EUROPEAN COMMISSION **ref:xxxxx-EN**

Information Society Technologies

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

2000 Workprogramme

Draft Version

www.cordis.lu/ist

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, a workprogramme is developed and revised each year, in close co-operation with the potential funding partners and participants in the RTD actions. Orientations for the workprogramme have been provided by the IST Advisory Group (ISTAG) and the Programme Committee. These have been elaborated as priorities, and used to help select and specify action lines from the suggestions arising from consultations with external experts.

The workprogramme recalls the structure 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 lays out the Action Lines for the Calls for Proposals to be published in calendar year 2000 and structures them in a way that reflects the nature of the programme and its Key Actions. A road map summarises the planned content and timing of Calls for proposals in 2000, though this always remains subject to formal confirmation through publication of each Call.

As a result of the first Call for proposals in 1999, over 2500 proposals were received, requesting a budget of over 5.3 BEuro's. 550 proposals were selected for an available budget of around 920 MEuro's. The revised workprogramme for 2000 (WP2000) builds on experience gained from this Call, and takes into account the projects now being launched. A second 1999 call for proposals was launched on 1 October 1999, and the results of this will be taken into account in future revisions of the workprogramme.

2 PROGRAMME OBJECTIVES, IMPLEMENTATION APPROACH AND STRUCTURE

2.1 THE CONTEXT,

In the 12 months since the 1999 IST workprogramme was published, there has been a sustained growth in the development and use of Information Society technologies. The strong response to the first call in 1999 has shown that the programme is well positioned not only to accelerate progress in technology and applications but also to foster user-supplier interactions that are essential for building a "user-friendly" Information Society.

The convergence of Information Society technologies and markets is leading to new products and services that are increasingly transforming our lives. Examples may be seen in the emergence of appliances for accessing both interactive and broadcasting services and in the development of intelligent home and office environments that provide users with easier and any-where access to services. The impact of IST on every-day's activity is raising people's expectations for a better quality of life. As technology is becoming part of our normal surroundings, new tools for content creation and diffusion are providing individuals with powerful means to express ideas and develop their creativity for professional use or for leisure.

The rapid deployment of e-commerce and the expansion of mobile and global access to services are driving enterprises to continuously modify their business models. They can build on advances in technology such as component-based development and platform independence, to better master and integrate their value chains. While this provides greater flexibility and allows them to react instantly to changing market needs, it also induces considerable shifts in working modes and structures.

Underlying these advances is the development of a multipurpose computing, broadcasting and communications infrastructure. In the last two years, Internet and mobile systems have played the major role in driving the development in the field. The move towards closer integration between internet-based, and fixed and mobile technologies as well as progress in middle-ware and multi-tier architectures are paving the way for the concrete realisation of a global distributed and shared infrastructure. RTD effort is leading to improved authentication techniques and more dependable systems. Ensuring more confidence in the technology and the related infrastructure is an essential condition for a broad acceptance of the Information Society by citizens.

2.2 CHALLENGES AND OPPORTUNITIES

The above developments are setting the scene for a further expansion of the Information Society into an era where the technology will be all around us but almost invisible and where networked devices embedded in commonplace appliances enable people to have easier interactions with services.

Europe is well positioned to contribute significantly to the progress and shaping of this expansion of the Information Society. In its report on *"Orientations for WP2000 and beyond"* (WWW.cordis.lu/ist/istag.htm) the ISTAG suggests that the programme should further focus its activities on the realisation of a "vision" that is user-centred. The vision should aim at developing an Information Society for ALL and should build on Europe's demonstrated strengths in critical sectors such as mobile and fixed communications, consumer electronics, general electronic appliances, software and system integration, service systems innovation, digital broadcasting and, rich content and network infrastructures.

This opinion is confirmed by analysis of the results of the first 1999 call, including an independent study on Programme Integration and Management (PIM). These analyses converge on further focussing the programme on a vision that scales and expands with time, bearing in mind the risk associated with the rapid pace of development of IST.

2.3 THE PROGRAMME VISION

The programme, with the help of the ISTAG and the IST Programme Committee, has elaborated a set of focal directions for the work in 2000 and beyond. These are embedded in a vision that places the needs of the user, i.e. the citizen, at home, at work, in leisure or commuting, at the centre of future development of IST. The vision is based on the concept of "the surrounding is the interface" and aims at allowing citizens to "naturally" interact with a universe of combined services. While directly targeting the improvement of quality of life and work, the vision is expected to catalyse an expanse of business opportunities arising from the aggregation of added-value services and products. Services can be provided either by physical agents (e.g. home and consumer appliances, office equipment, cars etc.); or by virtual agents (e.g. information servers); or by interactions with other citizens (e.g. community and team building). The WP orientations can be summarised by the following vision statement:

"Start creating the ambient intelligence landscape for seamless delivery of services and applications in Europe relying also upon test-beds and open source software, develop user-friendliness, and develop and converge the networking infrastructure in Europe to world-class".

