COUNCIL DECISION

of 27 July 1994

adopting a specific programme for research and technological development, including demonstration, in the field of advanced communication technologies and services (1994—1998)

(94/572/EC)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130i (4) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament [1],

Having regard to the opinion of the Economic and Social Committee [2],

Whereas, by Decision 1110/94/EC [3], the Council and the European Parliament have adopted a Fourth Framework Programme for Community actions of research, technology development and demonstration (referred to hereafter as RTD) for the period 1994—1998 specifying *inter alia* the activities to be pursued in the area of advanced communications technologies and services; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130i (3) of the Treaty stipulates that the Framework Programme is to be implemented through specific programmes developed within each activity of the Framework Programme and that each specific programme is to define the detailed rules for implementing it, fix its ration and provide for the means deemed necessary;

Whereas the amount deemed necessary for carrying out this programme is ECU 630 millin; whereas the appropriations for each financial year should be laid down by the budgetary authority, subject to the availability of resources within the financial perspectives and to the conditions set out in Article 1 (3) of Decision 1110/94/EC;

Whereas the harmonized development and introduction of new generations of communication systems and services is vital to the consolidation of the internal market; whereas research and technology development is an essential underpinning to the development of trans-European networks and services; whereas innovative use of new communications services underpins the development of more flexible working patterns and the convergence of the media, television and telecommunications sectors in provision of interactive video services; whereas decisions taken on liberalization of telecommunications services by 1998 will pose new challenges in technology development for both network and service inter-operation and service management in a competitive environment;

Whereas this programme may make a significant contribution to the stimulation of growth, to the strengthening of competitiveness and to the development of employment in the Community, as indicated in the White Paper on 'growth, competitiveness and employment';

Whereas the content of the Fourth Framework Programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this specific programme specifies the content of the activities to be carried out in accordance with this principle in the area of advanced communications technologies and services;

Whereas Decision 1110/94/EC lays down that a Community action is justified if, *inter alia,* the research contributes to the strengthening of the economic and social cohesion of the Community and the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas the Community should only support RTD activities of high quality;

Whereas fundamental research must be encouraged, because of the rapid pace of technological innovation, particularly in the area of photonic communications;

Whereas the rules for the participation of undertakings, research centres (including the Joint Research Centre (JRC)) and universities, and the rules governing the dissemination of research results specified in the measures provided for in Article 130j of the Treaty, apply to this specific programme;

Whereas provision should be made for measures to encourage the participation of small and medium-sized enterprises (SMEs) in this programme, in particular through technology stimulation measures;

(1) OJ No C 205, 25. 7. 1994.
(2) Opinion delivered on 2 June 1994 (not yet published in the Official Journal).
(3) OJNo L 126, 18. 5. 1994, p. 1.

Whereas the Commission's effort to simplify and accelerate the application and selection procedures and make them more transparent must be continued in order to promote the implementation of the programme and to facilitate the action which firms, particularly SMEs, research centres and universities must undertake in order to participate in a Community RTD activity;

Whereas this programme will help to strengthen synergy between the RTD activities carried out in the field of advanced communications technologies and services by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas, in view of the increasing convergence between information technologies, telecommunications technologies and telematics, the programme should be implemented in close coordination with research programmes in the field of information technologies and telematic applications of common interest, so as to reinforce the synergetic effects thereof;

Whereas it may be appropriate to engage in international cooperation activities with international organizations and third countries for the purpose of implementing this programme;

Whereas this programme should also comprise activities for the dissemination and exploitation of RTD results, in particular towards SMEs, notably in the Member States and regions which participate least in the programme, and activities to stimulate the mobility and training of researchers within this programme to the extent necessary for proper implementation of the programme;

Whereas an analysis should be made of possible socio-economic consequences and technological risks associated with the programme;

Whereas there is also a need to carry out research, in liaison with the targeted socio-economic research programme, firstly into the social impact of advanced communications technologies and services (particularly on regional planning and the organization of production and labour) and secondly into the interaction between the European citizen and the information infrastructure;

