# Opinion of the Economic and Social Committee on the 'Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions — Towards a European research area'

(2000/C 204/16)

On 18 January 2000 the European Commission decided to consult the Economic and Social Committee (ESC), under Article 262 of the Treaty establishing the European Community, on the above-mentioned communication.

The Section for the Single Market, Production and Consumption, which was responsible for preparing the Committee's work on the subject, adopted its opinion on 3 May 2000. The rapporteur was Mr Wolf.

At its 373rd plenary session (meeting of 24 May 2000), the Economic and Social Committee adopted the following opinion by 61 votes to two, with one abstention.

The opinion is divided into the following chapters:



## 1. Executive summary

1.1. The ESC emphasises the crucial importance of R&D for prosperity, social progress, ensuring competitiveness and safeguarding our future. It appeals to governments, industry, the Council and the European Parliament to step up their support for R&D, to strengthen scientific/technical education and training at school and university level, and to make career prospects in this field rewarding enough to attract the most talented people.

1.2. The measures proposed in the Commission communication provide important means of realising this goal. Networking Centres of Excellence, pooling expertise and facilities and developing the necessary infrastructure at European level will provide the basis for tackling these tasks and building the critical mass that cannot be provided by the Member States on their own, in perfect accordance with the principle of subsidiarity.

1.3. However, to fully harness these possibilities and establish a structure that encourages initiative, creativity and innovation, it is important to have an initial trial period during which the measures will be implemented, the best candidates identified, effective fully-fledged systems of self-organisation and self-management set up and responsibility clearly delegated. Administrative, application, approval, reporting and other procedures must also be simplified and standardised among the institutions involved so that total costs are kept within acceptable limits.

1.4. Many obstacles must be removed in order to improve and strengthen the interplay between basic research and product- and process-oriented development that is crucial to innovation. More effective incentives must be provided in order to promote mobility of scientists and engineers between industry (including SMEs), (technical) universities and other research centres, which is a prerequisite for achieving this goal. Intellectual property rights must be distributed evenly and results-oriented basic research must be adequately promoted as the source of new discoveries, ideas and methods.

1.5. Given SMEs' potential for innovation, even greater incentives should be provided for setting them up and their operating conditions should be improved. Private investment in R&D must be encouraged by economic measures. Business for its part must possess or develop enough scientific and technical competence to be shrewd and adaptable. Know-how can only be transmitted if it is available, recognised and understood.

1.6. The ESC opinion analyses these issues closely and makes detailed recommendations.

## 2. **Introduction**

2.1. The ideas and proposals contained in the Commission communication 'Towards a European research area' are motivated by the following observation:

'In Europe, however, the situation concerning research is worrying. Without concerted action to rectify this the current trend could lead to a loss of growth and competitiveness in an increasingly global economy. The leeway to be made up on the other technological powers in the world will grow still further. And Europe might not successfully achieve the transition to a knowledge-based economy.'

2.2. In view of this situation, the Commission communication sets out a series of targeted measures that can be summarised as 'a stock of material resources and facilities optimised at the European level'. In this context the communication can thus also be seen as a statement of principles for further preparation of the Sixth Framework Programme.

2.3. The following specific categories of measures and initiatives are proposed by the Commission:

— A stock of material resources and facilities optimised at the European level;

— More coherent use of public instruments and resources;

— More dynamic private investment;

— A common system of scientific and technical reference for policy implementation;

— More abundant and more mobile human resources;

— A dynamic European landscape, open and attractive to researchers and investment;

— An area of shared values.

2.4. The ESC considers this Commission communication to be a crucial and welcome initiative; this also applies to the proposed measures and the implicit importance of research and development for Europe's prosperity, competitiveness and culture. The ESC is pleased to note that ideas from its opinion of 25 October 1995 [1] ('Coordination of research and technological development policies') have been taken on board.

2.5. The Committee has taken note of the decision by the Lisbon European Council to endorse the objectives set out in the Commission paper on a European research area. The Council, in the conclusions of the Presidency, has also selected a number of particular actions of importance for the creation of a European research area. The Committee welcomes this rapid reaction from the European Council, which will accelerate the process for the establishment of a research area.

2.6. The ESC believes that the Commission communication contains essential advances and opportunities to strengthen and structure Europe's research programme. It supports the specific measures proposed, while noting that their effectiveness will depend on the availability of adequate material resources and on the precise way they are elaborated and implemented.

2.7. It is particularly important to consider in what environment creative ideas, new findings and significant developments can best flourish, or be achieved and evaluated. Essentially, a balance must be struck between breadth and focus, between guiding researchers and giving them the freedom to take their own decisions, between a federal and centralised approach, and between basic research, problem-oriented research and product- and process-oriented development.

2.8. The ESC will give its views on these matters in this opinion. To further increase public awareness of the importance of research and development, and of the prerequisites and processes they involve, the opinion first sets out certain key facts and underlying viewpoints.

## 3. **Research and development in Europe — the foundation and driving force of prosperity and social progress**

3.1. The Renaissance and the Enlightenment marked the beginning of a new type of cultural process in Europe, one which has changed and improved the lives of the people and regions participating in it to an extent unprecedented in the history of mankind. The subsequent technological, medical, cultural and social achievements have produced and characterise the dynamic affluent/information society.

3.1.1. Essential to this process at the beginning was the development of improved documentation and communication techniques (printing), and of tools and energy-producing machines that increasingly freed people from the burden of sheer physical labour, increased productivity to a previously unimaginable degree and allowed substantial mobility and information. It was only this that created the opportunity — until then available only to a small, privileged class of people — to develop a broad, diverse cultural capability.