This vision promotes both ubiquity and user-friendliness of IST and focuses on the combination of the two concepts into "ambient intelligence" environments.

- "Ubiquity" of IST implies the development of an efficient networking and computing infrastructure together with advanced mobile and networked embedded systems that enable any-where/any-time access to services.

- User-friendliness implies the building and deployment of interaction modes that are "relaxing" and "enjoyable" for the citizen, and do not involve a steep learning curve. This includes trust and confidence in the technology.

Realisation of the vision presents many technical challenges, including issues of standardisation and interoperability. The vision calls for the integration and application of new technologies within competitive products and services. It requires a strong linkage between technology and policy developments and implementation.

2.4 PRIORITIES FOR WP2000

WP2000 is focussed on the challenges of realising the vision from its various perspectives including technology and applications as well as policy issues. The priorities for 2000 are:

- To foster the development and convergence of networking infrastructures including the integration of fixed, mobile, on-line and broadcasting technologies.

- To further natural and personalised interactions with IST applications and services. This includes multi-lingual/multi-modal interaction systems that are adaptable to users profile.

- To develop embedded technologies, their interconnections and their full integration into the service infrastructure, the workplace and business processes. To develop applications and services that take advantage of such systems.

- To reconsider service provisioning in the context of any-where/any-time access to services and ambient dialogue modes including public services and, mediation and commercial transaction systems.

- To foster the development and use of open source software.

- To improve the tools and methodologies that enable creativity in content production and presentation, in the context of converging access and delivery systems.

- To emphasise trust and confidence as a general requirement for all technologies, applications and services.

In addition, these priorities will be complemented with a stronger focus on social and economic policy objectives. This will increase the European added value of work conducted in the programme by strengthening synergy between strategic technology developments and priority policy areas such as employment, competitiveness (particularly of SMEs), equal opportunities and sustainability in the Information Society.

From a policy integration perspective, aims include:

- Supporting *existing* European policy objectives with technological developments, for example in areas such as: data security, data protection and privacy, rights management, consumer protection, preventing and combating crime, fraud and abuses, including control of illegal and harmful content.

- Establishing sufficient research momentum to contribute to *future* European policy development e.g. in telecommunications, enterprise, social and economic affairs.

- Reinforcing the links to standardisation and industrial consensus development to ensure coherence in EU-wide technology deployment and in creation of new open framework for fair competition AND fast innovation.

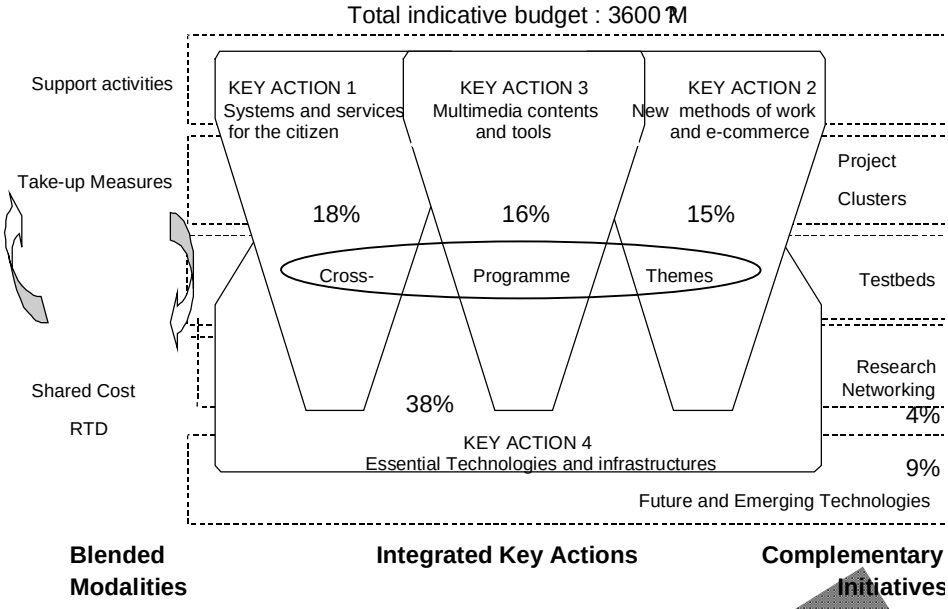
- Anticipating market needs and nurture emerging technologies where public funding can make a substantial impact by aggregating fragmented research and building critical mass ahead of market maturity.

- Strengthening competitiveness of European industry in areas where Europe has a demonstrated leadership and/or in areas of strategic importance.

The IST Programme informs and supports emerging policy priorities, notably in employment and competitiveness; in fostering the convergence of information processing, communications and media, and in ensuring 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*".