Whereas progress with this programme should be continuously systematically monitored with a view to adopting it, where appropriate, to scientific and technological developments in this area; whereas in due course there should be an independent evaluation of the progress with the said programme so as to provide all the background information needed in order to determine the objectives of the Fifth RTD Framework Programme; whereas at the end of this programme there should be a final evaluation of results obtained compared with the objectives set out in this Decision;

Whereas the JRC may participate in indirect actions covered by the present programme;

Whereas the Scientific and Technical Research Committee (Crest) has been consulted,

HAS ADOPTED THIS DECISION:

Article 1

A specific programme for research and technological development, including demonstration, in the field of advanced communications technologies and services, as set out in Annex I, is hereby adopted for the period from 27 July 1994 to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 630 million, including a maximum of 6,3 % for the Commission's staff and administrative expenditure.

2. An indicative breakdown of this amount is given in Annex II.

3. The budgetary authority shall lay down the appropriations for each financial year, subject to the availability of resources within the financial perspectives and in accordance with the conditions set out in Article 1 (3) of Decision 1110/94/EC, taking into account the principles of sound management referred to in Article 2 of the Financial Regulation applicable to the general budget of the European Communities.

Article 3

1. The general rules for the Community's financial contribution are laid down in Annex IV to Decision 1110/94/EC.

2. The rules for the participation of undertakings, research centres and universities, and for the dissemination of results are specified in the measures envisaged in Article 130j of the Treaty.

3. Annex III sets out the specific rules for implementing this programme, supplementary to those referred to in paragraphs 1 and 2.

Article 4

1. In order to help ensure, *inter alia*, the cost-effective implementation of this programme, the Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within the programme in relation to the objectives set out in Annex I, as amplified in the work programme. It shall in particular examine whether the objectives, priorities and financial resources are still appropriate to the changing situation. It shall, if

necessary, in the light of the results of this monitoring process, submit proposals to adapt or supplement this programme.

2. In order to contribute towards the evaluation of Community activities, as required by Article 4 (2) of Decision 1110/94/EC and in compliance with the timetable laid down in that paragraph, the Commission shall have an external assessment conducted by independent qualified experts of the activities carried out within the area covered by this programme and their management during the five years preceding this assessment.

3. At the end of this programme, the Commission shall have an independent final evaluation carried out of the results achieved compared with the objectives set out in Annex III to Decision 1110/94/EC and Annex I to this Decision. The final evaluation report shall be forwarded to the European Parliament, the Council and the Economic and Social Committee.

Article 5

1. A work programme shall be drawn up by the Commission in accordance with the objectives set out in Annex I and the indicative financial breakdown set out in Annex II, and shall be updated where appropriate. It shall set out in detail:

— the scientific and technological objectives and research tasks,

— the implementation schedule, including dates for calls for proposals,

— the proposed financial and managerial arrangements, including specific modalities for implementing technology stimulation measures for SMEs and the general lines of other measures, including preparatory, accompanying and support measures,

— arrangements for coordination with other RTD activities carried out in this area, in particular under other specific programmes, and, where appropriate, for ensuring improved interaction with activities carried out in other frameworks, such as Eureka and COST,

— arrangements for the dissemination, protection and exploitation of the results of RTD activities carried out under the programme.

2. The Commission shall issue calls for proposals for projects on the basis of the work programme.

Article 6

1. The Commission shall be responsible for the implementation of the programme.

2. In the cases provided for in Article 7 (1), the Commission shall be assisted by a committee composed of representatives of the Member States and chaired by the representative of the Commission.

3. The representative of the Commission shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion within a time limit that the Chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority provided for in Article 148 (2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

4. The Commission shall adopt the measures envisaged when they are in accordance with the opinion of the Committee.

5. If the measures envisaged are not in accordance with the opinion of the Committee or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

6. If, on the expiry of a period of three months from referral of the matter to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission.

Article 7

1. The procedure laid down in Article 6 (2) to (6) shall apply to:

— the preparation and updating of the work programme referred to in Article 5 (1),

— the content of the calls for proposals,

— the assessment of the RTD activities proposed for Community funding and the estimated amount of the Community contribution for each activity where this is equal to or more than ECU 1 million,

— any adjustment to the indicative breakdown of the amount as set out in Annex II,

— specific modalities for the financial participation of the Community in the different activities envisaged,

— the measures and terms of reference for programme evaluation,

— any departure from the rules set out in Annex III,

— participation in any project by legal entities from third countries and international organizations.

