s research budget and the Structural Funds, in particular in the framework of the future “Strategic Union guidelines for cohesion”;

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<sup>21</sup> In particular, CERN (European Organisation for Nuclear Research), EMBO (European Molecular Biology Organisation), EMBL (European Molecular Biology Laboratory) and ESO (European Southern Observatory), combined with others within EIROforum.

- increase their combined use, for example by granting complementary funding from the Structural Funds where a research project co-financed by the Framework Programme is carried out in a “Convergence” Objective region.

#### **4. FOCUSING THE EUROPEAN UNION’S EFFORTS ON KEY TOPICS**

##### **4.1. Identifying topics of major European interest**

36. The support activities for individual research teams and researchers will not have predetermined topics. In all other cases, it is necessary to identify the subjects for which support at European level is most needed: for actions based on calls for proposals, in liaison with the scientific community and industry; for technological initiatives based on Article 171, in contact with the technology platforms; for programme coordination activities, in particular on the basis of Article 169, in dialogue with the Member States.

##### **4.2. Supporting the Union’s political objectives**

37. Topics which should be given particular attention, especially as regards collaborative research, are those related to the Union’s policies. These actions will continue to stimulate advances in knowledge in areas such as health,<sup>22</sup> consumer protection, energy, the environment, development aid, agriculture and fisheries, biotechnology, information and communication technologies, transport, education and training, employment, social affairs and economic cohesion, justice and home affairs.<sup>23</sup>

##### **4.3. Two new areas for the Union: space and security**

38. Two new areas for the Union in which research plays a leading role should be the subject of specific actions, namely space and security.<sup>24</sup>

###### *4.3.1. Helping to implement European space policy*

39. In a changing international context, a European space policy is being put into practice.<sup>25</sup> The current instrument is a framework agreement on cooperation between the European Commission and the European Space Agency (ESA). It involves the development of a strong, scientific, technological and industrial base.

40. In the future, this policy will be based on a “European space programme” in which research will play a key part, with the research effort focusing on:

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<sup>22</sup> Recent examples of this are the network of excellence on the prevention and control of animal diseases set up under the Sixth Framework Programme and the integrated project on the impact of global change on freshwater ecosystems in Europe.

<sup>23</sup> This complements the scientific and technical support directly provided by the Joint Research Centre (JRC) in the definition, implementation and monitoring of EU policies.

<sup>24</sup> These actions will essentially be carried out using the six main categories of means of intervention described in Section 2, taking account however of the particular characteristics of these two areas.

<sup>25</sup> COM(2003)17 of 21.1.2003 and COM(2003) 673 of 11.11.2003.

- technologies for the exploitation of space, in the areas of navigation (Galileo project), global monitoring for environment and security (GMES system<sup>26</sup>), and satellite telecommunications;
- space transport technology, essential for ensuring independent access to space for Europe;
- scientific activities in space, for example in the framework of using the International Space Station and relating to space exploration.

#### 4.3.2. *Placing research at the service of security*

41. Security is a major challenge in Europe: the security of individuals, the State, transport and telecommunications networks in the face of organised crime and international terrorism, in particular bioterrorism. Increasing security involves advancing knowledge regarding detection, intelligence, reconnaissance and surveillance, as well as analysis of the causes of conflicts.
42. At the beginning of 2004, a preparatory action on this theme was launched. Taking this a stage further, and on the basis of the report of a high-level European group, a clearly identified “European Security Research Programme” is due to be implemented. With more substantial resources allocated to it, the aims will be to:
- increase public security in Europe in the fields of civil protection, for example, and combating bioterrorism;
  - help the Union to fulfil its tasks of preserving peace, preventing conflict and strengthening international security, in keeping with the principles of the United Nations Charter.