2.5 A SINGLE INTEGRATED ARCHITECTURE

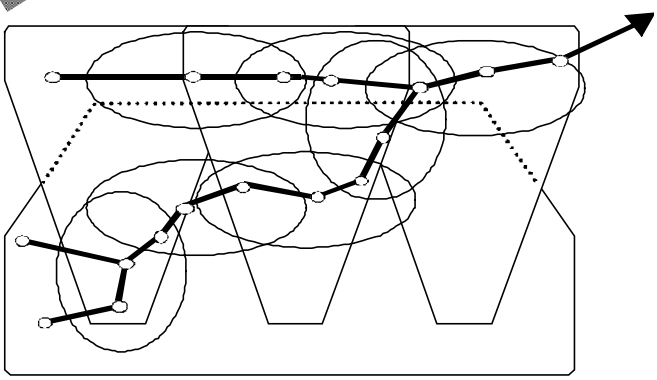
The IST Programme is structured as four inter-related Key Actions (KA's) all geared towards the achievement of the programme vision. Thus, the programme consists of a set of complementary activities that are derived "*by grouping together the technologies, systems, applications and services and the research and development and take-up actions with the greatest affinity or interdependence*". In this, "*each Key Action has, as appropriate, a balance of the complete range of RTD activities from basic research to demonstration and take-up actions".*



For the purposes of the workprogramme, the KA's are sub-divided into Action Lines. Each Action Line has clear monitorable objectives against which proposals for EU support will be evaluated.

Integration at the programme level is a key feature of the IST Programme. The programme vision provides a key framework for such an integration. The KA's and the Action Lines have been aligned with the "shared" priorities for WP2000. Specific measures are also included to further strengthen the programme integration:

- Firstly, *"cross-programme"* actions that focus on a limited number of specific themes relevant to the entire IST Programme. The aim is to ensure that the IST Programme supports in an effective way activities on specific priority challenges, 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.



Project Clustering, leading to synergy

- 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.

- Finally, to ensure critical mass and improve impact, this revised workprogramme includes several activities on **"test-beds"** within the action lines. Test-beds draw on existing implementation modalities (presented in Annex 1), and aim to develop technology and application platforms that would be made available to a large number of users for testing and benchmarking. The way test-beds are implemented depends on the relevant Action Lines. The description of these action lines provides the necessary explanation on the related test-beds

2.6 SELECTIVITY AND FOCUS

As explained above, this workprogramme reflects a focus in the selection of Action Lines that match the programme priorities and for which there is **clear added value in co-operation at EU level**. Calls for Proposals will cover specific Action Lines, in a manner that is consistent with available budgetary resources.

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.

Innovation in proposals can be in the form of novel products, services or applications. It can range from the development of novel techniques, systems and environments to the integration of new generation technologies in original ways. It can include development of novel business processes, new organisational practices or, more generally, novel forms of interaction between people and information, whether at work or in daily life.

The next **annual workprogramme revision** will again be developed in consultation with industry and academic experts, the ISTAG and the IST Programme Committee.

2.7 TYPES OF ACTIONS SUPPORTED

The IST programme is implemented through the indirect actions as provided for in Annexes II and IV to the fifth framework programme. These indirect actions comprise: shared-cost actions, which is the principal mechanism for implementing the specific programmes, as well as support for networks, concerted actions, accompanying measures including take-up actions and training activities. An efficient articulation between these actions is sought in the IST programme and mainly between RTD actions and take-up actions that constitute the main implementation instruments of the programme. Take-up activities in 2000 include Trials, Best Practice and Assessment actions and are often sustained by support nodes. For more details the reader should refer to Annex 1 to the WP or to the document entitled "G*uide for Proposers"* of the IST programme.

Annotations are included at the bottom of each Action Line description to indicate what type of actions can be used for the relevant Action Line and the possible links with the Work Programme for 1999 (WP99).

2.8 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, equal opportunities, 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 2000 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 address shared cost actions (RTD, demonstration and combined) as well as *other activities such as Take-up* (trials, best-practice, first-use, assessment, etc.) which are described in Annex1 of this workprogramme and in 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 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

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; transport and tourism. 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]."

Strategy, Architecture and Focus

The priority for KA1 is to enable European "users" (all categories of citizens, businesses, public authorities) to take advantage of the recent advances in Ubiquitous Computing, Ubiquitous Communication and Intelligent Interfaces for improving general interest services.

To fulfil this goal, Key Action 1 RTD projects will focus on innovative applications systems (e.g. new user-assistance systems for improving the access to government on-line services, the monitoring of health, environment or transport, new assistive systems for persons with special needs etc.).

These application systems must be innovative as defined in section 2.6. Specifically, in the case of KA1, RTD Projects must demonstrate that their application systems, by comparison with the state of the art, have the potential to lead to a significant qualitative step forward in the provision of new/improved, user-friendly and cost effective general interest services.

The RTD work will carry out innovative system integration of IST or non-IST systems involving either:

- **The research and development of new dedicated IST components and tools (e.g. new sensors or interfaces, etc.) or,**
- **The integration of new emerging IST systems and tools (e.g. UMTS, GNSS-2, new software agents capable of recognising individuals and learning their specific needs and abilities over time, etc.).**

This RTD work will not only improve the access of users to general interest services in the Information Society but it should also enable European industry to take advantage of the major opportunities offered to quick adopters and promoters of the ambient intelligence paradigm. This also will allow those public and private organisations charged

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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

with the provision of General Interest Services in the Health, People with Special Needs, Administration, Environment, Transport and Tourism fields to achieve a higher quality of service.

