EUROPEAN COMMISSION

Information Society Technologies

A programme of
Research, Technology Development & Demonstration
under the 5th Framework Programme

1999 Workprogramme

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Contents

1 INTRODUCTION

The Information Society theme in the 5th Framework Programme of EU RTD (as defined in the Commission's proposal for *Creating a user friendly Information Society*, hereinafter called the *Information Society Technologies (IST) Programme)* was agreed at the Council of Research Ministers on 22nd December 1998.

To implement the IST Programme, this workprogramme has been developed in close consultation with the potential funding partners and participants in the RTD actions. It is based on inputs received from many different quarters, including the Advisory Group, the Programme Committee, workshops, seminars and a targeted call for action lines within the industrial and research community which resulted in over 500 ideas and concrete suggestions.

It recalls the structure and focus of work as defined in Annex I to the Specific Programme Decision (namely "The General Outlines, the Scientific and Technological Objectives and the Priorities"). Within this setting, it then identifies the Action Lines for the Calls for Proposals to be published in calendar year 1999 and structures them in a way that reflects the integrated nature of the programme and its Key Actions.

The main focus of this first year workprogramme is on enhancing the *user-friendliness* of the information society: improving the accessibility, relevance and quality of public services especially for the disabled and elderly; empowering citizens as employees, entrepreneurs and customers; facilitating creativity and access to learning; helping to develop a multi-lingual and multi-cultural information society; ensuring universally available access and the intuitiveness of next generation interfaces; and encouraging design-for-all. These issues are all taken up in a focused, coherent and complementary way in each Key Action.

A second focus is on *integration and convergence* across information processing, communication and media. This is reflected in Key Action I in its support of new models of public service provision; in Key Action II in the context of new workplace tools and commerce systems; in Key Action III in linking interactive publishing with cultural heritage; and in Key Action IV in convergent infrastructure technology developments.

A third focus will be on the *globalisation* of RTD co-operation. With the new rules for 3rd country participation, it will be possible to build on the wider international co-operation already achieved in FP4 to make the IST programme the framework and the focus for European-led global co-operation. This will be supported through the activities described in Chapter 4.

The content of this workprogramme will be revised annually in consultation with the IST Advisory Group.

2 CHARACTERISTICS OF THE PROGRAMME: INTEGRATION AND FOCUS

2.1 THE CONTEXT

The pace of development of technologies vital to the Information Society is magnified by the convergence of information and communication technologies and markets. Change is facilitated and favoured by the fast growing importance of information/content which is breaking down the cultural and technological barriers that separated the world of broadcasting, publishing, telecommunications and IT. The Information Society builds on the convergence of information, communication and networking technologies and takes advantage of infrastructures, like the Internet and the Web. The aim of the IST Programme is to help to create a user-friendly information society by building a global knowledge, media and computing space which is universally and seamlessly accessible to ALL through interoperable, dependable and affordable products and services. New emerging technologies are enabling systems to interoperate and inter-work in any combination of their constituents, ranging from different delivery mechanisms and application servers to diverse software development models and heterogeneous network architectures.

- The next 10 years will see the potential for universally available access to general-interest services by citizens using highly capable digital devices. Continued technological progress raises citizens' expectations for scaleable, mobile and multimedia-based services that respond quickly, accurately and flexibly to their needs while ensuring security and privacy. The nerve system of the future information society will be a network of enormous capacity and sophistication, consisting of multiple, overlapping and interconnected webs and servers that together will realise the promise of symmetric broadband communication to virtually every node.

- In the Information Society individuals (both as workers and as consumers) and organisations are being confronted with new opportunities and challenges in the work-space and the market-space. In the global networked economy successful organisations will constantly shift the boundaries of their operations and collaborations, re-invent existing activities, and competitively exploit new business models and markets.

- New digital interactive information products and services will emerge. Their success will depend on the quality and the attractiveness of their contents, and on the ability of people to access and use them. The challenge will be to exploit Europe's creative and technological assets, its rich heritage and diversity and its highly-educated human capital to produce, organise, package and deliver this content. To this end, it is necessary to support linguistic and cultural diversity, stimulate creativity and enhance education and training systems.

- At a technological level, the trend is to establish generic service platforms that are independent of the underlying heterogeneous infrastructure. Intimately connected to this, is the rapidly extending scope of notions such as *distribution* and *sharing* that revolutionise engineering paradigms.

2.2 THE PRIORITIES FOR THE 1999 WORKPROGRAMME

The IST Programme reflects and supports emerging policy issues, notably fostering the convergence of information processing, communications and media, and the need for interoperability and coherence at a global level. The Specific Programme therefore foresees "close articulation between research and policies needed for a coherent and inclusive Information Society".

The 1999 Workprogramme will contribute to this vision by promoting excellence in advanced technologies that are crucial to the Information Society, to accelerate their take up and broaden their field of application, including in fields outside the IST domain, and therefore ensure and reinforce the competitiveness of European industries. Through its *additional* financial support, the Programme allows companies to leverage the development of new information society technologies and hence further speed progress and achievement.

An integrated approach to the execution of the programme has been adopted and the following priorities are being pursued:

- Expand the technological basis of convergence: e.g. innovative communication and open service platforms.
- Remove and overcome the bottlenecks that prevent the development of ubiquitous and scalable access networks and interoperation of heterogeneous systems: e.g. technologies for personal and mobile communications and standards for data, software service and system building blocks.
- Build key, user-friendly applications that enable the potential of the Information Society: e.g. develop integrated management and personalised access to content, knowledge and information.
- Support new organisational schemes to enable businesses, organisations and individuals to take advantage of their new environment: e.g. enhance efficiency and friendliness of administrations, build trust and confidence, create new working environments, establish new supplier/consumer relationships.

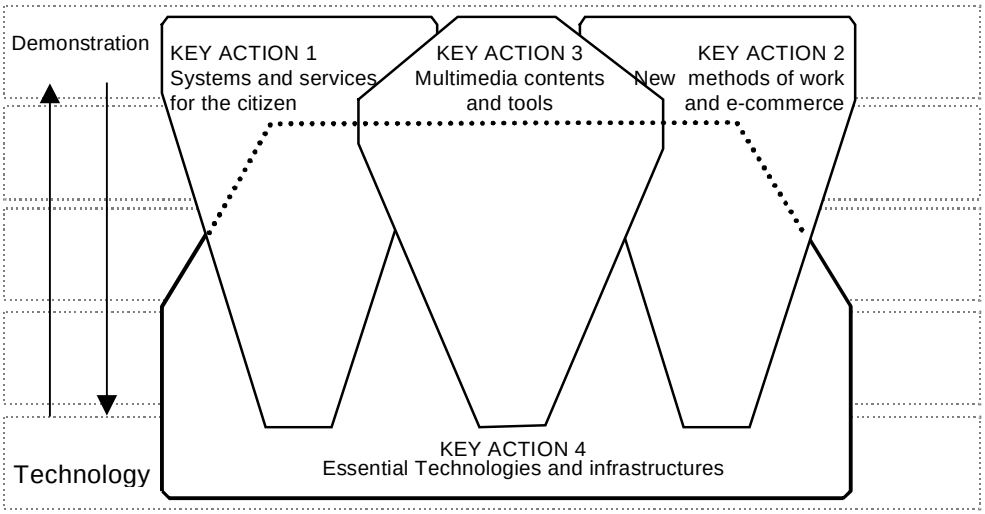
In addition, these priorities are complemented by policy oriented objectives, essentially:

- Support to interoperability and standards: to identify key strategic areas through a process of industrial concertation, and to reinforce the results already achieved in a former Specific Programmes (for instance with MPEG, GSM, amongst others).
- Support to European policies: to support policy objectives with technological developments, for example in areas such as: data security, data protection and privacy, next generation mobile voice and data services, control of illegal and harmful content. In addition, the socio-economic research component can provide conceptual and practical support to this objective.
- Anticipating market needs and nurturing emerging technologies: where public funding can make a substantial impact in terms of helping to aggregate fragmented research and build critical mass in anticipation of market maturity.

The IST programme provides an opportunity to explore and address such issues by RTD actions and with the support provided through *IST Support Measures*.

2.3 A SINGLE INTEGRATED ARCHITECTURE

In the light of the context and priorities above, the IST Programme is structured as four inter-related Key Actions each with specific objectives, and where *"the key issues of usability, interoperability, dependability and affordability will be addressed ubiquitously throughout the programme"*. Precisely, the programme consists of a set of complementary activities that are derived "*by grouping together the technologies, systems, applications and services and the research and development and take-up actions with the greatest affinity or interdependence*". In this, "*each Key Action will, as appropriate, have a balance of the complete range of RTD activities from basic research to demonstration and take-up actions".*



Integrated Key Actions

For the purposes of the Workprogramme, the Key Actions are sub-divided into Action Lines. Each Action Line has clear monitorable objectives against which proposals for EU RTD support can be evaluated. These Action Lines form a coherent set from the point of view of basic technology development and application.

However, integration at the programme level is a key feature of the IST Programme.

- Firstly, *"cross-programme"* actions will focus on a limited number of specific issues relevant to the entire IST Programme. The aim is to ensure that the IST Programme supports in an effective way RTD on certain specific challenges facing us in the Information Society, and that participants in the programme can address the different facets of these themes in the different context that the programme provides.

- Secondly, *"Clustering"* will be used to focus, co-ordinate and integrate the results and on-going work of projects. Clustering activities will not be imposed on projects. The aim is to reinforce the complementarity of projects and the synergies derived from their work and to create a critical mass of resources focused upon issues of strategic importance. Projects will either themselves initiate clustering activities or will find it to be "in their own interests" to support certain initiatives taken by others.

- Thirdly, while individual proposals will typically fall within the scope of a single Action Line, it is foreseen that proposals may have a scope which spans multiple Action Lines. Such proposals are critical to convergence and integration. In these cases **proposals should nevertheless identify an Action Line in which the largest part of their activities and / or their most significant innovation takes place, as being**

their "centre of gravity". Such proposals are eligible for support when their *"centre of gravity"* Action Line is open in a particular Call for Proposals.

2.4 SELECTIVITY AND FOCUS

The Key Actions, and the RTD priorities within them, already have a tight focus on issues of strategic importance to the European Union. This Workprogramme reflects a further selection and focus on specific Action Lines for which there is **clear added value in co-operation at EU level**, and the execution of which is consistent with the budget resources for Calls for Proposals in 1999. The Action Lines proposed for 1999 match both the priorities in the Specific Programme and the main ideas that have emerged from the recent consultations and analyses. They strike a balance between continuity and innovation, and between providing support for the continuation of the most relevant research lines of the 4th Framework Programme and establishing new directions. However, the integrated nature of the IST programme will bring together the broadest spectrum of researchers and technologists and give an opportunity to develop new lines of co-operation.

The architecture of the Workprogramme should therefore not be perceived as representing rigid boundaries but rather as an opportunity to tap into focused expertise when proposing multidisciplinary work which spans more than one domain of application or integrates in an innovative way a set of heterogeneous technologies and techniques. **Cross-programme themes** will be developed in the course of the programme to support activities that necessarily cut across the programme architecture (e.g. dependability, design for all, socio-economic assessments, etc.).

Selectivity and focus are established in a context of programme management policy that establishes a workprogramme which is a "snapshot" of RTD and take-up priorities. This snapshot will be regularly updated in keeping with the "dynamics" of the development of the information society. **Annual workprogramme revisions** will be developed in consultation with services, industry and academic advisors, the IST Advisory Group and the IST Committee. Calls for proposals will be frequent and cover a selection of workprogramme topics.

2.5 LINKS TO OTHER EU POLICIES

The IST Programme reflects and supports emerging policy issues, notably fostering the convergence of information processing, communications and media, and the need for interoperability and coherence at a global level[1, 2]. The Specific Programme therefore foresees "*close articulation between research and policies needed for a coherent and inclusive Information Society*". All Key Actions will link new technology and service developments to policy goals in the adaptability, employability and entrepreneurship of Europeans. In addition, the Key Actions will support EU policy developments related to sustainable development and to consumer protection in an information society. The strategic focus will be on bringing together technology developments and EU policy areas, such as: sustainable transport and tourism, enterprise policy, in particular in favour of SMEs, coherence and competition within the single market, employment, public health, public procurement, audio-visual and media convergence, education and training, protection of privacy and personal data[3], convergence and telecommunications regulation and EU enlargement. To this end, IST studies and projects may generate particular inputs to policy making both at Community level and within Member States and Associated States. Such inputs will be made available to Member States[4] through the ISTC and to other interested parties.

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1 The convergence policy issues were addressed in the Commission's Communication Green Paper on the "Convergence of the telecommunications, media and information technology sectors, and the implications for regulation" in December 1997 (COM(97)623). See also on http://www.ispo.cec.be/convergencegp/greenp.html

2 The global coherence issues are addressed in the Commission's Communication on "Globalisation and the Information Society - the need for strengthened international co-ordination" adopted by the Commission on 4 February 1998 , as well as in the Communication on the Competitiveness of European Enterprises in the face of globalisation (COM(1998) 718,20/1/99).

3 Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, OJ L 281, 23 November 1995, p. 31, and Directive 97/66/EC of the European Parliament and of the Council of 15 December 1997 concerning the processing of personal data and the protection of privacy in the telecommunications sector, OJ L 24, 30 January 1998, p.1.

4 In line with Article 19.3 of the Council Decision 1999/65/EC of 22 December 1998 on the Rules of Participation and Dissemination under Article 130j of the Treaty.

3 DETAILED OBJECTIVES AND RTD PRIORITIES

The following sections of Chapter 3 define the 1999 IST Workprogramme content for:

- The Four Key Actions (KAI-IV)
- Cross-Programme Themes
- Future and Emerging Technologies (FETs)
- Research Networking (RN)

- Each section starts by quoting objectives given in the IST Specific Programme and is followed by work described in terms of *Action Lines* which integrate both research and technology development (RTD) with *IST Support Measures* such as *Take-up* (trials, best-practice, first-use and assessment) and *Accompanying Measures* (project clusters, dissemination, etc.) which are described in Chapter 4 of this Workprogramme and the *Guide to Proposers.*

The Commission will publish *Calls for Proposals* that will refer directly to the Workprogramme Action Lines or specific topics / measures contained within the Action Line description. Each call will cover only some of the full set of Action Lines in this Workprogramme. **Proposers are advised to check carefully** that their intended work is included in the focus of a Call for Proposals and to take careful note of the *Guide to Proposers,* prior to preparing and submitting proposals.