2. Where, pursuant to the third indent of paragraph 1, the amount of the Community contribution is less than ECU 1 million, the Commission shall inform the Committee of the projects and of the outcome of their assessment.

3. The Commission shall regularly inform the Committee of progress with the implementation of the programme as a whole.

Article 8

Participation in this programme may be open, on a project-by-project basis without financial support by the Community, to legal entities established in third countries, where such participation contributes effectively to the implementation of the programme and taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 27 July 1994.

For the Council

The President

Th. WAIGEL

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the guidelines of the Fourth Framework Programme, in applying the selection criteria and in specifying its scientific and technological objectives.

Section 1.B of Annex III, (First Activity) of that Fourth Framework Programme, forms an integral part of this programme.

Introduction

The new focus of RTD in the specific programme on communications technologies is the emerging information and communications infrastructure, which will provide the basis of the information society of the future. The RTD areas proposed are those most vital to the development of the infrastructure, taking into account the need for selectivity and concentration of effort, and with the objective of improving the competitiveness of all industry and the employment situation in the European Union, and of enhancing the quality of life of its citizens, particularly by facilitating equal access for all to the information infrastructure.

Community support for research and technology development in this area started in 1988 under the Second Framework Programme and was reinforced in 1991 and 1993 under the Third Framework Programme. This industrial sector has considerably changed in recent years, and the focus of Community RTD support in the Fourth Framework Programme will be different, but it is vital that the Community continues to support RTD activities in advanced communications technologies and services for three reasons.

Firstly, the harmonized development and introduction of new generations of communications systems and services is vital to the consolidation of the internal market: research and technology development is an essential underpinning to the development of trans-European networks and services.

Secondly, the telecommunications sector is of major economic importance in its own right and as a support for all other sectors of the economy: new integrated communications services are the key to increased productivity, industrial competitiveness, economic growth and the creation of new employment; innovative use of new communications services underpins the development of more flexible working patterns and the convergence of the media, television and telecommunications sectors in provision of interactive video services.

Thirdly, decisions on liberalization of telecommunications services by 1988 will pose new challenges in technology development for both network and service inter-operation and service management in a competitive environment. Continued support for RTD at Community level is therefore an essential part of Community policies for the internal market, industrial development, new employment creation, and telecommunications itself.

The context

Advanced communications technologies and services are crucial for consolidation of the internal market, for Europe's industrial competitiveness and for balanced economic development. The services are a vital link between industry, services sector and market as well as between peripheral areas and economic centres. They are also a prerequisite for social cohesion and cultural development.

Advanced communication services will multiply the benefits of more traditional services. Some major corporations have already realized the advantages that can accrue: lower costs, improved productivity, competitive advantages and reduced environmental impact. However, in Europe, there is still a gap between the potential of technology and the reality of applications.

The activities to be pursued will not only be a basis for innovation and a key to competitiveness, but will also make a contribution to answering European society's needs. The research will concentrate on the interworking, integration and verification through trials of high-speed, photonic and mobile communication systems, and the distribution of network and service intelligence.

The two phases of the RACE programme focused on integrated broadband networks and demonstrations of how services could exploit such networks. Work in this programme will build on the achievements, and

contribute further to the success of European actions in this area. However, in the period to 1998, a paradigm shift is needed towards a stronger focus on stimulating innovative use. This will require a multi-disciplinary approach, and strengthened collaboration between users of advanced communications in the public and private sectors.

Community support for technology development is still needed in selected areas where no one player can act alone, and where common European specifications and standards are necessary. These are the areas covered in this programme.

The work will capitalize on the results achieved, and the collaboration frameworks established within the RACE programme. The emphasis on common functional specifications and standards is still vital. The actions will take account of the interaction between technology development and regulations, in collaboration with national regulatory bodies, to support the continuing harmonization of regulatory regimes in Europe, and to allow national authorities to manage the industrial and social impacts of new technologies and services.

Objectives of the programme

The objective is to develop advanced communication systems and services for economic development and social cohesion in Europe, taking account of the rapid evolution in technologies, the changing regulatory situation and opportunities for development of advanced trans-European networks and services.