The research consortia willing to help in achieving this objective should propose long-term and risky R&D projects with an expected time to market of between 5 to 10 years or medium-term R&D projects with an expected time to market between 3 to 5 years.

The emphasis has to be put on innovative systems that can demonstrate clear progress compared to the state of the art in particular in respect of user-friendliness, cost effectiveness and quality of service.

Furthermore, the consortia should clearly identify the conditions required to maximise the exploitation of successful results. The shorter the time-to-market, the more precise the exploitation plan should be. Strong industrial participation in consortia is desirable to further this end as well as equally strong user involvement (including public sector users) particularly in the demonstration phase of the RTD work.

This RTD work will be carried out with a view to improving the international competitiveness of European industry and to support Member State and European Union policy objectives in the relevant fields.

Emphasis will also be put on the interoperability of the systems to be investigated and developed as well as on pre-standardisation issues both for the European and, where appropriate, global markets.

RTD Priorities in 2000

A total of 9 Action Lines for RTD and 2 for take-up and demonstration actions have been identified as priorities for Calls for Proposals in 2000.

Overview	**Action Lines for 2000**
I.1 Health	• Intelligent environment for health promotion and disease prevention • Intelligent environment for patients • Advanced interactive environment for doctors and nurses • Best practice and demonstration actions in regional healthcare networks
I.2 Persons with Special Needs, including the Elderly and Disabled	• Intelligent assistive systems and interfaces to compensate for functional impairments
I.3 Administrations	• Smart Government 2005-2010
I.4 Environment	• Intelligent environmental management, risk and emergency systems (focusing on generic systems). • Data Fusion and Smart Sensor Technologies for Humanitarian Demining
I.5 Transport and Tourism	• Intelligent transport infrastructures • Intelligent vehicle systems • Best practice and demonstration actions in electronic fee collection • Intelligent systems for improved tourism and travel services

Subject to a detailed analysis of the results from Calls launched in the year 2000, and depending on continuous consultations with the programme committee and advisory group, the following RTD priorities have been tentatively earmarked for beyond 2000:

- Personal health systems
- Secure high-speed regional health care networks
- Ambient intelligence for social integration and participation, especially employment
- Systems for single point access to improve on-line interactive services in urban areas
- Systems for improving the business processes of public administrations
- Smart sensors for environmental management
- Ambient, seamless access for intelligence based services for mobile users

Comprehensive integration of sub-systems to improve transport safety and performance

I.1. Health

For RTD action lines work will be expected to address industrial consensus on common specifications as well as establishing or enhancing standards where appropriate. Furthermore, consensus building between the relevant health authorities should be addressed.

I.1.1 Intelligent environment for Health Promotion and Disease Prevention

Objectives: To support all citizens, including those predisposed to diseases, with new generation systems – for example information and decision support systems – allowing them to respond to risk factors (such as high blood pressure or high cholesterol levels) through lifestyle changes or other appropriate measures.

Focus:

- interactive secure systems for the home or workplace to provide citizens with general health information and guidance coupled with health monitoring devices
- Portable secure systems for citizens to monitor recommended lifestyle changes.
- Interactive systems for producers and suppliers of lifestyle related products and services (in domains such as nutrition and physical exercise) to take into account in their products or services evidence based health guidelines.

These innovative health systems should enable the citizen to implement appropriate life-style changes or improvements to ensure better health and disease prevention. These systems should establish or complement information flows between the citizens, the medical and paramedical professions, and the lifestyle related industry.

Type of actions addressed: RTD
Links with WP99: Reinforcing the 1999 Action Line “Personal Health Systems”

I.1.2 Intelligent environment for patients

Objectives: To enable European patients who are not confined to hospital, to actively participate, in close collaboration with their health care provider, to their on-going care.

Focus:

- Home Care platforms for patients
- Portable care and alert systems for patients

This work will contribute to the emergence of the new concept of tele-medicine as “care at the point of need in co-operative environments” for ensuring continuity of patient care. This work should, in particular, take into account the new advances in sensor technologies, usability and intelligent agents, virtual reality and simulation, high bit-rate fixed or wireless communications technologies.

Particular emphasis should be given to the protection of privacy, to usability and reliability, and to respecting multilingual and multicultural approaches in the provision of tele-medicine services for European citizens.

Type of actions addressed: RTD,
Links with WP99: re-focused Action Line.

I.1.3 Advanced interactive environment for doctors and nurses

Objectives: To enable doctors and nurses to remotely access whether from their surgery, hospital, patient's home or accident site available best medical practices as well as the patients' medical files.

Focus:

The work will be based on the integration of intelligent interfaces and mobile multimedia workstations exploiting the potential offered by the upcoming deployment around 2002 of the new generation of mobile communications (e.g. UMTS). Such advanced systems should allow doctors and nurses user-friendly, reliable, interactive access to multimedia medical information (including dynamic images). Privacy and security issues will also be essential.