3.1 KEY ACTION I - SYSTEMS AND SERVICES FOR THE CITIZEN

3.1.1 Objectives

"The aim of this work is to foster the creation of the next generation of user-friendly, dependable, cost-effective and interoperable general-interest services, meeting user demands for flexible access, for everybody, from anywhere, at any time. Work, including the associated education and training, encompasses RTD addressing the whole of the Key Action, as well as specific RTD in the following fields: health; special needs, including ageing and disability; administrations, environment; and transport. Certain of the ubiquitous issues addressed throughout the whole of this programme will be taken up further in order to pay due consideration to the needs and expectations of the typical users in this Key Action, in particular the usability and acceptability of new services, including the security and privacy of information[5] and the socio-economic and ethical aspects[6]."

3.1.2 Strategy and Architecture

The implementation strategy is based on mid- to long-term research and development, and where appropriate demonstration and take-up actions, with a view to developing and validating future general-interest services. Those may ultimately be provided by both public and private organisations, including enterprises, service providers, service and network operators, administrations, and/or any partnerships between the private and the public sector. Research work will exploit seamless connectivity and interoperability of information infrastructures. Emphasis is placed on the creation of easy to use, dependable and cost-effective general-interest services, meeting identifiable user needs.

The focus will be on the development of general interest services and on those aspects of service development which can most effectively be carried out at a European level: services which need to be accessible throughout the EU; service interoperability and standards development; and aspects of technology and service development which are closely linked to European policy development, such as sustainable transport and tourism. Priority will be given to the development of systems, making use of advanced technologies, to enable innovative means of delivering high quality, useable, affordable and accessible services. These activities should strengthen the global competitiveness of the underlying industries and support related EU policies.

3.1.3 RTD Priorities in 1999

A total of *twelve* Action Lines have been identified as priorities for Calls for Proposals in 1999.

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5 including security of information and data protection requirements such as data minimisation and anonymous use of services

6 including gender issues and social exclusion

Overview	Action Lines for 1999	Future priorities beyond 1999
I.1 RTD spanning Key Action I	• New models for providing services to citizens	• Sustainable service provision for residential & mobile environments
I.2 Health	• Personal health systems • Clinical, biological, managerial and imaging systems for health professionals • New generation telemedicine services *Co-ordination with KAII on security related aspects will be ensured and with the Thematic Programme, "Improving the Quality of Life and Management of Living Resources", particularly with generic research on "neurosciences".*	• Secure virtual networks and services for continuity of care • Service development for citizens, health professionals and managers
I.3 Persons with Special Needs, including the Disabled and the Elderly	• Systems and services for independent living *The work will be closely related to the Cross-programme Action Line CPA.3. "Design-for-all for an inclusive information society" and will complement research in KA on "Ageing Population" of the Thematic Programme "Improving the Quality of Life and Management of Living Resources".*	• Systems and services for social integration • Assistive technology products and interfaces to compensate for functional impairments
I.4 Administrations	• Systems enhancing the efficiency and user-friendliness of administrations • On-line support to democratic processes *Much of the work supporting this area will be addressed in the action line "New models for providing services to citizens" (see I.1 above).*	• Single point access to interactive services relating to public administrations • Public events: risk analysis and assessment, crowd and crisis management • Facilitating dispute resolution, in the courts and before
I.5 Environment	• Intelligent environmental monitoring and management systems • Environmental risk and emergency management systems *The latter will be addressed in conjunction with the generic research action on 'Hazards' and 'Earth Observation', and with the KAs on "Quality and Management of Water", "Global Change", City of Tomorrow" of the Thematic Programme "Energy, Environment and Sustainable Development"*	• Environmental risk and emergency management, focusing on landmines • Environment modelling, simulation and forecasting
I.6 Transport and Tourism	• Intelligent transport infrastructure and mobility management • Systems for intelligent vehicles • Systems and services for tourism *The first two action lines cover all modes. Co-ordination with the Thematic Programme " Competitive and Sustainable Growth" will be ensured.*	• Higher level of integration based on new components and services.

Action Line Descriptions

I.1 RTD Spanning Key Action I

I.1.1 New models for providing services to citizens

Objective: To develop and analyse scenarios (including the regulatory and info-ethical aspects) and new models for provision of general interest services, with appropriate mixes of on-line service, telepresence and direct human contact, and to quantify benefits in terms of wider accessibility (both geographically and to social groups), transparency, lower cost, higher quality or the availability of a wider range of services. Work will include socio-economic research to appraise the key social, economic, organisational and behavioural changes brought by the integration of IST in the general interest areas, define the 10-year vision of new modes of service delivery in these areas, and provide new metrics and evaluation criteria for monitoring progress. It will also include projects to test and validate the new scenarios and models in a real context. Where appropriate, the work should support the enlargement of the European Union and its adaptation to Economic and Monetary Union. Take up actions should include industrial co-operation to provide common validation platforms for advanced services. This work is to be largely addressed by IST Support Measures (Chapter 4).

I.2 Health

I.2.1 Personal health systems

Objective: To develop and demonstrate affordable appliances and services for personal health status support to enable citizens to take a more active role in prevention, care and rehabilitation. The RTD work will focus on personal health systems that communicate with the rest of the health information infrastructure. This work relates to work addressed elsewhere in the workprogramme and will, for example, be integrated with the development of advanced bio-sensors, transducers and microsystems, linked via communication facilities for secure information exchange with professional networks and interfaces with electronic health records. The results are expected to help the development of personal health services, to support the EU policy on health promotion, and to contribute to the growth of personal health-related industries.

I.2.2 Clinical, biological, managerial and imaging systems for health professionals

Objective: To develop innovative medical systems for screening, diagnosis, treatment and therapy and to demonstrate their benefits based on measurable indicators. These systems will involve new generation devices notably those based on micro- and nano-technologies, advanced medical imaging with integrated knowledge systems for diagnostic support, virtual and augmented reality based tools for medical treatment and education, and mobile and fixed secure systems for accessing personal health data. Work should also focus in part on the integration of health information systems and databases for timely access to health data at national and regional level, and on innovative interfaces for improved user acceptance. The RTD work is to be complemented by actions promoting large-scale implementation trials and the use of standardised electronic health records.

I.2.3 New generation telemedicine services

Objective: To develop and demonstrate a set of new generation telemedicine systems for tele-consultation and provision of tele-care at the point of need. The work should focus on the development and integration of new technologies for telemedicine applications including specific aspects of: tele-robotics, medical digital

assistants and advanced interfaces (including bio-sensors, transducers and micro-systems) integrated with dependable mobile and wireless information and communication services including satellite-based services. Emphasis should be on ease of use and on interoperability with the health information infrastructure and the development of new standardised protocols. The RTD is expected to provide tools for distributed health care services and to support access to care 24 hours a day across borders and for people in remote and isolated areas. The work will contribute to the development of future regulatory frameworks and codes of conduct for advanced telemedicine services.

I.3 Persons with special needs, including the disabled and the elderly

I.3.1 Systems and services for independent living

Objective: To develop and demonstrate new tools, systems and services to enable people with special requirements to live independently. The work will address personal care, mobility and communication, and will enable improved access to a wider range of services, and greater participation in social and community activities for people with reduced mobility or impaired functions, including extending employment and learning opportunities. Support for independent living will include personal devices for tele-support, the design of systems for the home environment, and advanced solutions for professional and informal carers. Within this Action Line, design-for-all tools and methods are to be further developed and applied to provide a focus on affordable, universal access to mainstream products and services. Particular improvements are sought in user modelling so that systems and user interfaces can be more easily configured to and by the individual, and to the tasks being undertaken and the environment.

I.4 Administrations

I.4.1 Systems enhancing the efficiency and user-friendliness of administrations

Objective: To develop advanced multimedia integrated systems and services for administrations and other public bodies, to improve businesses' and citizens access to information and regulation and facilitate contacts, exchanges and feedback between administrations and between administrations and third parties, i.e. citizens, institutions and business.To demonstrate the advantages of new services in terms of improved internal effectiveness as compared to existing systems, contribution to further EU integration and streamlining of inter-working between different levels (local, regional, national, EU) and types of administration, including public-private partnerships, and between administrations and citizens, institutions and business. Confidentiality, reliability, security, trustworthiness and accessibility of common data, auditability, real-time translation capability, robustness and user-friendliness are critical features of these systems and services. Work should support EU policies and integration, as well as EU enlargement.

I.4.2 On-line support to democratic processes

Objective: To develop and demonstrate innovative consultation, access and voting systems to support increased and equal participation in democratic processes, reduce costs and increase transparency in a user-friendly way. The systems are expected to facilitate contact with elected representatives and the understanding of proceedings of democratic institutions in simple low-cost ways. They are also expected to be applicable at local, regional, national or European level; to incorporate adequate safeguards for privacy and authentication and the handling of votes; to be simple to use, accessible and affordable to all electors and candidates. The work should be relevant to EU policies in terms of enlargement.

I.5 Environment

I.5.1 Intelligent environmental monitoring and management systems

Objective: To develop and demonstrate at local, urban, regional and trans-boundary level systems and tools for coherent international environment monitoring and management. The work is expected to involve integration of diverse networked information sources including, as appropriate, high-resolution remote sensing, geographic information, advanced data mining and decision support systems. It is also expected to involve development of intelligent sensors, detectors, models and networks for monitoring of slow chronic changes, as well as pollution, and the assessment of new business models for value-added environmental information services. RTD is expected to contribute to European and global standards for environmental data exchange and to the preservation of natural resources. It should also support environmental planning and early warning.

I.5.2 Environmental risk and emergency management systems

Objective: To develop and demonstrate new tools and integrated systems for coherent emergency management, supporting the entire cycle from prevention, identification, mitigation and post-crisis follow-up for both natural and man-induced risks. The work, which is focused on severe weather, geological incidents, flooding, forest fires, landslides and industrial accidents, is expected to involve development and use of intelligent, mobile and networked sensors for real-time data collection, remote sensing, high performance visualisation systems combined with risk assessment models and real-time GIS. The systems should include tools for real-time command and control and the integration of data from satellite, fixed and mobile communication networks; they should include the provision of early warning and information to the citizen. The RTD is expected to contribute to establish and enhance European standards for generic emergency management tools, including those to be used for potential high impact environments such industrial plants and urban environments.

I.6 Transport and Tourism

The work described below will, in addition to RTD actions, be supported by *IST Support Measures*, in particular best practice, covering for example system interoperability and benchmarking. These are an integral part of the work of this group of action lines.

I.6.1 Intelligent transport infrastructure and mobility management

Objective: To develop intelligent infrastructures for data capture, processing, exchange and distribution covering all transport modes to support traffic and demand management, collective and individual transport, fleet and freight operations for the whole logistics chain, and integrated sustainable transport operations in cities, rural areas and Trans-European networks. These objectives include the development and enhancement of surveillance, positioning, navigation, management, guidance and payment systems. Emphasis is placed on the enhancement of terrestrial and satellite communication, positioning and observation infrastructures (including UMTS and GNSS2) in view of their adaptation for traffic surveillance and control, tracking and tracing, telepayment and guidance. Priority will be given to media-independent and open architectures adapting mobile network intelligence and terminals for optimal use in transport. Image processing, monitoring technology and sensors should be further developed for surveillance. Work should include the development of new traffic control

systems integrating processing, simulation, prediction and decision-support tools, including tools for managing large-scale events and crises.

I.6.2 Systems for intelligent vehicles

Objective: To develop and validate on-board systems to improve the safety, comfort and more efficient use of vehicles, in particular in terms of obstacle and collision avoidance, human-centred vision, alertness enhancement and impairment watch, navigation, routing, traffic and weather information, maintenance and remote vehicle diagnostics and other “info-mobility” systems. Work should include resource usage optimisation, environmental impact monitoring and systems ensuring compliance with regulators and adaptive speed control and electronic vehicle identification. Human-machine interface development and integration and aspects related to verification procedures for their take-up are to be considered. Priority will be given to systems common to all modes of transport and the on-board system architecture. The work will contribute to industrial consensus on common standards and interface protocols as a basis for incorporation of greater intelligence and communication facilities into all new vehicles by 2005.

I.6.3 Systems and services for tourism

Objective: To develop new components and open distributed architectures for tourism management, information and communications systems supporting users and businesses, offering value-added services and multimedia information integration of value-added services on accommodation, travel, weather, events, culture and leisure, together with booking and payment facilities. The emphasis is on the integration of emerging technologies and processes enabling service personalisation and interaction, assuring quality information, providing mobile or fixed access and providing information channels for all types of tourism service suppliers. The work should include benchmarking and best-practice identification and interoperability adoption measures.

3.2 KEY ACTION II - NEW METHODS OF WORK AND ELECTRONIC COMMERCE

3.2.1 Objectives

"The aim of this work is to develop information society technologies to enable European workers and enterprises, in particular SMEs, to increase their competitiveness in the global marketplace, whilst at the same time improving the quality of the individual's working life, through the use of information society technologies to provide the flexibility to be free from many existing constraints on both working methods and organisation, including those imposed by distance and time. Specific attention will be paid to the social implications of new working methods, in particular their impact on equal opportunities and quality of life. It covers both the development and the trading of goods and services, in particular in the electronic marketplace, and takes into account the different requirements and capabilities of the individual worker, consumer and of businesses and organisations, and includes the related training. Considerations of the global context, in particular the rapid evolution of the marketplace, and socio-economic factors will guide the work, and the objective will be to develop and demonstrate world-best work and business practices, exploiting European strengths such as electronic payments, smart cards, mobile systems, software for business process modelling and enterprise management and consumer protection."