[1] OJ C 18, 22.1.1996.

3.1.2. Over the past 200 years average per capita real income in Europe (i.e. income available for food, clothing, accommodation, health, education, travel and entertainment) has increased by about a factor of twelve [1]. During the past 120 years alone average life expectancy has more than doubled [2]. Education systems that are now accessible to all sectors of the population have been developed to such an extent that today the average age of a person on joining the active workforce is the same as average life expectancy was 400 years ago.

3.1.3. The countries of the European Union have democratic systems of government and legal certainty, social security and personal freedom have reached unprecedented levels.

3.2. Cultural, social, medical and technological progress are closely interlinked. A crucial impulse behind this development is the empirical scientific methodology developed here in Europe and systematically applied in research and development.

3.2.1. This scientific methodology, and the results it has produced, have had a direct cultural impact, broadening and enriching our knowledge of the world and of life in a revolutionary way. It offers protection against fundamentalist ideologies, which are bred by ignorance or bogus knowledge (false knowledge).

3.3. The essence of science is to produce findings and insights that themselves raise further questions, problems and debates about scientific laws, which in turn lead to new and deeper knowledge but also to fresh applications of the knowledge gained.

3.4. The degree of prosperity attained in certain countries or regions — measured by gross domestic product, employment and other indicators — is clearly related to the current level of research and development. Not just economic competitiveness, but also the cultural and political standing of countries and peoples, are dependent on scientific and technological performance.

3.5. Research and development are the source of future peace and prosperity. Since it may take many decades for work to bear fruit, there is a risk that lack of investment will be noticed too late and will then have particularly harmful consequences.

3.6. The ESC therefore echoes the Commission's concern about Europe's future performance if research and development are not sufficiently and effectively fostered and strengthened: 'And Europe might not successfully achieve the transition to a knowledge-based economy.'

3.7. The ESC thus supports the Commission's commitment to substantially promote and strengthen research and development in Europe. It calls on the Council and the European Parliament to provide vigorous support for these efforts. It also calls on the governments and parliaments of the Member States, to take on this task of promoting and strengthening R&D at national level, in order to effectively complement and underpin the measures proposed by the Commission.

3.8. As the Commission's report indicates, most research and development is conducted and largely financed by industry. The ESC therefore calls on European industry to make a big effort to step up research and development.

## 4. **The purpose of research and development**

4.1. The basic incentive for research and development is the desire to acquire knowledge and skills, to seek connections behind phenomena and then fit these together to form a coherent picture of the whole. The aim is also to develop our technical knowledge on this basis and to benefit by applying what we have learned.

4.2. However, despite the enormous progress made — and partly also because of it — there are still questions and problems relating to people, society and nature that need to be analysed and resolved. These relate to our own identity as human beings and our place on planet earth (e.g. hole in the ozone layer, greenhouse effect), and to the realisation that excess and immoderation can develop at the opposite end of the scale from need and poverty.

4.2.1. It was usually science itself that first identified such problems and proposed ways of solving them.

4.2.2. One reason that these problems arise is that our values, and our political and economic ideas, are not yet in line with all aspects of current science and knowledge: the effects of our modern lifestyle on society, work, the environment, racial harmony and the availability of essential resources, especially energy and water supply, must be better understood and reflected in our actions.

4.3. The problems have also arisen because some countries that were not properly involved in this whole development and evolutionary process, and which are now applying some of the new technologies and achievements, still have to adapt and assimilate the appropriate social and cultural conditions.

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(1) Great Britain.
(2) Germany.

4.4. There is also a risk of political, social and cultural dilemmas: the main dangers are probably demographic, which includes the population explosion that has by no means been brought under control, and the migration problem which may result from this, as well as the availability of weapons of mass destruction.

4.5. In view of this situation research and development must be used to analyse the problems identified, to stimulate the intellectual and political debate and to develop problem-solving concepts or technologies.

4.6. It is equally important, however, that we continue extending and deepening our knowledge in the future, that we discover new things, improve and protect the foundations of our life and civilisation, and maintain the momentum of cultural, social and technological development in Europe and keep the process on course.

4.7. The European Commission can play a very important role in this process, and its concept of a European research area is a substantial contribution.

## 5. **Research and society**

5.1. Scientific and technological developments are generally regarded and applied as a matter of course, but it is not unusual for their potential or assumed effects to trigger fears and concerns. People's response to a new technology is often ambivalent or inconsistent, depending on whether they are afraid of unknown risks (as in the case of genetically modified foods, for example) or whether there is an expectation that the technology will relieve some kind of suffering (e.g. gene therapy). Here the ESC endorses the efforts mentioned by the Commission in its communication to develop 'a shared vision of the ethical issues of science and technology'.

5.2. These contradictions are due in part to the rapid accumulation of new knowledge and new technologies, and also to the difficulty of explaining, or understanding and wanting to understand, facts and very complex issues. Both the scientific community and society must therefore constantly strive to maintain a dialogue, to clarify facts, take well-founded concerns into consideration and avoid misunderstandings. Schools in particular have a very important educating role and the media a communicating role in this context.

5.3. The ESC therefore explicitly endorses the Commission's objective of 'giving the young a taste for research and careers in science'. However, it would also recommend that the Council, Parliament and Commission urge media organisations to provide more information, and objective information, about science, research and modern technologies, while trying gradually to introduce people to the often very complex issues involved (from an objective point of view, avoiding a sensational polarised presentation).