Type of actions addressed: RTD.
Links with WP99: Re-focussed Action spawned by the 1999 Action Line on Healthcare Professional Systems and new generation tele-medicine services.

I.1.4 Best Practice and Demonstration actions in Regional Healthcare Networks

Objectives: To promote the uptake of telematics healthcare networks across European regions and Member States.

Focus:

To promote the use of integrated scaleable and secure health information networks for improving the management of the healthcare systems by all relevant healthcare partners (e.g. hospitals, laboratories, pharmacies, primary care, and health authorities). Two domains will be covered:

- Best practice action (based on an assessment of available practices) and co-ordination across Europe of regional initiatives involving the three major partners (health care authorities, health telematics industries and relevant user associations) with a view to promoting the adoption of best practices and inter-operable solutions;

- Large scale demonstrations of integrated and secure health information networks supporting continuity of care for patients by facilitating the collaborative work of health professionals for improved patient treatment, including home monitoring. These large scale demonstrations will serve as integrated test-beds for advanced, secure networking technology and on-line co-operative work.

Type of actions addressed: Best practice and Demonstration actions.
Links with WP99: New Action Line.

I.2 Persons with special needs, including the disabled and the elderly

I.2.1 Intelligent assistive systems and interfaces to Compensate for Functional Impairments.

Objectives: To enable citizens with specific impairments, especially those related to ageing, to benefit as fully as possible from intelligent assistive systems

Focus:

The work will cover innovative assistive systems for supporting mobility, orientation, transportation, manipulation, vision and hearing and secure home and living environments. This work will capitalise on recent advances in innovative intelligent user-interfaces and personal devices, both capable of self-adaptation and/or easy customisation (the application domains will also cover interfaces for improved ease of access to common IST and non-IST devices). Longer-term research, based on an improved and detailed understanding of the nature of cognitive and sensory processes, is also required into how advanced interfaces can increasingly compensate for the effects of impaired functionality on human performance. Significant industrial participation is required to ensure commercial exploitation. Proposals will be expected to address industrial consensus on common specifications as well as establishing or enhancing standards where appropriate. Furthermore, consensus building between the relevant authorities should be addressed.

Type of action addressed: RTD.
Links with WP99: New Action Line

I.3 Administrations

I.3.1 Smart Government 2005-2010

Objectives: To provide users of government services (e.g. citizens, companies of all sizes, non-Government Organisations etc.) with more user-friendly services based on multi-functional and multi-lingual systems facilitating intelligent dialogue and interaction.

Focus:

- advanced user assistance systems offering from home terminals or from public kiosks improved citizen access to government on-line services based for instance on multiform dialogue modes with citizens coupled with new authentication techniques, on IST convergence (voice/data and fixed/mobile) and on the integration of the Next Generation Internet with 3rd generation mobile networks;

- User assistance systems for non-nationals based on intelligent multi-lingual and/or multi-cultural personal assistants and on intelligent agents enabling citizens to seamlessly deal with national or local administration.

Work will be expected to address industrial consensus on common specifications as well as establishing or enhancing standards where appropriate. Furthermore, consensus building between the relevant authorities should be addressed.

Type of Activities addressed: RTD
Links with WP99: Extension of 1999 Action Line with focus on longer-term research (objective 2005-2010) and on national and local levels of administration only (i.e. excluding European or regional level).

I.4 Environment

I.4.1 Intelligent environmental management, risk and emergency systems (focusing on generic systems)

Objectives: To provide citizens with improved environmental quality and improved protection from environmental risk. Increased reliable information provision to the citizen is a key factor.

Focus:

- Environmental management systems (including indoor environment) focused on generic scalable information systems (also able to cover water, air or noise pollution management).

- Emergency management systems focused on generic scalable emergency systems capable of covering natural hazards and industrial risks.

These new systems are expected to involve high performance and distributed computing, advanced model simulation and forecasting, UMTS and satellite networks, data mining, weather and earth observation data, Geographical Information Systems (GIS), sensor networks, advanced visualisation techniques and decision-support systems. Work will include adaptive models and tools for full life-cycle emergency and risk management. RTD is expected to establish and enhance industrial consensus towards standards in the area of interoperability, environmental data exchange and procedures relevant to public bodies, such as environmental authorities and civil protection agencies. Furthermore, consensus building between the relevant environment authorities should be addressed.

Type of actions addressed: RTD.
Links with WP99: Extension of 1999 Action Line focussed on generic systems for environment and emergency management.

I.4.2 Data Fusion and Smart Sensor Technologies for Humanitarian Demining

Objectives: The work aims at new and enhancement of existing IST solutions, to improve significantly and at affordable costs the speed, safety and efficiency of humanitarian de-mining (e.g. surveying, detection, clearance and post clearance). The most promising emerging sensor technologies are to be investigated, addressing the needs of both, humanitarian demining and airport/building security.