3.2.2 Strategy and Architecture

The strategy in this Key Action is based on mid- to long-term new technology research and development building on the application of current technologies. It will focus on empowering individuals, as entrepreneurs, workers and consumers, and on stimulating the co-operation between SMEs and large enterprises as participants in the global network economy. It will target architectures, technologies and tools for secure, scaleable, dependable and customisable systems. Particular attention will be given to trust and confidence building, business-led standardisation, and the demonstration and take-up of best practice supported by self-regulation in the EU single market, also for SMEs and the consumer.

This Key Action requires a strong interplay between the technical, economic, social and legal issues. Integrated socio-economic and technological research is therefore necessary to monitor and assess the development and impact of new technologies and particularly of the work done in this Key Action itself. Therefore it includes integrated Action Lines on socio-economic benchmarking, modelling and impact assessment, and on tools for the accumulation and transmission of corporate knowledge. The core RTD in the Key Action is structured as a number of Action Lines in each of the three areas defined in the Specific Programme. Each Action Line will include demonstration and take-up measures as well as a number of accompanying measures.

This Key Action will link new technology and service developments to policy goals in the adaptability, employability and entrepreneurship of Europeans. It will inform EU policy developments related to social and economic sustainability and to consumer protection in an information society. The focus on interoperability will contribute to both coherence and competition within the single market, particularly in the development of new market structures and Euro electronic payment systems.

3.2.3 RTD Priorities in 1999

A total of *eleven* Action Lines have been identified as priorities for Calls for Proposals in 1999. They form a coherent set from the point of view of basic technology development and application. Work in one Action Line can feed into or build upon work in another, and larger projects can address work in several Action Lines.

Overview	Action Lines for 1999	Future priorities beyond 1999
II.1 RTD Spanning Key Action II	• New perspectives for work and business • Corporate knowledge management	
II.2 Flexible, Mobile and Remote Working Methods and Tools	• Workplace design • Team work • Dynamic networked organisations *Focus on enabling, validating and demonstrating competitive, flexible and human-centred work methods and organisation. Addresses the needs of workers, enterprises and consumers alike.* *Strong collaboration will be ensured with actions on "Innovative Products, Processes and Organisation" in the Thematic Programme " Competitive and Sustainable Growth".*	• Higher levels of networked integration of work and business based on new middleware components and services
II.3 Management Systems for Suppliers and Consumers	• Digital design and life-cycle management for products and services *Co-ordination with Objective 1.2.1 of the Thematic Programme "Competitive and Sustainable Growth"* • New market mediation systems • Enhanced consumer-supplier relationships *Focus on seamless end-to-end support, covering both tangible and intangible products, for electronic trading and distributed virtual enterprises and marketplaces. Covers the full value chain and the technologies needed to support them.*	• Building upon the trend towards enhanced network-mediated forms of work and business
II.4 Information and Network Security and other Confidence Building Technologies	• Identification and authentication • Secure electronic financial transactions • Digital object transfer *Focus on technologies to boost trust and confidence in the information infrastructure, and in its services and information resources.*	• Advanced technologies to strengthen trust and enable new businesses that require a high yet flexible level of protection of information, such as personal data, digital content, and electronic cash

Action Line Descriptions

II.1 RTD Spanning Key Action II

II.1.1 New perspectives for work and business

Objective: To develop, quantify and demonstrate evolution scenarios and the potential social and economic impacts of new technologies and services on work and business in the next decade. Work should actively engage socio-economic research on the barriers faced by companies. It should be based on benchmarking, econometric models, new statistical indicators and technology foresight, to guide RTD and inform policy development. It should involve socio-economic research in the technology projects to aid in technology shaping and in identifying new skills requirements. Particular emphasis should be placed on identifying new opportunities for economic growth, employment, social inclusion and health and safety. Attention should also be given to entrepreneurship, equal opportunities, adaptability and to legal and policy issues related to networked organisational structures, such as virtual enterprises with respect to liability and IPR protection, in a global environment. Activities should include measures to raise public awareness and support the policy debates. This work is to be largely addressed by *IST Support Measures* (refer to Chapter 4).

II.1.2 Corporate knowledge management

Objective: To develop and demonstrate tools for representing, capturing, accumulating and transferring distributed organisational knowledge in working environments. The focus is on increasing individual and organisational adaptability and accelerating “learning from experience” in networked organisations. The focus should be on the intangible corporate knowledge about relationships and business/organisation practices as well as about more formalised skills. The goal is to research and demonstrate tools and best practice supporting the variety of work and learning cultures in the EU, specifically including younger first-time employees. The work should involve multi-disciplinary research, technology development and trials in real work situation, which should serve as showcases of best practice.

II.2 Flexible, Mobile and Remote Working Methods and Tools

II.2.1 Workplace design

Objective: To develop, integrate and evaluate innovative workplace technologies and concepts in a variety of work situations, including those involving mobility and dynamic roles, to create more effective and user-friendly work environments. The focus is on the research into integrated leading-edge technologies and tools for multi-sensory communication, information access and analysis, including for example augmented reality tools and wearables, and for individual and team creativity, giving due consideration to usability, health and safety, gender issues and the quality of working life. The work should involve multi-disciplinary research, technology development and trials in real work situations, which should serve as showcases for world-best workplace design.

II.2.2 Team work

Objective: To develop and demonstrate reference models, architectures and technologies that enable teams to work together across different, possibly mobile, locations and different time zones. These systems and services should allow sharing and managing information both in real-time and asynchronously, supported by appropriate models, simulations and analytical tools. The work is to involve the

linking and integration of heterogeneous workplaces, and to support both intra-company as well as inter-organisational working.

II.2.3 Dynamic networked organisations

Objective: To develop models, and demonstrate tools and systems for dynamic networked and virtual organisations, facilitating co-operation and the inter-operation of business processes, the management of large scale and complex business operations and on-line employee consultation. The work is expected to include benchmarking and evaluation of networked organisation models and the development of tools and systems for co-operative planning and scheduling of resources. Work should address in particular the needs of European SMEs as participants in global business networks and their infrastructure requirements, and on new business development. It is expected to contribute to business-led consensus building, for example on codes of practice, the legal framework and interoperability, including in the Global Business Dialogue, and to world-best showcases of new business practice.

II.3 Management Systems for Suppliers and Consumers

II.3.1 Digital design and life-cycle management for products and services

Objective: To develop and demonstrate models, systems and tools enabling products and services to be designed and developed digitally for full life-cycle management. The focus is on digital prototyping, simulation and virtual reality support for distributed design, including requirements capture, development, production, distribution and maintenance, including upgrading. The products and services particularly envisaged are those, which, in combination, make full use of embedded intelligence, linked with external communication and information services. Work is expected to involve interaction between suppliers, products in use, and customers to maximise value, minimise overall environmental cost, and facilitate enhancement and re-use.

II.3.2 New market mediation systems

Objective: To develop innovative marketplace concepts and technologies as well as to assess various architectures and tools for virtual marketplaces and business communities. The work should include mediation systems and tools for brokerage, to enable new business models, new types of trade and trade in new types of services. The work should cover emerging technologies for billing, payment, VAT collection, interactions with administrations, negotiation and brokerage and mediation and should reflect European diversity in business organisation and networking, and in financial services including access to venture capital (notably, for SMEs).

II.3.3 Enhanced consumer-supplier relationships

Objective: To develop and demonstrate systems and services to facilitate balanced relationships between consumers / customers and a range of suppliers of goods and services. The focus is on: empowering them as partners in the life-cycle management of goods and services, to facilitate maintenance, repair (particularly under guarantees), trading, customer feedback and personalisation; the management of personal information and preferences (in accordance with the EU data protection legislation), including enhanced consumer influence on the provision of product and service information to them; and consumer protection, including advice and redress services. The work should contribute to an effective

consensus on interoperability, enabling consumers to use the tools in all Member States with a wide range of suppliers, and on regulation, especially self-regulation.

II.4 Information and Network Security and Other Confidence Building Technologies

II.4.1 Identification and authentication

Objective: To develop and demonstrate architectures, protocols, technologies, tools, systems and services, including the use of third-party services, allowing for a diversity of approaches to trust management, to allow identification and authentication of individuals and services and items of equipment in inter-business, retail and personal relationships, and to prevent unauthorised collection, recording and disclosure of data. Work is expected to enable equitable multi-role personal identification with adequate privacy-enhancing features under an individual's control. Emphasis is placed on achieving international compatibility and interoperability, scalability and reconfigurability, to enable increased, flexible trans-border work, trade and collaboration.

II.4.2 Secure electronic financial transactions

Objective: To develop and demonstrate interoperable systems for secure electronic financial transactions, notably for use in the global marketplace and supporting the EURO, applicable in business-to-business, retail and transactions with public administrations. The work is expected to cover billing, payment, accounting and record keeping, as well as anonymous, small and micro payments. The focus is on scalability and interoperability between systems and on risk-management. The work is expected to include high-reliability and tamper-proof component development, including innovative smart-card and personal token systems.

II.4.3 Digital object transfer

Objective: To develop, validate and pilot the components, architectures, tools, systems and services to support the transfer of digital objects and their management as commercial assets. The focus is on providing best practice examples and validating business models on a large scale, which apply European strengths in innovative technologies and systems with a view to promoting widespread take-up amongst businesses. Attention should be given to global consensus on interoperable rights management systems, social, cultural, economic and legal impact assessment, and experimenting with advanced technologies for digital object rights and usage identification, including anonymity support and their integration into new business models.

3.3 KEY ACTION III - MULTIMEDIA CONTENT AND TOOLS

3.3.1 Objectives

"The aim of this work is to improve the functionality, usability and acceptability of future information products and services to enable linguistic and cultural diversity and contribute to the valorisation and exploitation of Europe's cultural patrimony, to stimulate creativity, and to enhance education and training systems for lifelong learning. Work will cover new models, methods, technologies and systems for creating, processing, managing, networking, accessing and exploiting digital content, including audio-visual content. An important research dimension will be new socio-economic and technological models for representing information, knowledge and know-how. The work will address both applications-oriented research, focusing on publishing, audio-visual, culture and education and training and generic research in language and content technologies for all applications areas, and will include validation, take-up, concertation and standards."

3.3.2 Strategy and Architecture

The implementation strategy for this Key Action is both applications-oriented - focusing on publishing, audio-visual and new media, culture (libraries, museums, archives) and education and training - and generic - in language and content technologies for all applications areas, including validation, concertation platforms and infrastructures, standards and socio-economic research. Multimedia content is taken in its broad form to cover audio-visual services, information and entertainment, knowledge and skills, multilingual and linguistic content and communication, and digital objects (phonetic, visual, spatial, etc.) directed at and for the use of people, as individuals and in groups.

The approach is content-centric, bringing together Europe's technology developers with content creators to support the cost-effective creation, handling and delivery of attractive, personalised and multilingual multimedia content, and for the effective exploitation and management of information. The approach is also user-driven, emphasising the increasing involvement of the user in innovative content and knowledge-based applications.

The main policy links in this area are with the content industries (including INFO 2000, Internet Action Plan, Global Information Networks), audio-visual policy (including Media), cultural initiatives (including the New Cultural Framework), education and training (including Socrates and Leonardo) and language (Multilingual Information Society - MLIS).

The architecture of Action Lines within the Key Action is based on three elements: an integrating line on socio-economic research; application-oriented lines within specific fields; and underpinning generic technology development lines. Each Action Line includes appropriate *IST Support Measures* (reference section 4.) including take-up as well as a number of accompanying measures.

The strategic focus will be on bringing together technology developments with EU policy formulation in areas of audio-visual and media convergence, education and training, creativity and heritage, multilingualism and information management. Priority will be given to enabling creativity and diversity through wide access to common technology platforms.

3.3.3 RTD Priorities in 1999

A total of *twelve* Action Lines have been identified for Calls for Proposals in 1999.

Overview	Action Lines for 1999	Future priorities beyond 1999
III.1 RTD Spanning Key Action III	• Social and business models for multimedia content *Focus is on benchmarking the emergence of new socio-economic and business aspects in the European content, creative and information industries and in education and training.*	• Geographic Information
III.2 Interactive publishing, digital content and cultural heritage	*Electronic publishing:* • Authoring and design systems • Content management and personalisation *Culture:* • Access to scientific and cultural heritage • Digital preservation of cultural heritage *Focus is on facilitating content creation for a variety of new dissemination forms, including digital studio production; on enabling personalised access to multi-owner collections; and on stimulating developments related to cultural heritage content.*	• Mass customisation, advertising and customer applications • User-controlled publishing and personal media systems • Cultural information systems • Seamless integration of legacy systems into new digital library applications • High-quality audio-visual and multi-sensory content

Overview	Action Lines for 1999	Future priorities beyond 1999
III.3 Education and training	• Open platforms and tools for personalised learning • The flexible university • Advanced training systems *These Action Lines have been defined to complement ongoing, actions, already launched in the context of the 4th Framework Programme[7] while providing a firm foundation for a new focus on the European RTD needed in the domain.*	• The school of tomorrow • Advanced learning systems • Flexible life-long learning
III.4 Human Language Technologies	• Multilinguality in digital content and services • Natural interactivity *Focus is on embedding spoken and written language technologies into global information and communication systems.*	• Cross-lingual information management *Development of generic technologies and exemplary applications with linguistic and related cognitive / communicative features, in further domains such as personal information appliances, inter-personal and group communications and public interest services.*
III.5 Information Access, Filtering, Analysis and Handling	• Multi-sensory forms of content • Media representation and access: new models and standards *The initial focus is on new forms of content and new standards for content identification.*	• Information filtering and agents • Data visualisation • New-generation cross-media search, directory and management services

7 Ongoing projects arising from the joint call on "Educational Multimedia, Telematics for Education and Training", Esprit actions on "Experimental school environments" and "IT for learning and training in industry".

Action Line Descriptions

III.1 RTD Spanning Key Action III

III.1.1 Social and business models for multimedia content

Objective: To identify the key social, economic, organisational and behavioural changes stimulated by the widespread introduction of new IST in the audio-visual, creative and information industries as well as the education and cultural sectors. To quantify the current and potential future impact on growth and employment, on education and training approaches, on linguistic and cultural diversity, on our cultural/knowledge heritage. This should include the impact of advanced interactive audio-visual systems, complementarities and convergences between networked (e.g. Internet, future Web) and broadcast (e.g. digital interactive) delivery modes, new metrics and quality control criteria for valuing information assets, new business models for multimedia, audio-visual services and disintermediated communication, effective use and management of information, as well as the identification of key areas for new business and trade development. This work is to be largely addressed by *IST Support Measures* (ref. Chapter 4).