5.4. Reproducibility and universal validity of findings are crucial features of scientific discovery, but the limits of known scientific laws must always be tested.

5.4.1. Because reproducibility has to be proven, parallel and repeat studies carried out by other research groups (or 'duplicate research'), generally using modified techniques or procedures, is not a waste of personal and financial resources, but an essential component of scientific methodology and scientific progress. Firstly, it avoids errors or even falsifications. It also permits the crucial competition between different research groups (to produce the latest and most important findings) that is necessary to stimulate performance and improve quality (but see 9.3 below).

5.4.2. Another hallmark of scientific research — that its methods and the related scientific terminology are the same in all countries and languages — is consistent with this. Thus there is a single scientific 'global culture' and a single scientific 'technical language', and associated common values. (Science can obviously still be spoken about in many languages, but English has become the undisputed international medium for understanding and disseminating scientific findings.) Only this allows a global international exchange of knowledge and worldwide cooperation. This is also a good basis for the Commission's efforts to promote an 'area of shared values' in Europe.

5.4.3. Science thus helps to unite peoples and to shape culture, sometimes even across ideological divides.

## 6. **Human capital**

6.1. The ESC supports the Commission's initiative of 'giving the young a taste for research and careers in science', also in order to foster interest in 'research and development' careers. Such careers must be made attractive enough to draw the most talented people, persuade them to go through a costly, high-quality — and certainly challenging — training with the prospect of appropriate employment. The Commission's proposed initiative aiming to broaden teaching of science subjects at all levels across the EU is also consistent with this objective.

6.1.1. The Commission has presented statistics indicating that the European Union as a whole is lagging behind the United States and Japan in the number of researchers per 1 000 employed. Various reports from within the Union give the same picture, indicating that there is an overall shortage of research-trained staff, both in the private and public sectors of the economies. The ESC would welcome if the Commission, in its future measures to establish a European research area, could give very high priority to actions, in cooperation with Member States, to increase substantially the training of new researchers. Since this training takes considerable time, actions are all the more urgent.

6.2. Society must handle its valuable and limited fund of 'human capital' and the potential for creative achievement with care and economy. It must endeavour to recruit the best-quality academic teachers to train new scientists. To achieve this it is also necessary to get (younger) scientists from non-university research bodies and from industry more involved in academic teaching, to remove obstacles to this and to reward commitment (see 6.3).

6.2.1. Here too the ESC supports the Commission's initiative to achieve 'greater mobility of researchers in Europe', but it explicitly recommends that reciprocal mobility between universities, non-university research centres and above all industry also be promoted.

6.3. In addition, the ESC suggests that we should consider whether (and in what form: central, virtual, scientific/technical, post-graduate level only) a European university — supported and run by European centres of excellence (see 9.8) — could be founded as a useful additional means of supporting these objectives.

6.3.1. The ideal system of research and training could thus also be achieved at European level with the best research centres in Europe both competing and cooperating with each other. Decentralised involvement of many research centres, industrial laboratories and universities would also develop a stimulating human environment, both among teachers and also in terms of study-related research opportunities.

6.3.2. The ESC believes that a European university could not just introduce new standards for developing closer cultural ties in Europe, but also further the following objectives of the Commission: 'introduction of a European dimension into scientific careers', 'making Europe attractive to researchers from the rest of the world'. A key factor here could be preferential use of English as a lingua franca. Various established institutions (e.g. the European University in Florence, the Viadrina European University and newer projects e.g. transnational cooperation in biotechnology) could provide useful experience. The same goes for other international 'summer schools' or 'summer academies'.

6.3.3. Under the objective 'integration of the scientific communities of western and eastern Europe', a European university could also help to provide the most talented students from the future member states with a top-quality education which for instance would enable them subsequently to help develop research centres in their own countries assisted through the PHARE programme or the Structural Funds.

6.4. In order to acquire competence, skills or a top position in a given scientific field, the people and groups involved must work hard to become familiar with the new tasks. Often it is also necessary first to develop high-quality technical facilities and provide a stimulating environment, i.e. research structures.

6.4.1. Although it is important for research programmes to be sufficiently flexible, and persisting with a given line of research may also be seen as a sign of rigidity, changing direction too suddenly or too often can lead to wastage of human capital. Ideas for exploring new, more productive avenues are provided by — often unexpected — research findings and usually come from researchers themselves.

6.5. Interaction between the scientific community and society — generally represented by politicians, civil servants or representatives of funding bodies — mostly concerns the type and extent of research funding, agreement about research objectives and subjects and the evaluation of findings, and the people involved in research.

6.5.1. This calls for the experience and knowledge of the very best and most successful scientists. At the same time, however, these people are diverted from active research by the associated procedures, e.g. grants, applications, meetings, etc. The ESC therefore recommends that funding systems be designed and procedures optimised and coordinated in such a way that the overall cost is acceptable and modest (see points 9.8 ff.).

6.6. Human capital is the most sensitive and the most valuable resource for research and development. The ESC therefore supports the Commission's efforts to enhance human resources.

## 7. **Research and technological innovation**

7.1. Research and development basically form a system embracing different research categories and thus also stages of scientific development of potential new technologies: basic research, application-oriented research, 'encyclopaedic' research (e.g. to complete our knowledge about substance properties, new substances, active substances, etc.), technological development and product and process development.