The aims are to support European policies for early deployment and effective use of advanced communications in consolidation of the internal market, and to enable European industry to compete effectively in global markets. The work will enable the rebalancing of public and private investments in communications, transport, energy use and environment protection, as well as experimentation in advanced service provision. In conjunction with the work in the specific programme on information technologies, it will provide a common technological basis for applications research and development in the specific programme on telematic systems and will prepare the ground for the development of a European market for information services.

Measures for technology-use stimulation, based on feasibility grants, will be implemented to encourage and facilitate the participation of SMEs.

The areas of work

The work will consolidate European technological leadership in digital broadband communications and enable effective network management and service deployment in a diverse and competitive communication environment. In particular, the work will stimulate and coordinate the emergence of digital multimedia services and integrated photonic systems with a view to their widespread introduction in Europe from 2000, including development of the technological basis for deployment of 'Transparent Highways': (all-optical networks). It will ensure mobility on fixed networks and through advanced wireless, radio and satellite systems across Europe, with particular emphasis on user access in both public and private networks, and develop and demonstrate technologies for the integrity, confidentiality (protection of privacy) and availability of information in integrated systems.

In all areas, technology and service demonstrators will allow uses of generic advanced communications services to evaluate the applicability of new technologies and to focus technology developments on their needs and on key areas for Europe's economic and social development. The lead given by users will also ensure that the technology development activities respond quickly to changes in economic and social conditions and to new scientific discoveries and breakthroughs.

A key role will be given to system integration, usage trials and demonstration of advanced services, and a close link will be maintained with trans-European network developments. Application trials will serve to demonstrate the capabilities of advanced communications in a variety of business and public service sectors, and will allow the advantages in terms of efficiency, reliability and environmental impact reduction to be evaluated. They will enable common interest groups to experiment with emerging technologies, to address structural and regulatory constraints to better use of advanced communication, to identify 'best practice'

and to evaluate the impacts of societal evolution to an 'information economy', with decentralized collaborative working and small business networking.

It is expected that the main technology development activities will fall in the following six areas:

1. *Interactive digital multimedia services*

Multimedia services, including television, have a strong impact on the socio-cultural life of society. European standards and multilingual services are essential for social cohesion in Europe, and a strong multimedia sector will create new employment opportunities. Digital systems will allow better use to be made of existing infrastructures for TV distribution, and will enable the provision of increased image quality and definition (to HDTV and beyond). They will make it possible to increase the number of programmes, to increase the number of sound channels for multilingual programmes, and to create advanced interactive audiovisual services.

The objectives of the work, in coordination with other European policies, will be to stimulate the emergence of European interactive digital multimedia communication services at least as fast as in other developed countries, with a view to their widespread introduction from 2000, and in order to keep competitive advantage.

The aims will be to enable the integration of existing broadband services, including terrestrial, cable and satellite TV distribution, with the public switched digital services (ISDN and GSM) for interactive multimedia services. Furthermore it will enable network development towards fully symmetrical interactive multimedia services. The work will aim to increase the efficiency of frequency spectrum use, increase the number of channels and quality of service available on all TV distribution networks and develop technologies for flexible use of digital video communications, including ultra-high definition video, for a range of different purposes.

The work will make it possible to introduce new services: from specialist and professional telework support to public entertainment services. Enhanced interactivity is a prerequisite for 'pay-per-view' TV, more selective public information dissemination, on-demand training support, electronic information services for the general public, on-line feature-film access, 'video dial' (to view a recent TV programme) and viewer-profiled advertising and direct marketing. Switched video services will allow high-quality video telephony and videoconferencing to be provided to a wide range of organizations, including small businesses and private individuals. By enabling the linking of multimedia workstations through high-speed digital networks, it will allow full motion video to be received and transmitted.