III.2 Interactive publishing, digital content and cultural heritage

III.2.1 Authoring and design systems

Objective: To promote more creativity and better design of European multimedia content in key application areas (knowledge, business and lifestyle publishing and geographic information) through the development of advanced content technologies. To improve multimedia authoring, design and production systems for handling radically new combinations of highly visual and interactive media forms, including 3-D, virtual reality, and broadband content. Expected benefits to be demonstrated include greater usability, functionality and productivity, as well as cross-media integration and new multi-platform publishing and broadcast applications. New distributed production processes and systems, new work flow procedures such as real-time tele-collaboration and new uses of interactive multimedia should be validated, with the active involvement of all actors concerned from production to distribution and use.

III.2.2 Content management and personalisation

Objective: To validate and demonstrate access, delivery and personalisation of heterogeneous assets in large distributed, and multi-owner collections in key application areas (knowledge, business and lifestyle publishing and geographic information). This includes the development and integration of automated content packaging and presentation systems, tailoring, Web-based and agent-based services, unified interfaces and search facilities across different information resources, new business models and dynamic transaction systems between collaborating content owners. The work is expected to contribute to open standards for interoperability and access management guidelines, including for consumer protection and privacy.

III.2.3 Access to scientific and cultural heritage

Objective: To improve access by citizens and by professionals to Europe's fast-growing science and culture knowledge base, through developing advanced systems and services supporting large-scale distributed, multi-disciplinary collections of cultural and scientific multi-media resources. The technological focus is on rich representations, powerful immersive features such as 3-D visualisation, real-time virtual object manipulation and group interactivity, whether for multimedia

retrieval, virtual galleries, mass media events or audio-visual distribution. Work is expected to develop new mixed-economy models for exploitation, repackaging and re-use. Work should also address interoperable access to distributed resources, whether through cross-domain resource discovery, interfaces or new architectures and standards, or whether through digital archives integrating library and museum objects.

III.2.4 Digital preservation of cultural heritage

Objective: To address new ways of representing, analysing, manipulating and managing different kinds of digital cultural objects from different media sources, with special attention given to surrogates of fragile physical objects. The work should focus on the sustainable development of valuable digital repositories in Europe's libraries, museums and archives. It should address the technical and organisational problems surrounding the viability of scaleable digital repositories, e.g. through testbed creation for: long-term preservation and content management in distributed heterogeneous collections (e.g. provenance, authenticity, identification and links). Particular attention should be paid to long-term accessibility, both by citizens and for scientific analysis, and to quality, affordability and acceptability.

III.3 Education and training

III.3.1 Open platforms and tools for personalised learning

Objective: To enable an education and training centre, company or service provider, to implement and maintain integrated learning services based especially on reusable learning objects. Emphasis is placed on personalised learning in collaborative environments that involve high-quality pedagogic approaches. The RTD should address the development of re-usable components and a suite of modular building blocks and tools on the basis of an underlying open infrastructure supporting a wide range of flexible learning activities (learning by doing, collaborative and group learning). It should also address the development of environments that facilitate interaction, including social interaction, between learners and between teachers. This should encompass all functionality needed to develop, manage and deliver courses and benefits should be sought in terms of pedagogy, cost-effectiveness, service quality and scalability. The work is expected to be validated in more than one learning setting and specific discipline. It should contribute to on-going standardisation activities in open learning architecture and learning objects re-usability.

III.3.2 The flexible university

Objective: To integrate and demonstrate emerging technologies for the flexible university of the future through large-scale experiments in areas promoting European integration. This should cover co-operation between institutions in providing advanced facilities to allow learners to follow a personalised mix of courses, virtual learner mobility, and interaction between tutors and learners in new ways. The work should promote higher-quality re-useable learning material; greater choice for learners through demand-driven course management; more consistent quality-management and more cost-effective on-line access to university and higher education facilities. To facilitate EU-wide implementation, the research should also address university teaching re-engineering, social and pedagogic requirements and cost-benefits. The learning context (subject domain, target populations), economic and organisational aspects of learning should be

addressed in a focussed way. The work should help to set technical and operational standards and to stimulate collaboration with other sectors (e.g. academic-industry links, public-private partnerships).

III.3.3 Advanced training systems

Objective: To develop and demonstrate radically new approaches for improving the future training and re-training of the work force, building on new cognitive approaches enabled by emerging technologies. The multidisciplinary RTD should cover intelligent, adaptable learning environments and new multimedia content, supporting the processes applied in real training situations. It should also address the experimental use of corporate knowledge networks, in particular for on-the-job training. The focus will be on the application of simulation and animation, 3-D visualisation and immersive virtual reality, and virtual presence for collaborative learning, knowledge management, group interaction and personal tutoring and evaluation. The work is expected to provide evidence of improved learning processes and associated benefits, for just-in-time training and lifelong learning in general, for individuals and corporations.

III.4 Human language technologies

III.4.1 Multilinguality in digital content and services

Objective: To develop and demonstrate multi-language tools and processes for tele-business, distributed corporate knowledge management, and online information services, enabling individuals and workgroups to produce, handle, retrieve and communicate information in the language(s) of their choice. The scope includes powerful language analysis, transfer and generation tools, including on-line translation and summarisation aids; technology support for content localisation and software internationalisation; and language-sensitive search and presentation agents for text, speech and metadata. The work covers multilingual language resources in standard formats and should assess different take-up approaches, including the transfer of promising technologies to a broader range of languages.

III.4.2 Natural interactivity

Objective: To develop and demonstrate systems to enhance the naturalness of human-computer interaction through more cognitive, intuitive interfaces, whether monolingual, multilingual or multi-modal. The work should integrate robust and scaleable language technologies into highly interactive systems, in different application areas. The work will encompass linguistically unconstrained human-machine dialogue, command and navigation capabilities, and will address systems that understand messages embodied in speech, language and gesture. It will cover harmonised repositories of language and domain knowledge, as well as techniques for modelling user behaviour and acquiring task and application specific knowledge.

III.5 Information access, filtering, analysis and handling

III.5.1 Multi-sensory forms of content

Objective: To explore new forms of multi-sensory contents enabling enhanced user perception and interaction, and to develop and evaluate the needed architectures, models and tools. The work should focus on enhancements to 3-D, virtual objects, hybrid (real-world and synthetic) objects, object-based content, intuitive interface development, and immersive animated content. It is expected to capitalise on

European strengths in design, cultural diversity and audio-visual production creativity by involving directly creators and designers. It should include the integration of new forms of content with novel delivery mechanisms in new media.

III.5.2 Media representation and access: new models and standards

Objective: To develop new coding and indexing technologies and to achieve wide industrial consensus on coding standards for next generation visual, auditory, 3-D and multi-sensory media and associated metadata, allowing search and retrieval by content characteristics. The work should focus on modularly exploitable and combinable generic components and should help to ease information access by focussing on multimedia content characteristics other than text based descriptors. It should demonstrate and validate emerging standards in public exhibitions and in the provision of experimental rich-content products and services.

3.4 KEY ACTION IV - ESSENTIAL TECHNOLOGIES AND INFRASTRUCTURES

3.4.1 Objectives

"The aim of this work is to promote excellence in the technologies which are crucial to the Information Society, to accelerate their take-up and broaden their field of application. The work will address the convergence of information processing, communications and networking technologies and infrastructures. The focus will be on technologies and infrastructures common to several applications, while those specific to one application only would be addressed in the context of that application in other parts of the Framework Programme."

3.4.2 Strategy and Architecture for the Key Action

Key Action IV will build on today's European strengths in access network technologies, public telecommunication networks, professional services, consumer products and embedded systems. This Key Action will bring together both a wide range of essential technology developments related to different but converging industries and infrastructures, and the essential component developments with integrated system and infrastructure developments.

Consequently, work undertaken throughout Key Action IV should be mindful of, oriented towards, and contribute to issues of convergence, interoperability and interworking at all technological levels.

The RTD results will inform and guide EU policy development on convergence, telecommunication regulation, spectrum allocation, space applications and component interoperability.

The strategic focus will therefore be on both contributing to issues of convergence, interoperability and interworking at all technological levels, as well as on enabling the widest possible access to essential and interoperable infrastructures and services to underpin the goals of Key Actions I, II and III. The technology development will emphasise generic building blocks and open platforms and will be complemented where appropriate by validations and demonstrations and by take-up actions such as assessments, first-user actions and best-practice initiatives.

3.4.3 RTD Priorities in 1999

A total of *twenty-four* Action Lines have been identified as priorities for Calls for Proposals in 1999. These are overviewed and indexed in the table presented below.

Overview	Action Lines for 1999
IV.1 RTD Spanning Key Action IV	• Convergence and integration: scenarios and analyses
IV.2 Technologies for and the management of information processing, communications and networks, including broadband, together with their implementation, interoperability and application	• Concurrent systems • Real-time systems • Network integration • Technologies for network management and service-level interworking • All-optical and terabit networks
IV.3 Technologies and engineering for software, systems and services, including high-quality statistics	• Component-based software engineering • Engineering of intelligent services • Methods and tools for intelligence and knowledge sharing • Information management methods
IV.4 Real-time and large-scale simulation and visualisation technologies	• Real-time simulation and visualisation technologies • Large-scale shared virtual and augmented environments
IV.5 Mobile and personal communications and systems, including satellite related systems and services	• Re-configurable radio systems and networks • Terrestrial wireless systems and networks • Integrated satellite systems and services • Tools and technologies for wireless communications
IV.6 Interfaces making use of the various senses	• Adaptable multi-sensory interfaces
IV.7 Peripherals, sub-systems and microsystems	• Peripherals technologies • Subsystems technologies • Microsystems *Co-ordination with Objective 1.1.2 of the Thematic Programme " Competitive and Sustainable Growth"*
IV.8 Microelectronics	• Microelectronics and opto-electronics design • Application competencies *Co-ordination with Objective 1.1.2 of the Thematic Programme " Competitive and Sustainable Growth"* • Processes, equipment and materials • Advanced opto-electronics and micro-electronics

Beyond 1999 new Action Lines may be added and current Action Lines refreshed.

Action Line Descriptions

IV.1 RTD Spanning Key Action IV

IV.1.1 Convergence and integration: scenarios and analyses

Objective: To assess the social, economic and regulatory implications of both the convergence of communications, broadcasting, and distributed information access and information processing and their integration in home, office, mobile and non-traditional environments. This work is expected to inform policy development, drawing on scenario analysis and experience from integrated field demonstrations. To identify open interfaces, standards and codes of practice to support access to and the inter-working and inter-management of different infrastructures and services (hardware & software). This work is to be largely addressed by *IST Support Measures* (Chapter 4).

IV.2 Technologies for and the management of information processing, communications and networks, including broadband, together with their implementation, interoperability and application

This work focuses on *"the development and convergence of information processing, telecommunications and broadcast network and system technologies"*. RTD activities target the development of a high capacity, fully interoperable information infrastructure driven by requirements from fully distributed and shared applications. The goal is to enable interworking of applications in an adaptive and scalable infrastructure. They are complemented by take-up measures, in particular trial and best practice activities (refer to Chapter 4).

IV.2.1 Concurrent systems

Objective: To develop and assess models, technologies and tools for the seamless and ubiquitous sharing and interactive use of applications and resources in geographically dispersed locations, in the context of heterogeneous hardware, software and communications architectures and systems. The focus will be on both development and execution environments to support distributed applications. The scope includes multi-tier architectures and middleware for interoperability, for interactive access to concurrently shared applications and services and for the cost-effective pooling of local- or wide-area-networked systems to build scalable application serving infrastructures.

IV.2.2 Real-time systems

Objective: To develop technologies and tools supporting the design and implementation of data- and/or compute-intensive real-time applications, such as online high-volume information handling, including data acquisition and control systems, and signal or image processing, including innovative approaches to signal representation and coding. This covers both consumer and professional applications. For consumer applications the focus is on cost-effective, mass-market embedded systems built by the integration of new technology off-the-shelf hardware and software components. For professional systems the focus is on performance and mastering complexity, including behaviour-based, modular and flexible systems with built-in self-learning and self-repairing capabilities.

IV.2.3 Network integration, interoperability and interworking

Objective: To develop the next generation network technologies (including switches, routers, modems and access devices), with the associated protocols and signalling mechanisms, in order to enable integration at the transport level of multiple heterogeneous networks, and component and system interoperability. To

develop new service independent architectures and systems to ensure all users have affordable access to nomadic multimedia services and service providers can easily incorporate new resources and users. The scope includes networks that will support advanced generic services with end-to-end Quality of Service, running over fibre, copper cable, radio, powerlines and broadcast channels. The work should ensure the interworking of core networks with local networks (mobile and fixed) and interoperability across the Internet, wide area, metropolitan area, local area and home networks.

IV.2.4 Technologies for network management and service-level interworking

Objective: To develop and validate technologies to support network interworking at the management and service platform levels, to increase intelligence, capacity, flexibility and functionality. The work includes methodologies and tools capable of managing the increased network complexity and supporting the introduction of new intelligent services. The target is to develop new open network management and service architectures, providing a framework for the convergence of network and broadcast services and technologies in multi-domain environments. The focus will be to provide anywhere, anytime communication supporting broadband and nomadic services. Open interfaces, common standards and codes of practice are to be developed.

IV.2.5 All-optical and terabit networks

Objective: To develop and demonstrate technologies and architectures for all-optical networks, which will allow end-to-end optical transmission across core and access networks, with transparent conversion of information between the optical and electrical domains. To exploit advances in optical signal processing, dense wavelength multiplexing, switching and routing, operation and management which support terabit capacity and beyond in the core network. The focus is on development of common design rules, interfaces and component specifications. The aim is to validate in field trials the technology for scalable, high capacity optical networks, and optical packet network nodes providing orders of magnitude enhancement of current network performance.