7.1.1. The distinction between these research categories is sometimes an artificial one, and innovation results from interaction and cross-fertilisation between them. A European innovation area can thus develop from a European research area.

7.1.2. However a goal-directed, planned approach can only be adopted when the objective has been defined and the direction is sufficiently clear. A single innovative idea can trigger a wave of innovations and have an impact on many technological fields. The most recent examples are computer and communications technology, and also gene technology. Their highly positive impact on the economy and the labour market can be seen in a number of countries.

7.1.3. That there are synergies between different research fields is clear for example from the fact that even basic research constantly requires new tools and resources, whose development often involves going beyond the current state-of-the-art, and which often generate completely innovative products that may even be unrelated to the original application (see for example point 9.6.2).

7.1.4. This synergy is also evident from the high-level basic research conducted by many companies — e.g. in the chemicals, pharmaceuticals, electrical engineering and information technology sectors — in addition to their applied and product-oriented research and development, often at their own expense.

7.2. Despite the similarities between the above-mentioned branches of research, basic research — which of course must always be susceptible to possible applications — is nevertheless as a rule chiefly carried out by universities and publicly funded research bodies, whereas most companies have now concentrated mainly on product- and process-oriented development, owing also to cost constraints and global competition.

7.2.1. For a number of reasons this distinction also reflects the way research funding tends to be divided between the public and private sectors:

— It is not possible to predict for which economic sectors the findings of basic research will be relevant. This means that the full economic return on basic research emerges only in the wider social context.

— The timescales within which economically viable findings can be expected, or are needed, are different for basic research and product-oriented development.

— Basic research, and indeed any longer-term research and development, thrives on early publication of findings so that other research groups have the chance to conduct control studies. It is also necessary to harness the synergies generated through immediate interaction within the scientific community, in particular where a large number of laboratories are cooperating in a joint research and development programme.

— Government must generally also insist on publication of findings from research it has funded in order to ensure a level playing field.

— On the other hand it is generally in a company's interests — in view of the competition situation — that the findings from its product development remain confidential at least until a new product is ready for the market.

7.3. These differences in organisation and objectives, etc. are preventing more integration between the different branches of research and development, which would be beneficial and is necessary for the full economic potential of research and development to be realised. There are problems in cooperation between the publicly funded universities and research bodies and development departments in industry.

7.3.1. This also raises issues of intellectual property and patent law in general. The ESC supports the Commission's efforts here to develop 'effective tools to protect intellectual property'.

7.3.1.1. For instance, cooperation may be impeded if rights to research results are all passed on to the contracting companies.

7.3.2. There is also the fact that the organisational structures — including employment conditions (salaries, pensions, etc.) — of publicly funded research bodies and universities on the one hand and private development laboratories on the other are not usually in line, even within a given Member State.

7.4. Reproduction rights organisations or technology transfer centres can nevertheless manage to a certain extent to ensure that application-relevant know-how acquired in publicly funded research bodies is used for developing products in industry. Joint conferences, technology fairs, databases, etc. can also play a role here. And task-sharing forms of institutional cooperation (e.g. contracting or subcontracting) have certainly also proved valuable, despite the problems mentioned.

7.4.1. The following proposal in the Communication can also contribute here: 'Initiatives to bring scientists, industrialists and financiers' at all levels into contact need to be stepped up. This could be achieved in conjunction with the national and

European research programmes, preferably on a combined basis. Promising experiments have been completed along these lines, like the 'Investment Forum' in the field of information technology and communications and the creation of the 'Biotechnology and Finance Forum'.

7.5. *The importance of small and medium-sized companies (SMEs) for innovation*

7.5.1. Small and medium-sized companies (SMEs) take on an important task, in order to take new ideas on board and to develop them. Indeed small companies are often founded for this specific purpose. But their economic viability, or chances of survival, depend not just on 'know-how transfer' but rather on the general economic environment, and on whether they have adequate initial equipment, financing arrangements and business experience.

7.5.2. Thus the main issue is not promoting research and development as such, but improving the competitiveness of new companies.

7.5.3. As Europe lags behind in private R&D investment, an ongoing improvement in the conditions for private research investment is required. Basically the use of indirect support — e.g. tax concessions — is the most effective way of boosting R&D investment, especially by SMEs. In the individual EU Member States there are already various, sometimes quite different, indirect aid instruments for stimulating research. This is not only confusing, but also leads to an imbalance in support for research within the EU. Many indirect support measures at both European and national and regional level have, however, proved their worth as an incentive for boosting research. The Committee therefore agrees with the Commission when it states in this connection that: 'User-friendly information systems need to be developed on existing mechanisms. The exchange and spread of good practices should also be encouraged in order to stimulate private investment in research, particularly among SMEs, and innovation... Where the measures employed have an element of State aid about them, Community rules on State aid should always be respected. (chapter 3.1)'.

7.5.4. Appropriate measures (including funding programmes) and favourable competition policy (cf. ESC opinion of December 1999 [1]) for small and medium-sized companies — particularly new companies — that are trying to develop innovative products, can thus do a lot to help bring new products to the market and also to create jobs. The ESC feels there is room for further improvement here, and it will also draft an opinion on the issue (see point 7.8).

7.5.5. Measures to promote innovation should be one of the main planks of research policy in order (a) to boost the impact of Community research on industry and in particular on SMEs which are set to generate the majority of new jobs in the next two decades, and (b) to exploit the innovation potential of SMEs [2]. To this end national and regional networks for the transfer of research findings and technological information should be opened up for the European research area.