The work will involve development of digital technologies for cost-effective transmission and reception of different image resolutions for large screens and portable receivers, in a coherent digital image hierarchy. The provision of a powerful, flexible multiplex scheme will enable the different configurations of image and sound streams within one channel; it will provide means for access control at programme and channel level, and it will enable more efficient use of the frequency spectrum. Technology developments will include work on image and channel coding, service multiplexing, network management and access control. It will include development of systems for efficient frequency allocation; multimedia communication architectures; an interoperable set of source-coding systems for storage, transmission and display; common channel-coding and modulation techniques for digital transmission, and advanced operating systems for management of multimedia communication services. The source- and channel-coding systems will be based on a digital hierarchy offering flexibility in service provision to match the viewing situation.

The work will also involve the development of advanced image compression systems for communication on bandwidth-limited media, and image analysis, understanding and generation for advanced services such as 3D-video communication and 'Virtual Presence'. It will involve development of stereoscopic and 3D presentation technologies; advanced image capture, editing, storage and retrieval; and advanced interaction techniques for digital video services.

The results of the work in this area will be tested and demonstrated in technically-realistic trials.

The work will make a major contribution to European common functional specifications and standards, particularly in the area of multimedia communication protocols, and image coding, and will permit the economies of scale that are needed for European industry to stay competitive in world markets.

2. *Photonic technologies*

The objective will be to stimulate the introduction of integrated photonic systems, including development of the technological basis for deployment of fully optical networks ('Transparent Highways') in Europe by 2000.

The work will exploit and build on the outstanding progress that has been made in optical communications and opto-electronics in the last decade. Technology will be developed to use optics throughout the network, for both switching and transmission, avoiding unnecessary conversion between photonics and electronics.

The work will include development of techniques for multi-gigabit bandwidth provision (at minimal cost, bit-rate and distance independent), optical switching technology, optical signal processing and control. Migration paths and timescales will be established for the evolution from present-day networks, based on electronic switches, to the future hybrid and all-optical networks. Radically new concepts in design, network management and control of photonic networks will be developed. The fundamental advantages in physical properties that photons possess compared to electrons will be demonstrated in realistic applications.

New concepts in quantum optics, non-linear dynamics, femtosecond technologies and optical processing will be used to achieve the next generation of technological breakthroughs and to provide terabit bandwidth capability beyond 2000. The necessary cost reductions for broadband access will be made, to take full advantage of the 'Transparent Highway', particularly for customer network interfaces and interfaces between the fixed network and mobile services. The design and development of the new network infrastructure and interfaces will be closely linked with the broadband services they will support.

3. *High-speed networking*

The objective is to provide integrated high-speed multi-gigabit networks by 2000 to leading-edge users in European industry, research organizations and universities, and to prepare for the Europe-wide mass deployment of these networks, at the same time as in other leading competitor countries [1].

The technology and system development will support broadband services, including videophones, teleworking, multimedia and social care. It will cover customer premises networks, public networks and corporate networks, from basic technology development through to pilot implementation of advanced services.

It will involve a phase of user-led definition activities to outline the network services and the network infrastructure essential to support advanced applications. The activities will include a thorough analysis of usage planning, system design, implementation, management and supervision issues. The different technology and economic options will be mapped with network topologies and architectures. This will be followed by a second phase, developing the missing elements and integrating them with the results of R&D in the other areas. It will cover all the networking issues required for high-speed communications (protocols, routing and congestion management). The ATM (Asynchronous Transfer Model) technologies developed in RACE will be a starting point, but they will be extended to higher speeds and capacities.

In a third phase, interconnection trials and demonstrations will be supported. They will promote the use of reliable, high quality and secure broadband network services and stimulate timely and coordinated infrastructure deployment. These activities will also nurture progress towards the resolution of trans-border regulatory issues. The trials will be used to evaluate network management and operation, reliability and flexibility parameters. They will form a comprehensive test infrastructure based on the interconnection of islands and support a wide range of advanced applications and services. Throughout, the various technologies will be aligned with evolving user requirements to raise user-acceptability.

4. *Mobility and personal communication networks*

The objective will be to accommodate the foreseeable demand for personal communications beyond the year 2000 and to permit the European industry to retain its leadership position in this area.

[1] This task will be carried out in close cooperation with related work in the Telematics Programme.

The dominant aspect of future telecommunication networks will be their capability to provide a wide range of telecommunication services to an ever-increasing number of mobile users. It is expected that future requirements for personal communications will reach unprecedented levels, and the demand for a 'Personal Communications Space' will require radically new, expanded and spectrum-efficient networks, infrastructures and equipment.