IV.3 Technologies and engineering for software, systems and services, including high-quality statistics[8]

This work is *"centred around the development, deployment, operation and evolution of software-intensive systems embedded in goods and services as well as facilitating production and enterprise processes"*. Take-up actions, in particular best-practice initiatives form an important part of the work (refer to Chapter 4).

IV.3.1 Component-based software engineering

Objective: To develop and validate the innovative processes, methods and tools necessary to design, implement and manage software-intensive systems using a component-based approach. The focus is on re-use, the incorporation of new technology COTS components and evolutionary re-configuration. The work should result in the definition of processes, methods and their supporting technologies that enable the smooth and auditable integration of components from multiple independent sources into complex systems and services, possibly taking advantage of the "system families" concepts. This work is to be complemented by

8 Research on Statistics will be developed in the context of the Cross-Programme Action 4. See Section 3.5.

technology-transfer and best-practice initiatives to stimulate both real-life practice improvement and the take-up of the associated technologies.

IV.3.2 Engineering of intelligent services

Objective: To develop and validate processes, open distributed architectures, methods, components and tools that support service development and also enable users to dynamically create their own personalised services. The scope includes the development of basic service building blocks covering all aspects of service provision and the creation, development, provision, composition and management of innovative and intelligent services across heterogeneous platforms and networks through the integration of service components. The emphasis is on the support of service negotiation, trading, quality assurance and management. The work is to be complemented by take-up actions.

IV.3.3 Methods and tools for intelligence and knowledge sharing

Objective: To achieve new capabilities, representation paradigms, models and tools to master complex and multi-disciplinary data and information (of enormously varying scales) and to support their transformation into “re-usable”, sharable and exploitable knowledge ontologies. The work is expected to involve developing knowledge-level methods and tools to increase the usability, capability and intelligence of applications, systems and networks. Emphasis is placed on creating knowledge mediation methods, processes and tools that could support perception, modelling, reasoning and sharing, at various levels of abstraction. The scope includes behaviour-based learning and self-organising systems. The work is to be complemented by take-up actions.

IV.3.4 Information management methods

Objective: To develop and validate advanced information management methods and tools for very large-scale (e.g. beyond the terabyte volume), co-operative, information repositories. The work is intended to form a bridge between multimedia content applications, personal information systems and the enabling technologies, generic systems and open architectures. It should specifically cover techniques for the storage and management of information in higher orders of magnitude than presently widely available and advanced search and retrieval based on novel processing techniques, taking into account the likely distributed and heterogeneous nature of such repositories. The work is to be complemented by take-up actions.

IV.4 Real-time and large-scale simulation and visualisation technologies

This work addresses *“the development and integration of advanced simulation and visualisation technologies and environments in all applications”*.

IV.4.1 Real-time simulation and visualisation technologies

Objective: To develop and demonstrate large-scale and/or real-time distributed simulation and visualisation systems for design, to support control and business processes, for training and general-interest applications. The work covers basic modules and tools, as well as integrated environments and bridging technologies. Support to multi-scale multi-physics simulations, interoperability and re-usability of software components on heterogeneous distributed systems, and support for collaborative work, are particular priorities. In addition to demonstrations and assessments, complementary work is expected to include both first-user and best-practice actions.

IV.4.2 Large-scale shared virtual and augmented environments

Objective: To develop and demonstrate models, languages and technologies for shared virtual and augmented environments and to explore human interaction in them, for both professional and consumer uses. The scope includes multi-sensory interaction within both reality-based and non-real virtual and augmented environments and their seamless integration with audio-visual representation and coding techniques. It covers new and improved virtual-reality modelling languages, virtual-presence concepts such as telepresence, avatars and autonomous agents, scalability and interoperability over distributed heterogeneous platforms and networks, and reducing the cost of access. The technological work should be complemented by large-scale demonstrators of new applications and by social and psychological research addressing both novice and experienced users.

IV.5 Mobile and personal communications and systems, including satellite-related systems and services

The work focuses on *"the move to an integrated seamless network that ensures global personal connectivity and enables access to broadband wireless multimedia communications and services by anyone, from anywhere, at any time"*. The work will be driven by advanced re-configurable radio concepts, extending from the terminal to the network, and permeating terrestrial, satellite, fixed and wireless services. The work described in the action lines below is complemented by relevant *IST Support Measures* including take-up actions, notably trials, and by concerted actions (refer to Chapter 4).

IV.5.1 Re-configurable radio systems & networks

Objective: To lay the foundations for allowing the radio network, including terminals and base stations, to adaptively/automatically adjust to traffic and user requirements. Architectures enabling the user to transparently access customised services over heterogeneous (terrestrial and satellite) networks operating across different frequency bands are to be developed and validated. Particular emphasis will be placed on the design and development of advanced re-configurable terminals and base stations, as well as on the appropriate download mechanisms.

IV.5.2 Terrestrial wireless systems and networks

Objective: To investigate, develop, test and validate advanced terrestrial wireless systems and architectures and their interworking and interoperation in particular with fixed/broadcasting networks. The range spans broadband wireless access and distribution systems, but also backbone wireless alternatives supporting interactive (quasi) real-time and bandwidth-on-demand services. It covers network planning, resource management techniques, flow control, signalling, quality of service focusing on managing complexity and on wireless-optimised protocols, security, intelligent roaming and handover schemes, and user/service profiling, notably for integrated communication and navigation/positioning systems.

IV.5.3 Integrated satellite systems and services

Objective: To develop, trial and validate novel technologies, architectures and innovative broadband services in the context of satellite-based communication systems, capable of providing access to low or high mobility users and inter-working with other infrastructures. The work ranges from technology developments to architectures and services trials and validations exploiting new spectrum frontiers. It covers spectrum/power efficient access schemes, support of packet-based services, integration of satellite and terrestrial networks, global network

management, seamless service provision, and the integration of navigation and communication systems and services.

IV.5.4 Advanced tools and technologies for wireless communications

Objective: To investigate, develop, integrate and validate advanced, innovative tools and wireless technologies that are necessary to facilitate a mass-market take-up of diversified wireless terminals, networks, services and applications, while maximising spectral efficiency and allowing in particular for the exploration of new spectrum frontiers. Such tools and technologies will address the needs of wireless terrestrial and satellite systems and networks operating in a broad range of frequencies. Particular emphasis is placed on the integration of such technologies in future generation broadband systems and networks, from cellular to broadband fixed radio access and broadband wireless local area networks.

IV.6 Interfaces making use of the various senses

This work addresses *"the provision of intuitive ways to capture, deliver and interact with systems"*. It includes "*the development and integration of advanced sensor, actuator and display technologies"*.

IV.6.1 Adaptable multi-sensory interfaces

Objective: Development and demonstration of integrated multi-sensor subsystems using advanced sensor, actuator and display technologies including image and auditory scene processing. The scope includes the development of new interaction paradigms and inter-mediation technologies supporting intelligent multi-modal, multi-sensorial user interfaces for portable and/or wearable information appliances and systems. The approach should aim at affordability, ease of use and accessibility and be targeted to both consumer and professional individual and group users. The scope also includes the development and demonstration of technologies for advanced displays, including, as appropriate, integrated driver, image processing, touch-sensing and control electronics, aiming at low-cost, mass-market applications. The work is to be complemented by take-up actions.

IV.7 Peripherals, sub-systems and microsystems

The work on peripherals *"addresses mass storage systems, subsystems with emphasis on partitioning, interconnection, packaging and testing, and on microsystems comprising intelligent miniaturised systems combining sensing and/or actuating with processing functions"*.

IV.7.1 Peripherals technologies

Objective: To develop and demonstrate advanced technologies for magnetic, optical and magneto-optic mass-storage subsystems, including electronics for data storage, retrieval and verification. Development of dense, monolithic storage subsystems, including technologies for low-power, portable and harsh environment applications.

IV.7.2 Subsystems technologies

Objective: To develop and demonstrate technologies for the design, manufacturing and test of subsystems comprising multi-component assemblies with active and passive elements and associated software, *e.g. "embedded systems"*, that constitute the functional blocks of information processing and communications systems and networks. The scope covers advanced interconnection, including opto-electronic interconnection, and packaging technologies including materials,

processes and equipment together with work on system partitioning methodologies and test techniques. The scope includes low-cost approaches to minimal packages and direct attachment and high-density interconnection substrates. The work is complemented with the assessment of advanced equipment for the manufacture of electronics subsystems, encapsulation and attachment of semiconductor devices, and services to facilitate the access of users to advanced subsystem integration technologies.

IV.7.3 Microsystems

Objective: To develop and validate multi-function intelligent microsystems. The work has a strong application focus and encompasses all industrial sectors. It covers research and development to enhance the manufacturing and technology base, design tools, methods and test, packaging, assembly and integration, and includes applications experiments. It also covers the assessment of advanced prototype equipment. Emphasis will be placed on facilitating broader application, including the provision of access to prototyping and small-volume manufacture, design and customer support services, research and development support networks and first-user actions.

IV.8 Microelectronics

This work takes a *"systems driven approach"* to *"materials, equipment, processes, design and test methodologies and tools which enable the development of electronic components",* and their *"application"*. Take-up actions, in particular access, assessments, first-user actions and best-practice initiatives form an important part of the work (refer to Chapter 4).

IV.8.1 Microelectronics and opto-electronics design

Objective: To develop advanced methodologies and support tools for the design and test of systems and circuits, with a particular focus on low-power, mixed-signal and RF circuits, and hardware/software co-design. The work will be organised in project clusters with emphasis on re-usable embeddable software and hardware functional blocks. The scope includes complementary actions providing best-practice initiatives for systems and circuit design and access to advanced technologies for prototyping and small-volume manufacture, access to CAD tools for learning and first-users, and access to advanced CAD tool support infrastructures for researchers.

IV.8.2. Application competencies

Objective: To develop and demonstrate the use of micro-electronics and opto-electronics technologies for application-specific requirements, with an emphasis on the themes of portability, endurance and real-time systems. Work covers hardware and software aspects of components, and improvement and adaptation of advanced technologies. It should be jointly addressed by technologies users and suppliers. The scope includes a first-user action for stimulating industrial enterprises to incorporate micro-electronic or opto-electronic technologies into their products.

IV.8.3 Processes, equipment and materials

Objective: To develop compatible CMOS process modules, equipment and materials, including optical lithography down to 0.1 micron and below, interconnect schemes for 0.15 micron and below, and related advanced process options. The scope includes research on semiconductor technologies making use of materials, such as SiGe and SiC and alternative approaches to bulk silicon such as SOI, and an action on the assessment of advanced prototype equipment for the manufacture of semiconductor components.

IV.8.4 Advanced opto-electronics and microelectronics

Objective: To develop advanced opto-electronic and photonic devices and modules, solid-state light sources, detectors and associated materials for high speed routing and processing, storage and interconnection. It includes low-cost opto-electronic and micro-optic components and integration with microelectronic devices. To undertake advanced semiconductor research aimed at determining the industrial feasibility and impact of novel devices, processes and materials, including non-optical lithography, that could impact markets within a 5 to 10 year period. The scope includes complementary actions providing access to advanced microelectronics technologies for researchers.

3.5 CROSS-PROGRAMME THEMES

3.5.1 Objectives

Cross-programme themes are the most practical manifestations of both the integrated nature of the Information Society Technologies (IST) Programme and of the underlying convergence of information processing, communications and media. The objective of the cross programme "actions" and "clusters" is to ensure that topics associated with more than one Key Action are addressed in a coherent manner, with each Key Action concentrating on and contributing from its particular perspective. These activities add value by facilitating information exchange, consensus and co-ordination on themes that cut across the programme.

3.5.2 Strategy and Architecture

Much of the value of IST stems from the breadth of research subjects brought together as one Thematic Programme, and the potential for cross-fertilisation and synergies that such integration creates. The strategy for facilitating the emergence of cross-programme themes is twofold:

- On the one hand " ***Cross-programme actions (CPAs)"*** invite proposals on themes which span more than one Key Action. Cross-programme Action Lines are a strong integration mechanism that allows proposers the flexibility to address multi-disciplinary and multi-purpose RTD related to more than one Key Action, in a coherent way. The projects arising from Cross Programme Action Lines should seek to work closely with the most relevant projects in the Key Actions.

- On the other hand "***Cross-programme clusters (CPCs)*** " will build *"a-posteriori"* links between ongoing projects throughout the programme and provide the glue which reinforces the complementarity of these projects and the synergies derived from their work. Projects in a cross-programme cluster, although located in several Key Actions, will share common topics and objectives. CPCs are implemented through the single Action Line described in paragraph V.2.1 below.

3.5.3 Priorities for 1999

Four themes are specified for **cross-programme actions** as listed in the table below.

Integrated application platforms and services	***CPA.1***
Dependability in services and technologies	***CPA.2***
Design-for-all for an inclusive information society	***CPA.3***
New indicators and statistical methods	***CPA.4***

Action Line Descriptions

V.1.1 CPA1: Integrated applications platforms and services

Objective: To develop technologies and tools for the integration of applications and synergetic bundles of services in a coherent way and to demonstrate and quantify their value to citizens and in businesses. These actions will be expected to integrate and subsequently demonstrate relevant systems and services from all four Key Actions, and to serve as showcases for the Information Society in Europe. Work will cover the development of integrated, application-serving environments for public and private organisations, through new working processes, technical paradigms for integration, adapted marketing and commercial approaches and infrastructure adaptation. It will also cover the development and demonstration of tools and platforms integrating sectorial services. Special emphasis will be given to innovative integration paradigms and complementarity between services. The demonstration sites will be expected to be complementary and interconnected, and provide a focus for national or regional information society development.

V.1.2 CPA2: Dependability in services and technologies

Objective: To develop technologies, methods and tools that will meet the emerging generic dependability requirements in the information society, stemming both from the ubiquity and volume of embedded and networked systems and services as well as from the global and complex nature of large-scale information and communication infrastructures, from citizens (especially with respect to enhancing privacy), administrations and business in terms of technologies (hardware and software), tools, systems, applications and services. The work must reflect the wide scalability and heterogeneity of requirements and operating environments. There will be an emphasis on risk and incident management tools as well as on privacy enhancing technologies. The scope includes self-monitoring, self-healing infrastructures and services.