7.5.6. The ESC also points out that SMEs may have less opportunity than large companies to benefit from European funding programmes. Whereas large companies can set up their own liaison departments which collect the necessary information and develop systems for submitting application procedures, etc., small companies — and this also applies to small research institutes — find the formalities of applying, drawing up contracts and administering projects are so onerous that they are often discouraged from taking the initiative. This is even more likely to be the case if previous applications have been rejected, if only on formal grounds.

7.6. The consequent disappointment also leads to disillusionment with European research policy, and often even with the European institutions in general. While fully appreciating the Commission's efforts to provide clear guidelines, information and support to applicants, the ESC recommends that other solutions be sought, in view of the high rejection rate inherent in the system. The ESC believes that a more integrated and less fragmented approach, as advocated in the Commission communication 'Towards a European research area', would also point the way to solutions here.

7.7. However, there are two basic prerequisites for every type of 'know-how creation' and 'know-how transfer': long-term research of sufficient breadth and depth is necessary, because this is the only way of generating new ideas from which targeted and product-oriented development planning can evolve; at the same time companies that are interested in developing new products must acquire enough scientific and technological expertise of their own to ensure that they are clear-sighted and adaptable. Know-how can only be transferred or bought if it is available, known and understood.

[1] 'XXVIIIth Report on Competition Policy (1998)', OJ C 51, 23.2.2000, p. 1.

[2] Own-initiative opinion of the Economic and Social Committee on the impact on SMEs of the steady, widespread reduction in funds allocated to research and technological development in the EU (at Community and national level), OJ C 355, 21.11.1997, p. 31.

7.8. Thus measures which (1) promote and encourage exchanges of staff between companies and publicly funded research centres, and (2) improve the competitiveness of newer companies, provide an important interface between basic research and product development, cultivating progress, technological innovation and economic growth. The Commission's 'encouragement of the creation of companies and risk capital investment', which was already mentioned in a previous communication (Risk capital: A key to job creation in the European Union, April 1998 [1]) is particularly important here.

7.9. The ESC reiterates its recommendation that the procedures required to establish and operate a European patent system be made simpler, shorter and cheaper. This would have an enormous economic impact. A critical factor in achieving this goal is the use of English as a common second language, which it tends anyway to be in the sphere of science and technology; this would also make communication with patent authorities in the United States much easier. The idea of a prior publication period, which does not jeopardise the novelty of the patent, should also be discussed again.

## 8. **Staff exchanges between research centres and industry**

8.1. By far the most effective 'know-how transfer' takes place through people who were themselves involved in acquiring a given knowledge and who then take it to the place of product development, or who are working in product development and then become involved in searching for sources of new procedures and technologies in (technical) universities and publicly funded research centres. These people are the human link between basic research, application-oriented research and product development.

8.2. However, this can only be achieved if there is an intensive exchange of staff between industry and publicly funded research centres. Owing to differences in terms of employment — even at national level — and a plethora of extra costs that restrict mobility, and to the different career paths and career criteria, such exchanges take place too rarely. In the case of cross-border mobility, additional obstacles are created by inadequate harmonisation of national social welfare systems, but also by the frequent lack of reciprocal recognition of academic degrees and periods of study or training undertaken abroad. Instead of mobility receiving incentives, it often actually entails penalties.

8.2.1. The ESC therefore welcomes the Commission's observations on mobility: 'The mobility of researchers between the academic world and the business world, in the different forms that this might take, should also be readily encouraged and developed. This is one of the best ways of improving cooperation between universities [ESC note: "and non-university research centres"] and industry. Information, training and familiarisation projects for researchers and the administrative managers of research organisations should, moreover, be undertaken in tandem by the Member States and the Commission. In the longer term the possibility should be looked at of improving, on a co-ordinated basis, for the bodies concerned, certain internal regulatory and administrative provisions.'

8.2.2. In this connection the ESC specifically recommends that the existing mobility programme ('industry host fellowships') be modified and stepped up, in such a way as not just to remove the social obstacles and associated risks for the people concerned, but also to provide definite incentives for the required mobility, making sufficiently long exchange periods attractive. It should also be made possible for the organisations providing staff to replace them (temporarily) and if necessary reinstate them at the end of the exchange period. The same applies, with certain provisos, to companies set up by people who take with them their expertise from publicly funded research centres. Such options could be used to help SMEs in particular to develop their research capabilities.

8.2.3. However, there are other, serious, obstacles to mobility in addition to the administrative, legal and cultural obstacles mentioned in the Commission communication. A key consideration whenever it comes to mobility of scientists and engineers is the effect on their family and its cohesion of moving to a new place and country. In addition to the need for appropriate schools ('European schools'), there is above all the question of adequate employment for the spouse or partner. In other words, in order to transfer or attract a scientist or engineer to another location or country, either an attractive employment prospect must be found for the spouse/partner or the lack of employment must be offset by other, much more attractive, incentives and opportunities [2].

8.3. There should also be discussion about how unfavourable (e.g. for career choice) free-market employment cycles can be adequately offset by government 'anticyclical' programmes so as to protect 'human capital'. One reason for the current lack of new recruits in science and technology is that a few years ago a very large number of young scientists — even those with excellent qualifications — were unemployed. A shortage of new recruits leads not just to a shortage of human capital but also to distortion of the age pyramid.

(1) SEC(1998) 552 final, 31.3.1998.

(2) ESC opinion on the 'Green Paper on education, training and research — the obstacles to transnational mobility', OJ C 133, 28.4.1997, p. 42.