Focus:

A particular focus is on integrated multi-sensor solutions, strengthened by data fusion, machine learning techniques and adequate communications technologies. The work is targeted to serve the specific requirements for the mine afflicted countries addressed by the Stability Pact Region.

Validation of the prototype systems, considered an essential part of the development, must be performed on the basis of a common methodological framework and defined procedures, on certified test sites. Such framework and procedures will be developed through complementary activities with the Joint Research Centre.

Type of actions addressed: RTD.
Annotations: This Action Line is co-funded by the entire programme. Co-ordination with related activities of the Joint Research Centre

I.5 Transport and Tourism

For RTD action lines work will be expected to address industrial consensus on common specifications as well as establishing or enhancing standards where appropriate. Furthermore, consensus building between the relevant transport and tourism authorities should be addressed.

I.5.1 Intelligent transport infrastructures

Objectives: To improve mobility management in support of sustainable economic growth in Europe and for improving the quality of life of citizens.

Focus:

- advanced IST surveillance and control systems focused on safety in road tunnels and railways
- intelligent integrated urban and interurban traffic management systems, including co-ordinated motorway control, management of large scale events and crises, advanced modelling, simulation and the management of over-saturated networks and network disruptions
- advanced IST systems for supporting logistics and co-operative resources management for the whole transport chain

This work will support integrated sustainable passenger and freight transport locally and across Europe.

Type of actions addressed: RTD.
Links with WP99: Continuation of 1999 Action Lines.

I.5.2 Intelligent Vehicle Systems

Objectives: To improve safety, security, comfort and efficiency in all modes of transport. This is achievable through the emergence of ambient intelligence within the vehicle for the direct benefit of drivers/pilots, operators and passengers.

Focus:

- Advanced driver/pilot assistance systems for vision and alertness enhancement, safety of manoeuvring, automated driving, compliance with regulations, providing and reacting to emergency traffic and weather information.
- Advanced systems for providing teleservices in areas such as maintenance, dependability, remote diagnostics and vehicle performance including environmental aspects, info-mobility and infotainment.

For the above two application domains (safety and operations), work will address in-vehicle platforms, interfaces to the user and to services that will include vehicle-to-vehicle and vehicle-to-infrastructure communication.

Additionally, system test and evaluation methodologies will be considered in order to ensure dependable and optimal use of components and the development of industrial consensus on common specifications and in-vehicle platforms.

Type of actions addressed: RTD.
Links with WP99: Continuation of 1999 Action Lines.

I.5.3 Best Practice and Demonstration actions in electronic fee collection

Objectives: To promote the uptake of standardised solutions to electronic fee collection in the domain of transport in the regions and Member States.

Focus:

To demonstrate and promote awareness of electronic fee collection supporting demand management, fare payment, access control and interoperable schemes (based on DSRC standards and/or mobile communications and satellite location technologies) supporting the integration of electronic payment across different transport applications. Two domains will be covered:

- Best practice awareness actions aimed at facilitating the co-ordination of regional initiatives across Europe with a view to promoting best practice and interoperable solutions

- Large-scale demonstrations supporting local regional and national authorities and stimulating the take-up of electronic fee collection solutions through associated dissemination. These large scale demonstrations should form a test bed for secure, on-line access technologies ensuring privacy.

Type of actions addressed: Best practice and demonstration actions.
Links with WP99: New Action Line.

I.5.4 Intelligent Systems for Improved Tourism and Travel Services

Objectives: To enable tourists, citizens on the move and tourism service providers in Europe to take advantage of the ambient intelligence revolution to promote the research and development of innovative systems leading to improved tourism and travel services.

Focus:

- Innovative assistant systems for tourists and citizens on the move integrating both the new generation of mobile multimedia information and positioning services as well as advances in dynamically customisable interfaces for providing ubiquitous, proactive interaction with relevant information and services.

- Tourism value chain systems enabling tourism and travel professionals to plan, integrate, improve, disseminate and promote their services.

The new systems should integrate advances in dynamically customisable interfaces (e.g. considering user profile and interaction, actual timing and position, device in use) and support innovative business models together with the adaptation, re-use and integration of existing processes, services and dispersed information.

They should adopt open distributed architectures, support interoperability, scalability, quality assurance and be based on widely accepted protocols.

Validation and evaluation methodologies should be addressed in providing new solutions and facilitating dissemination of best practices and exploitation of results.

Type of actions addressed: RTD.
Links with WP99: Re-focused Action Line.

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

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"

Note on Terminology:

For the sake of brevity, text for this Key Action relies on the following two conventions:

- **eWork** refers to IST-enabled work practices in the broadest sense of the term both at the level of the individual and the organisation
- **eCommerce** refers to IST-enabled business-to-consumer as well as business-to-business practices with both of these to be interpreted in the broad sense and with "business" intended to include non-profit organisations.