V.1.3 CPA3: Design-for-all for an inclusive information society

Objective: To apply and demonstrate design-for-all principles in the development and piloting of mainstream IST-based products and services to ensure that they better address the needs of the widest range of user categories. The work should consider human factors related to the transition from an interaction paradigm that is computer-centric to novel interaction environments, and focus on methods and technologies for the provision of high-quality interactivity and accessibility tailored to individual user requirements. It should target the adoption by 2002 of design-for-all principles and practice in the development of consumer devices and on-line services. The work should demonstrate the impact of applying design-for-all principles on the development of usable and acceptable products, interactive applications and services in the information society. The work should be complemented by *IST Support Measures*, notably for the development of a design corpus containing recommendations, tools and methods; additionally, works should aim to raise awareness on universal design and to promote the establishment and dissemination of best industry practice.

V.1.4 CPA4: New indicators and statistical methods[9]

Objective: To develop and demonstrate new statistical tools and methods, to use statistical tools and methods in applications, and to develop indicators of the *new economy.*

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9 This cross-programme action will be elaborated in co-ordination with Eurostat.

- ***Tools and Methods:*** to develop and demonstrate new methods and tools for the collection, interchange and harmonisation of statistical data, for adapting statistical concepts to the dynamic global environment, for improving data quality and establishing quality assurance standards, for processing and analysis, for user-friendly dissemination and achieving critical mass through best practice demonstration and transfer.
- ***Applications:*** To develop innovative ways to make use of statistical tools and methods in specific applications aimed at supporting the work undertaken in the Key Actions. For instance in Key Action 1, on the generation of statistics to monitor health status, in Key Action 2, on data collection for virtual enterprise management, in Key Action 3, in developing data collection and sampling methodologies for assessing accessibility, skills renewal etc.
- ***Indicators:*** To conceptualise, define and measure statistical indicators on the nature, the dynamics and socio-economic impact of the new information economy. This will require multidisciplinary teamwork; an examination of the adequacy, the relevance, the quality, the coherence and comparability of existing statistics on the new economy; hence the development and implementation of novel data generation techniques and data collection strategies.

V.2.1 CPCO: Open Cross-programme Clusters

This Action Line facilitates the "open" development of cross-programme themes based on clusters of projects. Proposed clusters should be able to demonstrate added-value from their activities at a programme level and they should draw on several of the *IST Support Measures* (refer to Chapter 4) in order to build the theme. For example, individual cross-programme clusters could address topics such as "mobile citizens and services", "privacy and data protection", "security and personalisation", "space technologies and applications", "knowledge management and learning", "interfaces and interactivity" which all exhibit programme spanning characteristics. This, however, is not intended to be an exhaustive list of possibilities and is open to suggestions from proposers.

3.6 FUTURE AND EMERGING TECHNOLOGIES

3.6.1 Objectives

"This specific activity on future and emerging technologies covers research that is of a longer-term nature or involves particularly high risks - compensated by the promise of major advances and the potential for industrial and societal impact. Such research will typically be either trans-disciplinary or in an emerging discipline. It will reinforce the link and flow of ideas, initiatives and people between academia and industry in the EU."

3.6.2 Strategy and Architecture

This area will be implemented in two parts: the **open domain** and a limited number of **pro-active initiatives**.

The **open domain** ensures a seamless coverage of all information society technologies by keeping the door open to any new idea, with a potential for industrial or societal impact, in a bottom-up fashion. A continuously open call will be published in 1999.

The **proactive initiatives** have as an objective the focusing of resources on a few key emerging visionary and challenging long-term goals. The selection of Action Lines for proactive initiatives will be based on their potential for long-term industrial and societal impact and their timeliness. Each initiative consists of a set of autonomous but closely interacting and appropriately networked projects that co-ordinate their research, reinforced with some shared research facilities when these provide economies of scale.

3.6.3 RTD Priorities in 1999

Overview

In addition to the open domain, the following proactive initiatives are identified as priorities for 1999.

- Quantum information processing and communication
- Universal information ecosystems
- Nanotechnology information devices

Possible new initiatives for 2000 and beyond will be identified through a series of strategic and visionary workshops and a technology watch activity, that will be carried out in close co-operation with other actors, including the relevant JRC's Institutes and the "Scientific and Technological Options" Unit of the European Parliament where appropriate.

Action Line Descriptions

Open Domain

VI.1.1 FET O: Open domain

Objective: To nurture invention, creativity, and bright-spark ideas. It is open to any idea that pertains to information society technologies, as long as the ideas are highly innovative, and the realisation of these ideas is either high risk or requires longer-term research. Work submitted must have the potential of leading to

significant breakthroughs in industrial or societal terms. The domain is open to developing new technologies; exploring new ways of doing things; or creating new contexts and roles for emerging technologies. Funding is available for short assessment phases (typically for one year, funded with a fixed amount) and for full-scale research projects. The call for proposals will remain open for the duration of the programme (i.e. proposals can be submitted at any time). This Action Line includes links with the US Human Frontiers Science Programme (HFSP) - see section 6.1.

Proactive Initiatives

VI.2.1 FET P1: Quantum information processing and communications

Objective: To develop novel systems and techniques for information processing, transmission and security by exploiting the properties of quantum mechanical operations. Medium-term goals are the development of a scaleable elementary processor, secure communication systems through quantum cryptography, longer distance quantum communication demonstrations, as well as of corresponding technological building blocks. Associated grand challenges include the control of de-coherence, the development of quantum algorithms, as well as the development of methods for quantum information storage, retrieval, and intermediate read-out. Work should consist of a balance of experimental and theoretical research, and should bring together cross-disciplinary expertise in physics, chemistry, computer science, communications and semiconductor engineering, photonics and potential applications.

VI.2.2 FET P2: Universal information ecosystems

Objective: To explore means of creating an "universal information ecosystem" in which every single "knowledge entity" (whether a person, organisation or entity acting on their behalf) can be globally, yet selectively, aware of the opportunities afforded by all others at any point in time. "Knowledge entities" will seek to achieve their objectives by identifying those most appropriate to collaborate with and the most effective ways in which to do so, dynamically self-organising and establishing new organisational structures as needed. This initiative will explore novel scenarios, techniques and environments in a context where more and more people and organisations need to communicate, co-operate, and trade with each other in a truly open and global environment. It will combine experimental and theoretical research, bringing together interdisciplinary expertise in networking technologies, distributed systems, software engineering, computational logic, artificial intelligence, human computer interaction, as well as economics, organisational theory and social sciences in general.

VI.2.3 FET P3: Nanotechnology information devices

Objective: To develop new families of devices and systems leading to radically new alternatives for information processing and storage, with strong expected advantages compared to ultimate silicon technology in terms of power consumption, speed, storage, capacity, cost or functionality. Such devices and systems should exploit molecular or atomic-scale behaviour for their operation and would require the development of novel architectures for logic or memory operations, as well as the development of fabrication techniques for structures with critical dimensions around 10 nm and below, including self-assembly. Trans-disciplinary work on nano-scale physical, chemical, mechanical, and biological phenomena is expected to be key for developing innovative approaches to information processing nano-systems.

3.7 RESEARCH NETWORKING

3.7.1 Objectives

The first objective is "to facilitate the supply of trans-European broadband interconnections between national research, education and training networks at capacities and of a quality matching the aggregated need of Europe's academic and industrial researchers[10] and to keep the resulting network at the forefront of the "state of the art" in global terms.

The second objective is to support the provision of experimental interconnection of testbeds for "the integration of leading edge collaborative research and development, demonstration, and take-up activities from all key actions in this programme".

3.7.2 Strategy and Architecture

The approach in the calls in 1999 will be to focus the supply of trans-European broadband interconnection services, whether for interconnecting research networks or testbeds and the supply of testbeds in a single Action Line. This will be managed as a procurement activity, with full transparency in public tendering for state-of-the-art services. For the interconnection of research networks, this work will follow-up that in the Fourth Framework Programme.

The second Action Line supporting the provision and use of testbeds for advanced networking and application experiments is to be implemented through both RTD activities and complementary *IST Support Measures* (refer to Chapter 4).

3.7.3 Priorities for 1999

Action Line Descriptions

VII.1.1 RN1: Broadband interconnection of national research, education and training networks, and testbeds

Objective: To procure and manage state-of-the-art trans-European broadband interconnections between national research, education and training networks, matching the aggregated need of Europe's academic and industrial researchers and the nationally available services. This implies upgrading existing capacities to capacities approaching gigabits/s, introducing support for different levels of 'Quality of Service' and improving connectivity to third countries, and includes monitoring the usage of such services and establishing the user requirements for them. To procure and manage advanced testbeds and trans-European experimental communications links to support IST project experimentation.

10 Support for research infrastructure is provided by thematic programmes, as well as by the horizontal programme "Improving the human research potential and the socio-economic knowledge base". This horizontal programme will have the responsibility of drawing up and publishing on a regular basis a "map" showing for all classes of research infrastructure to which specific programme(s) they may apply for support.

VII.1.2 RN2: Testbeds for advanced networking and application experiments

Objective: To support the use of advanced testbeds for IST RTD project experimentation for: validating next generation communications and networking, and applications and services; and integrating high-performance computing and communication, including virtual laboratories, studios and institutes. The actions are also expected to: address future computing and communication needs of researchers; improve the take-up of world-best functionalities and systems in European centres of excellence; and to accelerate the formulation, validation and adoption of open interfaces, common standards and codes of practice by manufacturers, network operators, service providers and users.

4 IST SUPPORT MEASURES

These activities run in parallel with the RTD actions and are employed to *prepare* (before), *support* (during) and facilitate the rapid take-up and *transfer* (after) of technologies, experiences and know-how gained in the execution of RTD. The IST programme also specifically encourages the formation of clusters of RTD activities with common objectives, concertation between projects needing to exchange information, working groups and networks of excellence to encourage flexible collaboration between leading researchers. Support to the standards and pre-standards process will be encouraged in all areas. Socio-economic research actions will be co-ordinated and their results pooled in a coherent presentation format.

IST Support Measures may be articulated either at the level of the IST programme, or that of a key action, or -more usually- that of an action line or cluster of action lines. With the exception of *Take-up Measures* (see paragraph below), *IST Support Measure proposals may be submitted at any time* (refer to the current *call for proposals*) and are typically evaluated in parallel with an evaluation of RTD proposals.

Further detailed guidance on how to prepare and submit a proposal is contained in the *Guide to Proposers*.

VIII.1.1 Take-up Measures

Take-up measures are a special kind of support measure and are always the subject of specific calls for proposals. They help to transfer leading edge as well as established but insufficiently deployed methodologies and technologies to industry and other organisations in order to achieve greater efficiency, higher quality and greater economy. Take-up measures include:

- *Trials:* (for users and suppliers) aiming at the adaptation and introduction of leading edge technology (promising but not yet fully established) in industrial/service applications and its joint evaluation (by supplier and user). In order to exploit synergies, to accelerate wider adoption and to overcome barriers for commercial exploitation, measures are normally organised in groups of actions with an obligation to disseminate results and exchange experiences across borders and industrial/service sectors.

- *Best practice actions*, (for users) promote improvements in the practices, processes and operations in industry and services through the take-up of well-founded, mature and established - but insufficiently deployed - methods and technologies, so as to achieve greater efficiency, higher quality and greater economy (in the user organisation).

- *First-user actions:* promote improvements in the products, processes and operations in industry and services through the first time take-up of well-founded and established methods and technologies, so as to achieve greater efficiency, higher quality and greater economy (in the user organisation).

- *Assessments:* (by users and suppliers) promote the use of innovative equipment and materials in industrial and service environments through evaluation of innovative products against user requirements and specifications.

- *Access Actions:* are designed to provide co-ordinated access to advanced, emerging technologies and services, knowledge and competence. In 1999, the priority is on providing access to: advanced subsystem integration technologies; prototyping and small volume manufacture, design and support

services, research and development networks; advanced microelectronics technologies for researchers; CAD tools for learning, and advanced CAD tool support infrastructures for researchers.

- *Take-up Support Nodes:* are designed to co-ordinate and implement a group of take-up activities in order to exchange experiences, exploit synergies and expand the efforts of the various players so as to reach a critical mass. A major focus is on pro-active support of take-up, broad dissemination of results, awareness creation and stimulation of technology transfer on a thematic, regional, or industrial / service sector level. Support nodes will be normally networked to facilitate exchange of experiences between nodes on a European scale.

These measures are aimed at stimulating broad take-up particularly in SMEs, and encouraging innovation. Take-up measures can only be undertaken when a specific reference is made within an Action Line, or group of Action Lines. **Consequently, the timing for submission of proposals addressing Take-up measures is defined for each specific action line in the published calls for proposals.**

VIII.2.1 Concerted Actions and Thematic Networks

- *IST Project Clusters:* are designed to co-ordinate RTD projects already in receipt of funding, in order to exchange experience acquired, to expand the research efforts of the various players so as to reach a critical mass, to disseminate results and to inform users. Projects are actively encouraged to co-operate with each other, and to develop a coherence of approach that will progressively integrate the IST Programme. Proposals may be submitted for the additional resources necessary to support their clustering activities. This measure seeks to ensure a close co-ordination and complementarity of work performed in the different projects in order to maximise their joint impact, especially concerning standardisation, best practice and exploitation of results. Clusters of projects may span the scope of more than one Action Line, Key Action or may form a cross-programme activity.

- *Networks of Excellence and Research Training Networks* bring together industry, users, universities and research centres with a common RTD objective. Networks of excellence can be particularly beneficial for groups and institutions in outlying regions through the channel they provide for training, technology transfer, and access to expertise and resources.

- *Working Groups:* aim at improving the systematic exchange of information and the forging of links between teams which carry out RTD or take-up activities around a common theme, through short scientific visits and the organisation of seminars, workshops or conferences. Working groups may also be used to support normalisation and standardisation activities and to co-ordinate the specification of user requirements to one or more ongoing projects.