9. **The European dimension: subsidiarity, concentration and diversity, competition and order**

9.1. It is obviously very difficult to anticipate and plan which people or groups will make really innovative and critical discoveries, at which location, using what methods and in what area of research. There are two aspects to this problem: the processes of before and after evaluation (see point 10) and the degree of diversity and variety of topics and structures that is necessary and useful.

9.2. It is therefore necessary to permit and to cultivate a diversity of research methods and structures in order to encourage competition for the best ideas and findings from them. The most productive environment for achieving this is one where there is a balance between, and adequate variety of, competing ideas, concepts and education structures.

9.3. However, this ideal is stymied not just by the restriction on resources available for research and development, but also by the 'critical mass', costly infrastructures and large-scale equipment required for many research areas, which demand a substantial concentration of resources. This is a fundamental dilemma affecting all research assistance.

9.3.1. Individual Member States are often unable or not prepared to finance the development of 'critical mass' and the creation and maintenance of infrastructures and large-scale equipment, and to fully capitalise on these.

9.4. World-renowned and extremely successful international or European centres — such as CERN, ILL, ESRF, ESO, EMBO and EMBL[1] — have therefore been set up, mainly on the initiative of the scientific community, and these have been run and used by scientists themselves. Another example is the European Space Agency, with which European efforts to develop a successful space programme have produced impressive results. Certain Member States already have large facilities that are used on a multilateral or bilateral basis.

9.4.1. The Commission too has integrated and very successfully implemented joint European research and development programmes requiring large-scale equipment and infrastructure, e.g. the European Fusion Programme, which has helped Europe become a world leader in fusion research.

9.4.2. One explanation for these achievements is the incentive to combine and pool resources that arose from a clearly defined joint objective that cannot be realised in any other way. They can also be attributed to cautious and rational management of the research programmes and projects concerned, in which scientists and their 'parent organisations' are fully involved in the whole development process, and in which a middle course is steered between focusing on the most successful concepts and being open to new ideas and approaches.

9.5. This type of initiative is supported by scientific associations such as the European Physical Society (EPS), whose conferences and publications provide a forum for exchanging findings and ideas, for critical dialogue, organising cooperation (including international cooperation), quality evaluation and opinion-forming on further measures. Quality and innovation are acknowledged in 'invited papers' at specialist conferences.

9.5.1. Another initiative of the scientific community that is becoming increasingly important is the European Science Foundation (ESF), whose role and involvement the ESC also explicitly recommends should be strengthened. The COST initiative should also be stepped up in this context.

9.5.2. There are also international organisations such as the International Energy Agency (IEA), which promotes and coordinates research and development programmes relating to energy in the framework of the OECD.

9.6. In this context the Commission proposes 'a stock of material resources and facilities at the European level'.

9.6.1. The Commission wants these goals to be achieved through a series of specific measures, especially 'networking of centres of excellence and creation of virtual centres', 'defining a European approach to research infrastructures', 'more coordinated implementation of national and European research programmes' and 'closer relations between European organisations for scientific and technological cooperation'.

9.6.2. As a specific means to this end, the Commission also wants to broaden and promote the use of electronic networks in the various research areas. The potential importance of electronic networks for the economy as a whole is evident from the regrettably little-known fact that 'the World Wide Web, which was developed by a CERN researcher to cover the needs of physicists, is now used by tens of millions of people'. These efforts of the Commission are explicitly supported by the ESC, also because of their direct economic implications.

[1] CERN = European Organisation for Nuclear Research; ILL = Institut Laue-Langevin; ESRF = European Synchroton Radiation Facility; EMBO = European Molecular Biology Organisation; EMBL = European Molecular Biology Laboratory.

9.7. On principle, the ESC welcomes the objectives of the Commission as a promising means of strengthening Europe's performance in research and development and of harmonising national and international research programmes.

9.7.1. The ESC sees these objectives as the right way, striking a balance between diversification and concentration, for the Commission to assume responsibility for coordinating programmes and projects that require concentration of substantial resources and where resources must therefore be pooled primarily at European level, while leaving the Member States with responsibility for ensuring adequate breadth of assistance.

9.7.2. The Commission should also become involved in projects involving intercontinental cooperation and their supervision. Such intercontinental cooperation is particularly important where internal competition (and the chances of independently reproducing findings) within Europe is necessarily reduced owing to the one-off nature of certain laboratories. In such situations, the global competition environment is more significant.

9.7.3. The ESC also expects the Commission to succeed here in its efforts to establish 'the conditions for political consultation between these organisations. This could be achieved by way of a council of their senior officials meeting at regular intervals. This would also give Europeans and outside observers a more coherent image of the Europe of science and technology'.

9.8. However, this only applies if the main aim really is, and remains, to improve quality and efficiency, and if the total cost for researchers and research centres of the relevant coordination and unavoidable 'bureaucratic' procedures is consequently reduced and harmonised, and on no account further increased.

9.8.1. Complaints about inordinate bureaucracy and excessive application and approval procedures have already become endemic in scientific circles and in many cases unfortunately are therefore no longer taken seriously. Precisely because of this we would point out that whereas there is no question of the need for cooperation, agreement, coordination, communication, etc., science and research also require periods of withdrawal, of introversion, so that individuals — and groups — can think, concentrate and write.