Strategy, Architecture and Focus

Context:

1999 has been marked by a rapid acceleration in the development and adoption of new business solutions and practices for eWork and eCommerce. In its 1999 report, the European Information Technology Observatory found that 47% of a sample of 570 European businesses surveyed expected to be using Internet-based eCommerce applications by the end of the year in contrast to a mere 6% three years earlier. The Millennium Benchmark (Ecatt) shows that 60% of large companies now offer opportunities for telework. New trends also include the emergence of wireless eCommerce, recently projected by Romtec to reach over 42 million subscribers world-wide by 2005.

As enterprises, workers and consumers world-wide are awakening to the opportunities of the digital economy, there is a growing realisation that the transition has barely started and that a vast number of challenges remain to be addressed before potential benefits materialise to the fullest. Challenges range from building a global infrastructure that promotes trust and confidence to the research, development and broad take-up of novel

technologies, applications, business processes and organisational practices aimed at empowering individuals, whether as entrepreneurs, workers or consumers, and enterprises, small and large, as participants in the global economy. This breadth of issues was reflected in both the number and variety of proposals received by Key Action II in 1999. In this context, to remain effective and avoid spreading itself thin across too broad a range of topics, Key Action II has selectively repositioned itself for 2000. The end result is an initiative that is organised around *a smaller number of more focused priority areas* (Action Lines) and places a greater emphasis on *innovation* over more incremental development. Priority areas will continue to be updated from one year to the next.

Focus and Approach

Work in Key Action II builds on the programme vision of a global networked economy where consumers, workers and enterprises can seamlessly and dynamically come together and interact through a ubiquitous infrastructure that promotes both trust and confidence. Key Action II aims at paving the way for Europe to capitalise on this vision and in the process enhance the competitiveness of its enterprises, empower its citizens, as workers, consumers and entrepreneurs, and provide for a more sustainable economy. Key requirements in this context include the research and development of architectures and solutions that emphasise usability, interoperability, scalability, customisability, multilinguality and dependability as well as the adoption of user-centred design approaches.

In practical terms, this broad mission translates into a three-pronged approach:

- **Promoting Innovative and Visionary RTD:** Support the research, development and demonstration of novel, visionary solutions and practices for eWork and eCommerce with the potential of significantly contributing to the programme's vision. This is the core of Key Action II. Innovation can be in the form of novel IST technologies or in the form of novel IST-enabled applications, business processes or organisational practices. Emphasis is on medium- to long-term/high-risk efforts with high potential payoffs. Funding will not be provided for incremental efforts that could easily be supported with private RTD investments.

- **Promoting Early Adoption and Exploitation:** Facilitate the rapid exploitation of research results by providing funds for "trials" and "testbeds". The objective is to strengthen Europe's technology base as it transitions into the digital economy. This is done by supporting efforts to validate and customise *novel* solutions in practical contexts so that they can quickly be moved to the marketplace

- **Promoting Broad Adoption:** Promote early and broad adoption of novel solutions across Europe. This is implemented via "best practice" activities aimed at showcasing the benefits of new solutions and facilitating their deployment in SMEs. These objectives will be pursued in collaboration with other initiatives at the regional, national and Community levels.

Another important element of Key Action II stems from the broad interplay of technical, economic, social, legal and policy issues it touches on. This is addressed through integrated socio-economic and technological research aimed at monitoring and assessing the development and impact of novel IST solutions and practices for work and business with a particular focus on those developed by the Key Action itself. Simultaneously, this research is expected to also help shape up future RTD priorities and policy activities.

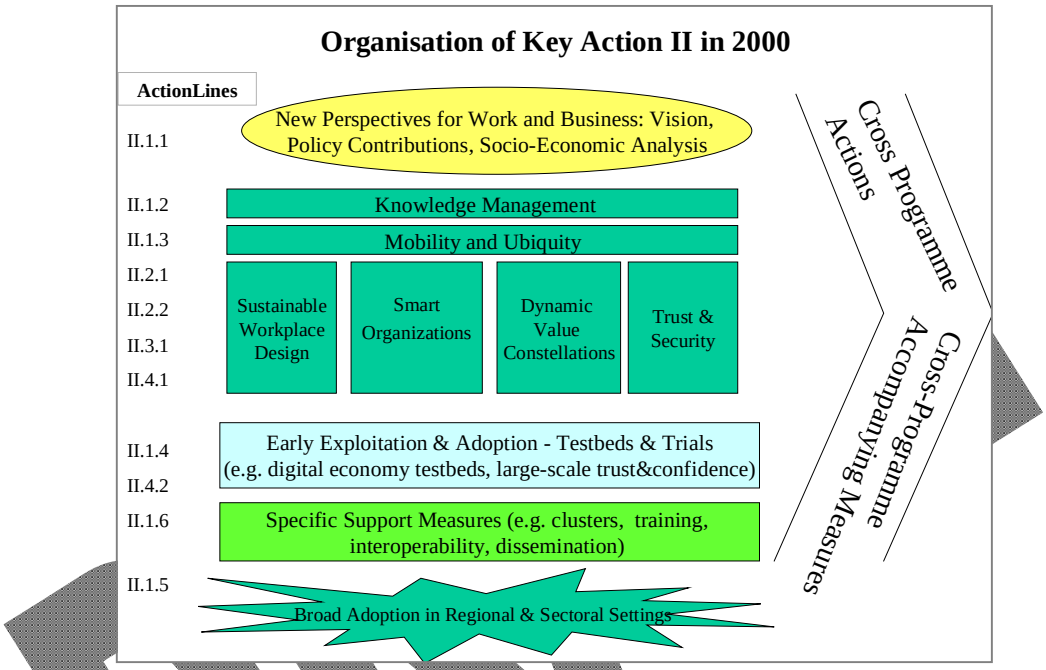
Work in Key Action II will continue to be conducted in close cooperation with other relevant Commission activities and Programmes. This includes close cooperation with the "Competitive and Sustainable Growth Programme", the "Energy, Environment and