VIII.3.1 Accompanying Measures

- *Studies:* These actions provide both technology and market analysis to the research community, with a view to matching the research activities with international and socio-economic trends. The intention is understand the societal and economic consequences of the application and use of information society technologies developed within the programme. Such studies may form part of the RTD spanning each Key Action. They are also co-ordinated with initiatives of the "Socio-Economic Research Programme" – See 6.3.

- *Dissemination and awareness actions:* fall into two categories:

The first category is targeted on specific audiences outside of the IST Programme. These aim to stimulate and promote the rapid take-up of RTD results, to enhance awareness of RTD activities, the IST programme itself and to enhance the exploitation of its results. These external actions include dissemination of the practical results of projects, the provision of wider access to existing trials and demonstrations, and participation in / organisation of selected exhibitions and trade fairs. Some IST dissemination and awareness actions may have to be subject to specific calls for tender, following the procurement rules applicable to the Commission. Other actions, e.g. support to conferences or exhibitions, may be implemented as a subsidy under the applicable Commission procedures.

The second category of dissemination and awareness actions addresses the IST participants themselves. These enable the collection[11] editorial co-ordination and provision of content, the publication and subsequent management of that content, as IST projects - and their results - progress. Publications may be made electronically (WWW CD-ROM etc), as well as periodically in paper or hybrid formats. In addition to the general publicity on IST produced e.g. in direct liaison with the Commission Services, there is a need to produce material of a more focused nature specifically targeted on the needs of particular interest groups.

Some IST dissemination and awareness actions may be made the subject of specific calls for tender, issued under the procurement procedures of the Commission.

- *Training measures:* promote and support the dissemination, exploitation and **enhancement of research knowledge** in both technical and non-technical fields relevant to the Information Society. Interplay between academic and industrial research will play an important role within such measures, which are to be co-ordinated with those of the Human Capital Development Programme – see section 6.3.

VIII.4.1 Technology stimulation projects to encourage and facilitate SME participation

In conjunction with the programme *"Innovation and the participation of SMEs"*, The IST programme will financially support relevant proposals for:

- *SME Co-operative Research*
- *SME Exploratory Awards.*

Such proposals should be directly submitted to the single complementary entry point, set up under the programme *"Innovation and the participation of SMEs"*, and will be subject to the published Calls and procedures and criteria defined by that programme (see also 6.2 below).

VIII.5.1 Training fellowships

- *Marie Curie:* Organisations interested in acting as hosts for Marie Curie Industry host fellowships related to IST research are referred to the specific Guide to Proposers provided by the horizontal programme "Improving the human resource potential and the socio-economic knowledge base". As explained in that document, successful organisations will subsequently advertise for fellows and

11 All IST projects will be expected to contribute summary descriptions of their project, and their public domain results in a form suitable for publication.

young researchers wanting to obtain a fellowship. Applicants for fellowships will then apply directly to the organisations of their choice.

Persons or organisations interested in applying for other categories of Marie Curie training fellowships, even when related to IST research, are invited to do so directly to the horizontal programme "Improving the human resource potential and the socio-economic knowledge base". Such applications will be subject to the published Calls and procedures defined for that programme (see also 6.3 below).

- *Bursaries:* A Bursary Scheme will be available to give young researchers from Developing Countries, including Mediterranean Partner Countries and Emerging Economies, the opportunity to collaborate in shared cost actions of the IST Programme.

Further information on format, preparation and submission of proposals is provided in the *Guides to Proposers*

5 EVALUATION CRITERIA

The criteria applied to the evaluation of proposals will follow from the general criteria given in the Decision on the Fifth Framework Programme[12], and the Rules of Participation which are specified in more detail in the "Manual of Proposal Evaluation Procedures".

The five general evaluation criteria are defined as:

- Scientific / technological quality and innovation
- Community added value and contribution to EU policies
- Contribution to Community social objectives
- Economic development and S&T prospects
- Resources, Partnership and Management

For the IST programme the participation of industrial entities in industrially orientated actions should, as a general rule, be appropriate to the nature and purpose of the activity.

The above criteria may be weighted differently for specific types of activities and therefore proposers are advised to refer to the *"Guide to Proposers"* and the "IST Specific Annex to the Manual of Proposal Evaluation Procedures" in order that they prepare their submission in the appropriate manner.

12 Set out in the Council Decision for a 5th Framework Programme for Research, Technological Development and Demonstration (1998-2002) . and in the Council Decision on rules for implementation pursuant to Article 130j of the Treaty.

6 CO-ORDINATION ARRANGEMENTS AND RELATED MEASURES

In addition to the internal co-ordination between Key Actions on specific themes, wider co-ordination arrangements will be put in place to maximise the benefits of an integrated IST Programme.

6.1 INTERNATIONAL CO-OPERATION

The **strategic objectives** will be to encourage the widest possible international co-operation to: *achieve upstream global consensus* for interoperability and standardisation; *promote exchange of scientific information* and best technological know-how world-wide; *strengthen scientific and technological co-operation with the "accession" countries* on their way to full participation in the European Union programmes; and to *strengthen business co-operation*, in particular in the future free-trade zones, while protecting European IPR.

In general international co-operation activities will be implemented through the modalities described in sections 3 and 4 of this document, or through the specialisation of such modalities to international co-operation requirements. International co-operation activities may also be implemented through the modalities described in the workprogramme of the horizontal programme "Confirming the international role of European Research".

Participation in the IST Programme is open to entities from associated states, and countries with S&T agreements with the EU in the area of information society technologies, and on a project-by-project basis to international organisations, as well as entities from other European, developing countries and Mediterranean countries[13]. In 1999, accompanying measures to encourage stronger participation from, in particular, associated states and from countries with co-operation agreements will include support for the organisation of selected exhibitions, conferences and workshops, trade fairs, “information and partnership” events and facilities, and support for regional information centres and web-sites, organised in conjunction with the horizontal programme on “international co-operation”.

Cross participation and **co-ordination with other major RTD frameworks** (such as the ATP programme in the US, the new “Electronic Commerce” programmes of MPT and MITI in Japan, and established frameworks such as IMS[14] and HFSP[15]) on specific Action Lines in the programme will be stimulated through accompanying measures, including support for EU-US, EU-Canada and EU-Japanese “partnership workshops” in 1999, the co-ordination / synchronisation of focused Calls for Proposals, and support to accompany the participation of EU entities in relevant programmes in third countries.

Co-ordination with the **EUREKA** and **TEN-telecom frameworks** will also be used to encourage industrial co-operation in down-stream product and pan-European service innovation. Information about emerging EUREKA projects and about calls for proposals for TEN-Telecom support will be made available to all IST programme participants.

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13 The “Rules of Participation” are set out in the Decision pursuant to Article 130j of the Treaty, see also the "Guide to Proposers".

14 Intelligent Manufacturing Systems Initiative (http://www.ims.org/)

15 Human Frontiers Science Programme

Co-operation with Actions in the **COST** framework will be strengthened with links to all IST-related COST actions, including the established COST-Telecommunications set. Technical co-ordination of these actions will be ensured with the appropriate Action Lines related to their technical area. COST action co-ordinators will be invited to join related IST concertation meetings and RTD workshops.

International consensus and standardisation will be a priority in IST work and in international co-operation. In 1999, accompanying measures will be established within Key Actions to stimulate and co-ordinate European input to ETSI, CEN/CENELEC, ITU working groups, and to industry consensus frameworks (DAVIC, DVB, OMG, IETF, W3C, etc.). Measures will also be established to support European involvement in the Global Business Dialogue focused on the global regulatory environment and common business guidelines for electronic commerce.

Wider **information exchange at the international level** on the development of the information society will be initiated in liaison with national foresight organisations, for example: the Club of Rome; the Smithsonian and Futures Institutes in the USA, and with other similar organisations in for example the Mediterranean countries, China, Japan and Russia. Focused workshops will be used to bring key contributors together and to consolidate ideas. In 1999, priority will be given to wider international concertation on the implications of electronic commerce for international trade, taxation and economic governance (in conjunction with the activities of the Global Business Dialogue), and on the impacts of globalisation and delocalisation of economic activity in both industrialised and developing countries. *IST Support Measures* will be used to maintain links with EU-trained IST specialists in third countries; in 1999 these will target emerging economies.

6.2 INNOVATION AND SPECIAL MEASURES FOR SMES

The IST programme will place special emphasis on the dissemination, transfer, utilisation and/or exploitation of R&D results leading to innovation. To this end, the Programme will carry out activities in co-ordination with the Innovation and SME programme, inter-alia:

- To promote the transfer and exploitation of EC RTD results, for example through the organisation of technology brokerage events, workshops on exploitation issues and as IPR, mobilisation of risk and private finance as well as publish specific calls to this end;

- To provide information on EC RTD results, in the format agreed with the Innovation and SME programme, for inclusion in CORDIS (including an indication of those results that are suitable for third-party exploitation or for EUREKA) ;

- To assist in preparing management tools to promote the exploitation of EC RTD results by the consortia (or their members) and to monitor with the help of adequate tools, such as the Technology Implementation Plan and technology audits, the further use of RTD results ;

- To assist with the assessment of the efficiency and effectiveness of the network for technology transfer, of joint actions between the thematic programmes and the Innovation and SME programme, and of the Innovation Units or Innovation SME units.

The programme will implement special measures to facilitate and encourage the participation of SMEs in RTD and demonstration activities. These measures consist of co-operative research, exploratory awards.

The measures aimed at encouraging and facilitating SME participation in RTD activities relate to projects which show great potential as regards innovation and which fall within the overall objectives of the thematic programmes. In other words, they do not have to relate specifically to the key actions, generic technologies and research infrastructure. As such, these measures allow for a "bottom up" character since proposals may be submitted for the objectives and priorities of the thematic programmes in their entirety.

The implementation of the SME specific measures follows the common rules established in the horizontal programme "Innovation and the participation of SMEs", in order to ensure transparency for the beneficiaries. These rules include common contractual and proposal evaluation, a single complementary entry point for the reception of proposals for SME specific measures, common rules for eligibility and for scientific and technological evaluation; common legal and financial provisions as well as a harmonised and rapid feedback to applicants.

The participation of SMEs in RTD projects will also be facilitated by support measures for partnership brokerage between ongoing projects and new SMEs active in related RTD, and by measures such as "exploratory awards" to cover part of the cost of developing SME partnerships and RTD ideas. In addition, the scheme of co-operative research will allow SMEs with limited or no in-house R&D capability, but facing technological problems, to entrust the necessary research to a third party (the RTD performers). In this context, part of the research may be carried out by the SMEs themselves. The implementation of these specific measures will conform to the published calls, procedures and criteria established for the horizontal programme "Innovation and the participation of SMEs", in order to ensure full-transparency for the beneficiaries.

6.3 HUMAN RESEARCH POTENTIAL AND SOCIO-ECONOMIC KNOWLEDGE BASE

Assessments of social and economic trends and impacts will be supported as an integral part of Key Actions and will be co-ordinated within the IST Programme as described under *IST Support Measures* in Chapter 4. They will also be co-ordinated with related activities in other programmes of the 5th Framework Programme, with work supporting EU policy-development activities, and with research in other European and international frameworks.

The focus of co-ordination across the 5th Framework Programme will be the Key Action on "Improving the socio-economic knowledge base" in the horizontal programme "Improving the human research potential and socio-economic knowledge Base". The work in the IST Programme will contribute in a consolidated form to the **annual report on socio-economic research** in the 5th Framework Programme, co-ordinated by this horizontal programme. Information exchange between projects will be facilitated by a series of concertation workshops on specific themes related to EU-policy priorities. In 1999, priority will be given to IST impacts on **employment** and on **economic sustainability** of information society development.

European policy development support in the IST Programme will be co-ordinated with the activities of the Commission's Future Studies Unit (*Cellule de Prospective*), the relevant JRC's institutes, the European Technology Assessment Network (ETAN) and the Information Society Forum. Jointly organised workshops and conferences will complement co-ordination by an Interservice Group within the Commission. In 1999, the IST Programme will support the exploration of priority themes to be selected in consultation with those bodies.

Marie Curie Training Fellowships are defined in the framework of the horizontal programme "Improving the human research potential and the socio-economic

knowledge base". Amongst the various types of fellowships the IST Programme will offer support to the *Industry-Host Fellowships* only. The implementation of these fellowships will follow common rules in order to ensure the consistent high quality and prestige of the schemes. These rules include a common definition of Marie Curie Fellowships, a Single Entry Point for the reception of all Marie Curie Fellowship proposals, common rules for eligibility and for evaluation, common legal and financial provisions as well as harmonised feedback to applicants and monitoring of the fellows.

6.4 CO-ORDINATION WITH THE OTHER THEMATIC PROGRAMMES

Work in the IST Programme is related, in a number of instances, to Key Actions of other thematic programmes, in particular when the latter involve research associated with the deployment of scientific and technological developments in areas covered by the IST Programme. In order to ensure proper co-ordination specific arrangements will be defined taking one or several of the following forms:

- synchronisation of calls for proposals addressing complementary subjects or joint calls for proposals on specific subjects, and, where appropriate, joint evaluations,
- transfer of proposals between programmes when appropriate,
- co-ordination of the monitoring of projects,
- co-ordination of projects through clustering or concertation.

7 AN INDICATIVE TIMETABLE FOR IMPLEMENTATION

The programme will be implemented over 4 years, starting with the adoption of this Workprogramme in January 1999 and a first Call for Proposals early in 1999.

Year	1999	2000	2001	2002
Indicative Budget (M Eur)	789.5	800.5	872.5	867.5

Over this period, a Call for Proposals for a selected set of Action Lines in the current year's Workprogramme will usually be published about every three months. This will allow related Action Lines to be addressed simultaneously and proposals for related RTD to be evaluated as a coherent set. It will also allow the work involved in proposal preparation, evaluation, and RTD contract negotiation, to be spread over the year.

To allow the full provision of 789.5 M EUR to be engaged in fiscal year 1999 and to ensure continuity with 4th Framework Programme lines of RTD, the first Call for Proposals in 1999 will be published on 16th March 1999. This will allow new RTD projects to start work, with signed contracts, before the end of 1999.

The second Call for Proposals will be published on 15th September 1999. The proposals submitted in response to this call will be evaluated in January 2000, and will take up part of the provision for budget commitment in 2000, with projects starting in mid 2000.