9.8.2. Consequently any successful scientist has only a limited capacity for interaction — and a limited period of time — available to use and interpret contacts with other people, groups, bodies, committees, etc. without reducing his or her scientific productivity. Too many and too costly application and approval procedures — particularly if they are unsuccessful — deprive research of input from the people it needs. This is particularly the case given that there are many funding instruments and evaluation procedures, which often overlap, for a given project.

9.8.3. If the balance between introvert and extrovert working styles is upset, there is a risk that activity will be unproductive and the same papers produced again and again. Recognising this requires an understanding of the nature of research and development.

9.8.4. For this reason and many others it is important that the officials in the Commission with responsibility for these matters should be successful scientists with research expertise who have leadership qualities and good judgement, and are therefore accepted as members of the scientific community. To retain this in future, respected scientific organisations in Europe should contribute their experience in recruitment to such posts, and should also be prepared to provide top-notch candidates.

9.8.5. The ESC also recommends that the plethora of application, monitoring and evaluation procedures, which often overlap with each other, be harmonised and integrated at institutional, national and European level.

9.9. The Commission proposes a new instrument: 'networking of centres of excellence and creation of virtual centres'. The aim of this new instrument is to pool research expertise in appropriate fields at the highest level in Europe, using existing facilities, for a specified time period. Various types of measures are conceivable under this general heading.

9.9.1. The ESC basically welcomes this new approach. It believes that a key aspect of this instrument should be delegating responsibility to centres of excellence being operated by self-organisation for a specific purpose.

9.9.2. Responsibilities must be clearly defined, with respect to both technical coordination of all the research strands and to budgetary powers, so that the synergistic effects of these centres of excellence can be harnessed. It must be considered to what extent their budget should include structural aid in addition to the actual research spending, in order to adequately promote the objective of strengthening the European research area with the help of this instrument.

9.9.3. However, before setting up such a centre of excellence it is necessary to check carefully whether the field of research really justifies the extra cost of establishing the centre of excellence, i.e. whether added value can really be expected.

9.9.4. This should generally be the case where large laboratories are jointly built and used, and priority should therefore be given to such projects.

9.9.5. It is more difficult to take a decision in cases that do not involve central facilities, but rather a pooling of labour. In this case the main purpose is to produce a 'critical mass' of research capacity to effectively address a key problem. It is important to take this into consideration with respect to setting up and running databases and service facilities needed in Europe, e.g. genetic archives, biomedical databases or genome research.

9.9.6. Such centres of excellence should therefore be selected and set up on a competitive basis with the aim of achieving high quality. Their number should be limited, at least during a preliminary pilot phase, and initially they should only be funded for a well-defined period to prevent them automatically becoming a permanent institution.

9.9.7. The Commission proposes that 'measures should be taken at national and European level to encourage the return to European laboratories of researchers who have left to complete their training or pursue their careers in the United States'. Under such a 'brain-gain initiative' the possibility could also be considered of providing a system of return grants in these centres of excellence for young scientists who want to work in Europe again after employment in a third country such as the United States.

9.9.8. Experience with such centres of excellence should open up new possibilities for the way formal promotion of research by the EU develops. The procedural and institutional experiences gained through the European Fusion Programme should also be considered in this context: the results of the European evaluation procedure here have become a quality standard which the Member States also use as a benchmark when granting their own share of assistance.

9.9.9. Another interesting point in connection with setting up centres of excellence is their potential influence and catalytic effect on new research activities and programmes in the future EU Member States. The Commission's proposal of creating a 'greater role of the regions in the European research effort' through 'combined use of the Structural Funds and the European research programmes', if acted upon, is likely to produce a similar, potentially valuable effect.

9.10. In its communication the Commission addresses another factor relating to European integration: 'By aligning methods, harmonising procedures and comparing results, a common system of reference needs to be established at Union level.' The ESC sees this as an important objective for Europe that is worth supporting. However, it notes that when putting this plan into effect it should first be carefully considered whether existing national reference centres — pooled in task-sharing, if necessary — could perform this task for Europe, possibly in collaboration with the JRC.

## 10. **Procedures and evaluation**

10.1. So that scientists and engineers can have access to the resources they want or need, it is necessary to evaluate the pertinence of the proposed research programme, its chances of success, the justified cost and the personal and institutional capabilities of the applicant.

10.2. Only highly qualified specialists are able to assess the above factors, and such people must therefore be asked to act as evaluators (peer review). The history of science shows that even in this case it is difficult, especially with innovative and therefore inevitably speculative proposals, to always make a correct a priori assessment.

10.2.1. However, there is no procedure better than peer review. Choosing suitable evaluators who can give a balanced assessment is a critical and difficult task that is generally best done by experienced scientific organisations, companies and associations. However, some critics object that this procedure could lead to these organisations themselves receiving preferential treatment.

10.2.2. Partly as a response to this objection, the Commission has started to select the evaluators itself for various programmes, under a system whereby evaluators themselves apply. Since problems cannot be excluded here either (e.g. eminent scientists not applying), some of the evaluators could be selected under the Commission's current procedure, while others should be recommended by research bodies and companies with particular expertise in the field concerned or the relevant scientific/technological associations. In conjunction with the effort to simplify procedures in the Commission and increase involvement of the organisations concerned, such a combined procedure should be the best way of avoiding any bias.

10.2.3. However, to ensure the necessary transparency it is also important that evaluators — and their responsibility for a given field — are known to the potential applicants, without it being possible to know whether they have decided for or against a given project application.