The work will focus on operational trials and on the technological aspects of integrated fixed and mobile broadband networks that have a direct bearing on the provisions of enhanced personal communication services.

The trials will validate the wireless subsystem and network components in a variety of environments (office, residential and factory). It will demonstrate cost-effective applications and services in such environments, validate the integration of different networks and services, and prove interface effectiveness. It will also involve the development and proving of maintenance procedures, reliability testing and end-to-end quality-of-service management. The work contributes to development of common specifications and standards, as well as to the identification of new market opportunities.

The work will specifically address the following two main areas:

For mobile broadband systems and services, technological developments will concern miniaturization, component integration and packaging techniques for low-power portable transceivers, for transmission, reception, display and local processing of multimedia information. Broadband radio technologies will be developed for cost-effective transmission/reception of interactive and distributive multimedia information over wireless networks, including satellite and local area networks, with optimum use of the frequency spectrum. Advanced electrical/optical technologies will be used to permit 'radio-over-fibre' and the development of novel mobile network architectures using low power distribution points and base stations. Novel multiple-access techniques will be developed, together with associated coding and compression technologies, to meet the requirements for the reliable and secure transfer of very large volumes of information at speeds commensurate with those of fixed broadband networks. Critical technologies will be developed for integrated satellite and terrestrial networks; signalling and transmission protocols will be developed, and assessments will be made of their capacity and coverage requirements, as well as high hyper frequency propagation and active antenna technologies. Standardization will be supported through contributions to the development of common functional specifications for the integration/interworking of mobile broadband networks (land- and satellite-based) with fixed networks.

To develop the concept of a 'Personal Communications Space', advanced technologies will be investigated for personal authentication, security and privacy through the use of voice recognition schemes and/or personal smart cards. Advanced broadband integrated network management techniques will be developed for location/registration management and subscriber database management. Man/machine interfaces and common operational procedures will be developed for personalized service profiles, service and network access, call connection, service control and billing.

5. *Intelligence in networks and service engineering*

The objective is to develop technology for flexible and real-time management of communication assets, reflecting the requirements of users, service providers and network operators for solutions which can evolve organically with user needs, market evolution and technology changes, and to match the capabilities in other leading competitor countries.

The specific aim of the work on intelligence in networks is to equip the communications networks with the build-in features required for real-time communications management, including networks, services and user access.

The R&D on service engineering will advance the concepts of modular standardization of service components and building blocks, as a basis for cheaper, quicker and more responsive development of services. Modular standardization is the basis for reusability and sharing of assets. It is also the prerequisite for future-proof investments as it decouples the technology from the functions and its integration in the realization of a given service or application.

This work will therefore contribute to the fast and flexible introduction of new services in advanced broadband networks, and effective network management and service deployment in a diverse and competitive communication environment. The expected impact will be to speed up new service provision

by at least one order of magnitude, thereby creating early market opportunities for new services. For the user, the impact of service engineering will be the ability to have more control over the services and communication media used: to combine voice, data and video in the form needed at a given time.

The software and system development will be carried out in the context of application trials, involving end users, service providers and network operators. It will involve the development, assessment and validation of architectures, methods and tools, the integration of service components, and network and service management techniques. Self-learning and self-healing management systems for 'adaptable networks' will be developed and tested.

Work on the reduction of the service development cycle will focus on the whole provisioning cycle, from the identification of needs to the creation and deployment of services in the network. Particular attention will be given to transparent and reliable service introduction in real operational environments. The work will involve the development and testing of new service concepts which take advantage of increased bandwidth and intelligence in networks and increased mobility of users. Application programming interfaces will be developed and their validity tested. The work will take account of the heterogeneity of networks, migration to integrated networks, user mobility, the evolution of reusable service components, and resource-hungry services, such as Virtual Presence. Techniques will be developed for rapid service conformance testing.

Work on service engineering will address new needs in an environment characterized by a rapidly growing diversity. The work will involve development of common functional specifications and codes of practice for integrated service engineering. Work on service creation environments will involve development of organizational frameworks and technologies for reuse of service components. Work on user issues will involve development of technologies and systems to increase user control of services, their integration, and use of resources; ergonomic research on use of services, and techniques for adaptive user-service interaction.