The proposed selection of Action Lines for each call is based on the guiding principles of keeping together closely related sets of Action Lines within and across Key Actions, and keeping an appropriate balance between:

- the need for continuity, from 4th Framework Programme RTD for example, to avoid serious interruption of research;
- the need to start up Key Actions or Action Lines where a new effort is urgently needed;
- the need for coherence within each call and to address strategic themes in a structured fashion.

The indicative timetable and scope for Calls for Proposals in 1999 are illustrated in the following tables.

Notes:

- The Director General responsible for the IST Programme may modify the date of publication of calls for proposals by up to one month. In such cases, notice will be published in the Official Journal on the date initially foreseen.
- The Commission reserves the right not to commit in full the budget indicated for each call.
- An additional call for proposals may be launched by the Director General responsible for the IST Programme, if the proposals resulting from a call do not satisfy the objectives of the Programme.

7.1 CALLS FOR PROPOSALS IN 1999

7.1.1 First Call

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals 16/06/1999					
RTD	**I.2.1, 1.2.2, 1.2.3,** **I.3.1,** **I.4.1,** **I.5.1, I.5.2,** **I.6.1,** **I.6.2,** ***(road & air transport only)***	**II.1.2,** **II.2.1, II.2.2, II.2.3,** **II.3.1, II.3.3, II.3.2,** **II.4.1, II.4.2, II.4.3,**	**III.2.1, III.2.2, III.2.3,** **III.3.1, III.3.2, III.3.3,** **III.4.1, III.4.2,**	**IV.1.1,** **IV.2.1, IV.2.2, IV.2.3, IV.2.4, IV.2.5,** **IV.3.1, IV.3.2, IV.3.3, IV.3.4,** **IV.4.1, IV.4.2,** **IV.5.1, IV.5.2, IV.5.3, IV.5.4,** **IV.6.1,** **IV.7.1, IV.7.2, IV.7.3** **IV.8.1, IV.8.2, IV.8.3, IV.8.4**	**V.1.1 CPA1, V.1.2 CPA2, V.1.3 CPA3,** **V.1.4 CPA4,** *(Tools & Methods and Applications only)* **VI.2.1 FET P1, VI.2.2 FET P2, VI.2.3 FET P3,**
TAKE-UP (see footnotes)				**IV.7.2**[16]**, IV.7.3**[17]**, IV.8.1**[18]**, IV.8.3**[19]**, IV.8.4**[20]**,**	
Continuous[21] **Submission Procedures until 15/09/1999**					
RTD					**VI.1.1 FET O**[22]**,**
Support Measures					**VIII.2.1, VIII.3.1, VIII.5.1** (IST Support Measures)

16 Including take-up "assessment of advanced equipment" and "access to advanced subsystem integration technologies"

17 Including take-up "assessment for advanced prototype equipment" and "access to prototyping and small volume manufacture, design and customer support services, research and development networks"

18 Including take-up "access to advanced technologies for prototyping and small volume manufacture, access to CAD tools for learning, and access to advanced CAD tool support infrastructures for researchers"

19 Including take-up "assessment for advanced prototype equipment"

20 Including take-up "access to advanced microelectronics technologies for researchers"

21 Proposals will be batched and batches evaluated at intervals that depend on the number of proposals received, but which will not exceed 3 months.

22 FET Open will follow the 2-step procedure, see "Guide to Proposers" for further information

7.1.2 Second Call

Scope of the Call (Action Lines)					
	KA1	**KA2**	**KA3**	**KA4**	**Others**
Deadline for Proposals 15/12/1999					
RTD	**I.1.1,** **I.4.2 ,** **I.6.2,** ***(rail & waterborne transport only)*** **I.6.3,**	**II.1.1,**	**III.1.1,** **III.2.4,** **III.5.1, III.5.2,**	**IV.1.1,** **IV.2.1, IV.2.4,** **IV.3.1, IV.3.4,** **IV.6.1,**	**V.1.4 CPA4,** *(Indicators only)* **VII.1.1 RN1,** **VII.1.2 RN2,**
TAKE-UP					
	VIII.1.1 Take-up[23]				
Continuous[24] **Submission Procedures until 15/03/2000**					
RTD					**VI.1.1 FET O**[25]
Support Measures					**V.2.1 CPCO** **VIII.2.1, VIII.3.1, VIII.5.1** (IST Support Measures)

7.1.3 Intelligent Manufacturing Systems Initiative (IMS) Call

It is planned to publish a separate *joint* call for the "Intelligent Manufacturing Systems Initiative[26]" (IMS) in conjunction with the Specific Programme "Competitive and Sustainable Growth" (see Section 6.1 on International Co-operation). The indicative budget is 35 M EUR for 1999-2000 of which 5 M EUR is foreseen for 1999. The IMS "continuous submission" call is expected to be published on March 16, 1999 with a closing date of September 15, 2000. The work relates to IST Programme Action Lines II.1.1, II.2.1, II.2.2, II.2.3, II.3.1, II.3.2, II.3.3, II.4.2.

23 Take-up measures will be called by reference to specific Action Lines in the Call for Proposals.

24 Proposals will be batched and batches evaluated at intervals that depend on the number of proposals received, but which will not exceed 3 months.

25 FET Open will follow the 2-step procedure, see "Guide to Proposers" for further information

26 See http://www.ims.org/

7.2 INDICATIVE ACTION LINES FOR 2000 AND BEYOND

Key Action I

- Sustainable service provision for residential and mobile environments
- Secure virtual networks and services for continuity of care
- Service development for citizens, health professionals and managers
- Systems and services for social integration
- Assistive technology products and interfaces to compensate for functional impairments
- Single point access to interactive services relating to public administrations
- Public events: risk analysis and assessment, crowd and crisis management
- Facilitating dispute resolution, in the courts and before
- Environmental risk and emergency management, focusing on landmines
- Environment modelling, simulation and forecasting
- In transport, higher level of integration based on new components and services

Key Action II

- Higher levels of networked integration of work and business based on new middleware components and services
- Building upon the trend towards enhanced network-mediated forms of work and business
- Advanced technologies to strengthen trust and enable new businesses that require a high yet flexible level of protection of information, such as personal data, digital content, and electronic cash

Key Action III

- Geographic information
- Mass customisation, advertising and customer applications
- User-controlled publishing and personal media systems
- Cultural information systems
- Seamless integration of legacy systems into new digital library applications
- High-quality audio-visual and multi-sensory content
- The school of tomorrow
- Advanced learning systems
- Flexible life-long learning
- Cross-lingual information management
- Information filtering and agents
- Data visualisation
- New-generation cross-media search, directory and management services

Key Action IV

- Beyond 1999 new Action Lines may be added and current Action Lines refreshed.
- Future an Emerging Technologies
- The disappearing computer
- Advanced algorithms for computing and communications

- Personal bio-information systems

8 GLOSSARY

ACTS	Advanced Communications Technologies and Services (FP4 Programme)
AIST	Agency of Industrial Science and Technology (www.aist.go.jp)
AL	Action Line:
Allowable costs	See **Eligible Costs**
Assessments: (by users and suppliers)	Type of **Take-up measure** promoting the use of innovative equipment and materials in industrial and service environments through evaluation of the innovative products against user requirements and specifications.
Assistant Contractor	a project participant whose role largely is in support of one or several of its **contractors**
ATM	Asynchronous Transfer Mode, or Automatic Teller Machine, or Air Traffic Management
ATP	Advanced Technology Program (US – NIST)
Best practice actions, (for users)	Type of **Take-up measure** promoting improvements in the practices, processes and operations in industry and services through the take-up of well-founded, mature and established - but insufficiently deployed - methods and technologies, so as to achieve greater efficiency, higher quality and greater economy (in the user organisation).
Bursary: (international co-operation training bursary)	Granted for training activities only e.g. to allow the applicant to learn a new scientific technique or to work on a particular experiment or set of experiments where the host institution has particular expertise and which cannot be performed in the home institution of the candidate.
CAD	Computer Aided Design
Call for Proposals	As published in the Official Journal. Opens parts of the Workprogramme for proposals, indicating what types of actions (RTD projects, Accompanying measures etc.) are required. A provisional timetable for such Calls is included in the Workprogramme
CATV	Cable Television
CEN/CENELEC	*Comité Européen de Normalisation / Comité Européen de Normalisation Electrotechnique (www.cenorm.be)*
Certification (of a proposal)	The process by which the Co-ordinator may apply a digital signature to the proposal, before it is submitted to the Commission.
Cluster	A group of **RTD** projects and/or other cost-shared actions and/or accompanying measures that address a common theme or area of interest.
CMOS	Complementary metal-oxide semiconductor
COST	*Coopération européenne dans le domaine de la recherche scientifique et technique (www.belspo.be/cost/)*
Concerted Actions	1. co-ordinate **RTD** projects already in receipt of funding, for example to exchange experiences, to reach a critical mass, to disseminate results etc. 2. co-ordinate **RTD** projects funded at national level
Continuously Open Call	One having no fixed closure date, but with a periodic **evaluation** of received proposals.
Contractor	a project participant who has a wide-ranging role in the project throughout its lifetime
Convergence	One of the driving socio-economic forces necessitating research under the Fifth Framework Programme. Generic term that covers: 1. Technological Convergence 2. Market Convergence 3. Regulatory Convergence

	4. Policy Convergence
Co-operative research project (for SMEs)	One in which at least 3 mutually independent SME's from at least 2 Member States jointly commission a research project to be undertaken by a third party. Supported by the Programme of Innovation and Special Measures for SME's.
Co-ordinator (Co-ordinating contractor)	Lead **contractor** in a Community action, delegated by the consortium for the role of co-ordination with the Commission.
COTS	Commercial – Off-the-shelf (of products and components)
CPA or CPC or CPT	Cross-programme Action or **Cluster** or Theme (in IST Programme)
DAVIC	Digital Audio-Visual Council (www.davic.org)
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union (www.ebu.ch)
EC	European Commission (europa.eu.int)
Eligible costs	Costs that are reimbursable in full or in part by the Commission, under the terms of the Contract that is the basis for the project.
ESA	European Space Agency (www.estec.esa.nl)
ESPRIT	FP4 Programme – European Strategic Programme for R&D in IT
ETSI	European Telecommunications Standards Institute (www.etsi.org)
EU	European Union
EUREKA	A Europe-wide Network for Industrial R&D (www.eureka.be)
Evaluation	The process by which proposals are retained with a view to selection as projects, or are non retained. Evaluation procedures are fully transparent and published in the Evaluation Manual. Evaluation is conducted through the application of published Evaluation Criteria.
FP	Framework Programme (EU - Fourth FP is FP4, etc.. - www.cordis.lu)
GIS	Geographic Information System
GNSS	Global Navigation Satellite Systems
HFSP	Human Frontier Science Program (www.hfsp.org)
IBC	Integrated Broadband Communications
IETF	Internet Engineering Task Force (www.ietf.org)
IMS	Intelligent Manufacturing Systems Initiative (http://www.ims.org/)
Integration	Application of Synergy, by which different fields of endeavour are brought together to yield results of far greater significance than would have been possible through individual and independent actions.
IPR	Intellectual Property Rights
IST	Information Society Technologies. The 2nd Thematic Programme of FP-5, addressing research issues towards a user-friendly Information Society.
ISTAG	Information Society Technologies Advisory Group
ISTC	Information Society Technologies Committee
ITU	International Telecommunications Union (www.itu.org)
JRC	Joint Research Centre (EC)
KA	Key Action (in FP5)
Marie Curie	Training fellowships supported by FP-5. Of these, IST itself only supports "Host" fellowships for young researchers.
Members (e.g. of concerted actions)	Are associated with an action that is led by one or more **Contractors**.
MITI	Ministry of International Trade and Industry (www.miti.go.jp)
MPT	Ministry of Posts and Telecommunications (www.mpt.go.jp)

NIST	National Institute of Standards and Technology (www.nist.gov)
NSF	National Science Foundation (http://212.208.8.14/nsf.htm)
OECD	Organisation for Economic Co-operation and Development (www.oecd.org)
OMG	Object Management Group (www.omg.org)
Pre – Registration	Procedure by which proposers notify the Commission of their intention to submit a proposal
Programme Support Measure	Everything other than the research and the demonstration measures included within the IST Programme **.**
Research Infrastructures	Facilities necessary for conducting research or for supporting the researchers. These may include research institutions, laboratories, testbeds and other specialised research equipment, communications networks dedicated to research (including the Internet), libraries, learned bodies and other sources of knowledge.
Research Training Networks	Promote training-through-research especially of researchers at pre-doctoral and at post-doctoral level
RF	Radio Frequency
Roadmap	Part of the Workprogramme indicating which Action Lines are opened in each **call for proposals**, and at which time. The roadmap provides a means of focusing attention on areas or sub-areas of the Programme in any specific **Call**, thereby optimising opportunities for launching collaborative projects and establishing thematic networks**.**
RTD	Research and Technology Development
SiGe	Silicon Germanium
SiC	Silicon Carbide
SME Exploratory Award	Given to an SME to support the exploratory phase of a project (for up to 12 months). Supported by the Programme of Innovation and Special Measures for SME's.
SOI	Silicon-on-insulator
Subcontractor	For specific tasks of a fixed duration, a proposal / project may include sub-contractors, who do not participate in the project and do not benefit from the intellectual property rights acquired through achievements of the project.
Submission Date	Equivalent to the closure date of a **Call**. The precise date and time by when proposals need to have been received by the Commission Services.
Take-up measures	Measures stimulating diffusion and utilisation of technologies developed under RTD projects. A specific form of Accompanying Measure
Trials (for users and suppliers)	Type of **Take-up measure** aiming at the adaptation and introduction of leading edge technology (promising but not yet fully established) in industrial/service applications and its joint evaluation (by supplier and user). In order to exploit synergies, to accelerate wider adoption and to overcome barriers for commercial exploitation, measures are normally organised in groups of actions with an obligation to disseminate results and exchange experiences across borders and industrial/service sectors.
UMTS	Universal Mobile Telecommunications Services
W3C	World-Wide Web Consortium

9 INDEX OF ACTION LINES