10.3. It is also recommended that some criteria — e.g. socio-economic factors like months to market launch, impact on jobs — should be applied more flexibly in assessing projects submitted, in order to avoid the impression created in some cases of unrealistic and confusing requirements.

10.4. As explained in previous sections, it is also important not to place more demands on evaluators — and applicants — than absolutely necessary. Again, one important step in this direction would be to harmonise evaluation procedures at local, national, European and other levels, as recommended.

10.5. Another way of achieving this would be to organise programmes due for evaluation clearly and not divide them into too small units. The ESC also recommends that the evaluation process for well-defined parts of programmes be delegated to national or European bodies on a trial basis, as part of a decentralisation effort and in the framework of specific pilot projects.

10.5.1. This suggestion is consistent with the ESC's recommendation that EU assistance be targeted at large projects, i.e. projects or tasks that cannot be properly carried out at national level, as is consistent with the subsidiarity principle.

## 11. **Conclusions and recommendations**

11.1. The ESC considers the Commission communication to contain important and valuable strategic ideas and measures, which already provide for approaches to integrate the new Member States after EU enlargement.

11.2. The ESC welcomes and supports the Commission's commitment to substantially strengthen research and development in Europe. It calls on the governments and parliaments of the Member States, and on industry, to effectively underpin and complement these efforts at national level and in industry.

11.3. An essential and welcome system for strengthening European performance in research and development is resource pooling.

11.4. A promising new idea for achieving this is to set up centres of excellence.

11.4.1. However, it is necessary to ensure that the necessary coordination and networking measures — including the consequent use of research staff — in all cases really yield added value.

11.4.2. For this reason only a few centres of excellence should be set up initially, on a trial basis and for a limited period. The fields and work chosen should be restricted to projects and objectives for which an individual Member State cannot provide the necessary input for cost reasons, meaning critical mass and the added value needed by Europe can only be achieved through a joint effort.

11.5. It is essential to ensure that this does not lead to a restriction or even reduction in basic research in Europe. Basic research is the source of new knowledge and skills. Innovation is achieved through competition, but also by combining rival ideas, concepts and methods.

11.6. The Commission also proposes a common European reference system, an idea which should be supported. This is very important, for example, in terms of achieving the key objective of a certification system valid across the EU. However, such a system should preferably be established on the basis of existing national institutions and the JRC which — through task-sharing — can provide a joint EU reference system on behalf of Europe.

11.7. The ESC wishes to make the following recommendations on aspects and details of the research programme and its design.

11.7.1. Existing organisations and scientific associations, especially bodies with experience and success in international cooperation, should be extensively used and involved.

11.7.2. Evaluation processes should continue to be based more on the principle of peer review, i.e. with more involvement of experts recommended by experienced research centres and industrial laboratories. These processes should also be simplified, transparent and, in selected areas (e.g. where there are a large number of smaller 'projects'), delegated to Member State institutions that have experience in this field on a trial basis.

11.7.3. The economic environment and competitiveness of small businesses (SMEs) should be enhanced in order to promote innovation and employment.

11.7.4. The procedures for a European patent must be made simpler, cheaper and shorter. English should be the second common language for the patent. A prior publication period should be considered which does not jeopardise the novelty of the patent.

11.7.5. To increase mobility between research bodies, universities and industry (especially SMEs), adequate incentives and conditions should be created for the scientists and engineers concerned — and also for contributing and benefiting institutions.

11.7.6. School and university courses must be made more comparable and brought closer together as a prerequisite for scientific integration in Europe and improved mobility of people working in science.

11.7.7. There should be assessment of the pros and cons of setting up a virtual European university — as another instrument and symbol of European scientific integration — in which the centres of excellence in particular could participate.

11.7.8. The principal Commission officials dealing with research and development matters should in future also increasingly be successful and highly qualified scientists, and European research organisations should contribute their experience to these appointments.

Brussels, 24 May 2000.

*The President*

*of the Economic and Social Committee*

Beatrice RANGONI MACHIAVELLI

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**Opinion of the Economic and Social Committee on:**

**— the 'Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on certain Community measures to combat discrimination',**

**— the 'Proposal for a Council Directive establishing a general framework for equal treatment in employment and occupation',**

**— the 'Proposal for a Council Directive implementing the principle of equal treatment between persons irrespective of racial or ethnic origin', and**

**— the 'Proposal for a Council Decision establishing a Community Action Programme to combat discrimination 2001-2006'**

(2000/C 204/17)

On 19 January and 4 February 2000 the Council decided to consult the Economic and Social Committee, under Article 262 of the Treaty establishing the European Community, on the above-mentioned communication and proposals.

The Section for Employment, Social Affairs, and Citizenship, which was responsible for preparing the Committee's work on the subject, adopted its opinion on 5 May 2000. The rapporteur was Mr Sharma.

At its 373rd plenary session of 24 and 25 May 2000 (meeting of 25 May 2000), the Economic and Social Committee adopted the following opinion by 108 votes in favour and 6 votes against, with 6 abstentions.

## 1. **Legal basis, content and scope of the proposal**

1.1. The Commission in its communication on certain Community measures to combat discrimination is proposing two new equal treatment Directives together with a Community Action Programme to support these initiatives.

1.2. The legal basis for this initiative derives from Article 13 of the Treaty of Amsterdam which for the first time provides the Community with specific powers to take action to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation.

1.3. The application of the principles of subsidiarity and proportionality as set out in the Protocol on the Treaty, require that action at Community level 'produce clear benefits by reason of its scale or effect compared to action at the level of the Member States'.