The work will be carried out in conjunction with that in area 6 on communications system safety, and security aspects of access to resources. Functional specifications and codes of practice arising from this work will support the standardization process.

6. *Quality, security and safety of communications services and systems*

The objective is to investigate and develop technologies for economically viable and operationally satisfactory solutions to requirements for services and systems that are of high quality, secure and safe. There will be close cooperation with SOGIS and other relevant bodies.

Quality of service, security and safety are closely related. Easy to use, reliable and maintainable solutions must be developed, within which security is one essential component. Information services require positive attention to the protection of information assets, both directly through the technology employed (functionality) and indirectly through the quality of the system design, development and operation (assurance).

The work will concern the public unclassified domain. It will therefore be relevant to most business sectors, public administrations and the public at large. It will be concerned with traditional requirements for integrity and reliability of communications (relating to the certainty that the information is as intended) and confidentiality (or privacy), as well as other features, such as non-repudiation (whether or not the originator is whom he claims, or that the addressee cannot subsequently deny receipt) and electronic signatures. This set of features, once publicly available, will allow the business community to perform most of their transactions electronically. In the area of confidentiality, it is recognized that solutions are required that are compatible with national security and the maintenance of public order.

The strong common links between quality of service, security and safety implies the development of a constant technical approach. Trustworthiness implies both secure and safe networks and services. The work will concentrate on technology developments to improve quality of service, security and safety throughout distributed information systems, paying particular attention to cost-performance. It will explore built-in early warning and fault/risk reporting techniques, as well as flexible response mechanisms. These will be developed, where appropriate, as a means of protecting public network-based services and applications against interference and loss of availability.

For better quality of service, technology development is a prerequisite for improved usability and reliability in multimedia and distributive services. The R&D will address new architectures for delivery of safe and secure broadband services. For secure communications, R&D will address the flexible

management of security in an open, worldwide network and service environment. For enhanced safety, technology development will be related to fail-safe mechanisms, self-healing and self-repairing networks and services.

The work will complement that in other areas of this programme and in other specific programmes and will include investigations, demonstrations, experiments and trials of integrated systems. The results will include Common Functional Specifications, Codes of Practice and contributions to standardization.

Horizontal actions:

Consensus development and concertation of national and regional activities for stimulation and promotion of broadband infrastructure and service development.

These actions, which will bring together work in each of the six areas, will include concertation between RTD projects, concertation with European standardization and strategic planning bodies (1), coordination with, as well as collaboration in appropriate cases, with COST and Eureka activities, and coordination with actions funded under the ERDF, EIB, EIF and Cohesion and Structural Funds. Concerted actions and accompanying measures will focus on social and economic impacts of advanced communications. These actions will highlight opportunities for rebalancing of investments in both the public and private sectors between telecommunications and transport for energy saving and environmental protection. They will involve the identification and definition of advanced services for Europe-wide deployment, as well as their impact assessment. Special actions will be taken to increase the awareness of the advantages derived from the availability of new services.

Special actions in international cooperation

Most business activities are worldwide, and telecommunications must therefore operate globally. The mergers that are going on in major industries, including telecommunications, emphasize this global dimension. Special actions to support international cooperation will focus on applications development and network management, and will be limited to areas of clear mutual and balanced interest. Particular attention will be given to synergies with the National Information Infrastructure initiative in the USA and with similar activities in Japan.

These actions will also provide a framework for stronger cooperation with initiatives in Eastern and Central Europe, as well as with the new Independent States of the ex-Soviet Union, including those funded under the Phare and Tacis programmes, and initiatives financed by the EBRD. At a time when Eastern and Central Europe is going through a very critical reconstruction, support for advanced communication experiments based on 'appropriate' technology, linking organizations in Eastern and Western Europe, will help speed up transfer of know-how, stimulate indigenous economic development and open up new opportunities for European businesses. Special measures will also be taken to facilitate the exchange of scientists and researchers between Eastern and Western Europe in the framework of some R&D projects and trials.