## 5. **DOING BETTER TO DO MORE**

### 5.1. **Using the most effective means of implementation**

43. In conformity with the principles set out in the Commission’s Communication of 10 February,<sup>27</sup> the most effective methods of implementation will be used to implement research policy. The aim is to achieve a significant decoupling of the increases in the Commission’s budget and staffing, while strengthening the link with national structures.
44. The Commission would exercise its full political and budgetary responsibility before the Council and the European Parliament, and would ensure the scientific monitoring of the activities in a manner varied according to its involvement.

#### 5.1.1. *Management in partnership*

45. Management in partnership by the Member States, research stakeholders and the Commission would be used in the case of activities carried out to strengthen the

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<sup>26</sup> GMES: Global Monitoring for Environment and Security.  
<sup>27</sup> COM(2004)101 of 10.2.2004

coherence between public and private research efforts, and coherence between Member States' technology policies:

- Actions carried out under Article 171 of the Treaty: mainly the “joint technological initiatives”. A specific management structure must be set up for their implementation;
- Actions carried out under Article 169 of the Treaty: the creation of a specific management structure is possible, but not compulsory.
- Actions to support the creation and development of infrastructures of European interest, implemented on the model of the trans-European network projects (TENs).

46. A characteristic of these actions is the mobilisation of critical mass of resources in financial engineering schemes involving funding by the European Investment Bank (EIB) and national public and private funding. By adopting its “i2i” and then “Innovation 2010” action plans, the EIB has increased its commitment in the field of research. To make use of the opportunity to mobilise loans from the EIB, consideration could be given to the creation, in the Framework Programme, of a European guarantee scheme for major technological research projects.

#### *5.1.2. Externalised management*

47. Externalised management would be used for the support for individual research teams and for researchers. In both cases, these are activities open to the entire field of science, concerning small numbers of people and involving a large number of small-scale financial operations.

48. Several formulas can be considered for giving concrete form to the idea of a “European Research Council”: an executive agency; a Union agency of the conventional type; or a specific structure (for example, a foundation), set up under Article 171 of the Treaty. The political process initiated will make it possible to determine the best way to satisfy the following three fundamental principles: supervision by the scientific community; political and financial responsibility with the Commission; and a Community nature, to avoid the risks regarding a “fair return”.

#### *5.1.3. Management by the Commission in evolution*

49. Management by the Commission would be used to support collaborative research, for several reasons:

- the Commission's role in establishing and regularly updating the “work programmes”, which are the heart of these initiatives;
- its role in assisting in the setting up of partnerships and its recognised ability to ensure the management of complex transnational projects;
- the close tie between these actions and Union policies.

50. With the Sixth Framework Programme, new financial provisions have made it possible to reduce accounting operations in favour of tasks relating to supervision, control and scientific monitoring. Once the activities which do not require the direct involvement of Commission staff have been identified, the remaining purely implementation tasks should be entrusted to an external body.

## **5.2. Improving the operation of the Framework Programme**

51. At the same time, it is necessary to improve the regulatory and administrative environment. The aim is to increase the transparency of the evaluation process, to reduce delays, and to minimise the cost of preparing projects.<sup>28</sup>
52. The financial and administrative provisions must be revised and simplified in the light of the experience of current practice. Following on from the conclusions of the panel for the evaluation of instruments under the Sixth Framework Programme, a process will be launched with this purpose in mind, involving programme users and national research structures. The financial rules will be re-examined and proposals will be made to the Council and the European Parliament in the framework of proposals for Commission decisions for the next Framework Programme and the corresponding rules for participation.

## **6. TOWARDS THE SEVENTH FRAMEWORK PROGRAMME**

53. The ideas presented here must be the subject of two debates: a policy debate within the Institutions; and a debate among the stakeholders in and users of research in Europe. At the beginning of 2005, notably on the basis of the results of these two debates, the Commission will present its proposal for the Union's Seventh Research Framework Programme. Along with specific information about the financial support schemes, it will include the Commissions proposals for thematic research priorities.

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<sup>28</sup> In conformity with the conclusions of the Spring European Council of March 2004 (paragraph 26).