Special actions for dissemination and exploitation of results and for professional training in advanced communications technologies and service management

These actions will include the organization of summer schools, seminars, workshops and support for selected international conferences. Provision will also be made for professional exchanges of scientists between the Member States of the Community, for limited periods of research in the projects.

An increased effort will be made to stimulate the effective exploitation of emerging technologies and services through a programme of public demonstrations and exhibitions.

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(1) ETSI, CEN/Cenelec, Eurescom and ETNO.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	million ecus
1. Interactive digital multimedia services	162
2. Photonic technologies	104
3. High-speed networking	75
4. Mobility and personal communications networks	115
5. Intelligence in networks and service engineering	100
6. Quality, security and saftey of communication services and systems	43
Horizontal actions	31 (1)
Total	630 (2)

(1) Of which:
— ECU 9 million for coordination and concertation activities (including special actions in international cooperation);
— ECU 22 million for preparatory, accompanying and support measures, including ECU 6 million for the dissemination and optimization of results.

(2) Of which:
— a maximum of 6,3 % for staff and administrative expenditure;
— 3,3 % for operational support to concerted actions, concertation networks and interconnection of trials;
— 10 % for basic research to be carried out in Area 2 (Photonic technologies);
— up to 10 % for activities in respect of SMEs.

This breakdown does not exclude the fact that a project could relate to several areas.

ANNEX III

SPECIFIC RULES FOR IMPLEMENTING THE PROGRAMME

1. The programme will be implemented in the context of trials of advanced communication applications which will best contribute to reinforcement of competitiveness and to the development of employment in the Community. The work programme for research and technology development will be adapted in the light of the specific requirements of the trials.

2. The programme will be executed through indirect action, whereby the Community makes a financial contribution to RTD activities carried out by third parties or by JRC institutes in association with third parties:

   (a) Shared-cost actions: RTD projects carried out by undertakings, research centres and universities; creation of consortia for integrated projects with a common objective will be stimulated.

   Community funding will normally not exceed 50 % of the cost of the project, with progressively lower participation the nearer the project is to the market place. Those universities and other similar institutions which do not have analytical budget accountancy will be reimbursed on the basis of 100 % of the additional costs.

   (b) Measures appropriate for this specific programme:

   — technology-use stimulation, to encourage and facilitate participation of SMEs in collaborative RTD activities (up to one-third of total participation) by granting awards for carrying out the exploratory phase of an RTD activity, including the search for partners, during a period of up to four months. The award will be granted following the selection of an outline proposal. It will cover up to 75 % of the cost of the exploratory phase, without exceeding ECU 22 500 per successful applicant SME. Following an initial call, proposals may be submitted at any time;

   — measures in support of standardization, and measures aimed at the establishment of usage protocols of general value to the objectives of the programme;

   — financial support for interconnection of infrastructures and installations necessary for trials and coordinated actions (reinforced coordination actions), and as identified by the participants in projects.

   The Community participation may cover up to 100 % of the costs of these measures.

   (c) Preparatory, accompanying and support measures, such as:

   — studies in support of this programme and in preparation of future activities:

   — support for exchanges of information, conferences, seminars, workshops, or other scientific or technical meetings including intersectoral or multidisciplinary coordination meetings;

   — use of external expertise, including access to scientific databases;

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out within the third action; the factors liable to encourage use of results will be taken into account from the outset and throughout the duration of RTD projects, the partners in which will constitute a key network for diffusion and exploitation of results;

   — analysis of possible socio-economic consequences and technological risks associated with the programme, which will also contribute to the programme 'Targeted Socio-economic Research';

   — training actions related to research covered by the programme in order to stimulate technology transfer and enhance employment skills;

   — independent evaluation of the management and execution of the programme and of the implementation of the activities;

— measures in support of the operation of networks for increasing awareness and providing decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD.

The Community participation may cover up to 100 % of the costs of these measures.

(d) Concerted actions consisting of the coordination, notably through 'concertation networks', of RTD projects in the programme and those already financed by public authorities or private bodies. Concerted actions may also serve as the necessary coordination for the operation of common interest groups which, through shared-cost RTD projects (cf. 2 (a)), bring together around the same technological or industrial objective, manufacturers, network operators, service providers, users, universities and research centres.

The Community participation may cover up to 100 % of the costs of the concertation.