Sustainable Development Programme" and the Programme on "Increasing Human Research Potential and the Socio-Economic Knowledge-Base". Work in the area of interoperability and standardisation will continue to be coordinated with relevant activities in the Enterprise Directorate General (DG). This close relationship also extends to issues relating to SMEs and entrepreneurship.

RTD Priorities in 2000

Overview

A total of 11 Action Lines have been identified as priorities for Calls for Proposals in 2000. They form a coherent set of RTD, take-up, support and socio-economic analysis activities, as depicted in the figure below.



Socio-economic analysis will help to orient and focus work conducted in the Key Action as well as to monitor the impacts of IST developments. Its results will contribute to related policy activities as well as to the identification, refinement and validation of visions driving work in this Key Action. RTD work is organised around well-focused action lines in four key areas: **Sustainable Workplace Design, Smart Organisations, Dynamic Value Constellations and Trust & Security**. This is complemented by RTD on two themes that cut across the entire Key Action: **Knowledge Management** and **Mobility & Ubiquity**. Take-up of results will be supported through Actions Lines to promote Early Exploitation of novel solutions and practices as well as their broader adoption in regional and sectoral settings. These activities are further complemented by Specific Support Measures, including measures to help create synergy across activities within the Key Action, promote interoperability and standardisation, strengthen Europe's skill base for the digital economy, promote international co-operation and facilitate broad dissemination of results.

Work in one Action Line can feed into or build upon work in another, and larger projects can address work in several Action Lines. In addition, all RTD Action Lines are open to and encourage the submission of visionary, long-term research proposals.

This is further detailed in the table below.

Overview	Action Lines for 2000
II.1 Work Spanning Key Action II	• New Perspectives for Work and Business • Knowledge Management for eCommerce and eWork • Mobile and Ubiquitous eCommerce and eWork • Early Exploitation and Adoption of eCommerce and eWork Solutions and Practices • Promoting Broad Adoption of eCommerce and eWork in Regional and Sectoral Settings • Specific Support Measures
II.2 Flexible, Mobile and Remote Working Methods and Tools	• Sustainable Workplace Design • "Smart" Organisations
II.3 Management Systems for Suppliers and Consumers	• Dynamic Value Constellations
II.4 Information and Network Security and other Confidence Building Technologies	• Technology Building Blocks for Trust and Security • Large scale Trust and Confidence (Trials and Testbeds)

Priorities in 2001 will generally aim at reinforcing work initiated in 1999 and 2000, taking into account new technological, social, market and policy developments. The objective is to continue focusing on strategic and visionary RTD priorities that are at the very least one step ahead of current market developments (i.e. medium- to long-term/high-risk RTD) and complement these activities with measures to promote early exploitation and broad adoption of novel solutions and practices.

II.1 Work Spanning Key Action II

A number of critical challenges and issues associated with the research, validation, socio-economic analysis and adoption of novel solutions and practices for eWork and eBusiness are best approached when considered across the entire Key Action. This includes the research and validation of novel knowledge management functionalities and novel mobile and/or ubiquitous solutions to empower people and organisations. It also includes activities aimed at promoting early validation and exploitation of novel solutions as well as their early and broad deployment. Key Action II seeks to add further value to its activities through a number of support measures such as clusters of projects, training, international co-operation, dissemination actions and interoperability efforts aimed at creating synergy and maximising impact.

II.1.1 New Perspectives for Work and Business

Objectives: To develop a better understanding of the social, economic, industrial and environmental impact of novel technologies for work and business and, in the process, provide guidance to other activities in this Key Action as well as to related legal and policy activities. This work is expected to be carried out through a combination of accompanying measures and demonstrations.

Focus:

- Improve understanding of the organisational, industrial, economic, legal, policy and social challenges faced by European enterprises as they strive to leverage novel IST solutions & practices for work & business and compete in the global digital economy.

- Development of new econometric models to assess and predict the impact of new eCommerce solutions and practices on industrial competitiveness

- Improve understanding of the linkages between IST-enabled work and sustainable development in a global Information Society. Particular attention should be given to social relationships in the workplace, quality of worklife (including health and safety), changes in transport, energy and material consumption, as well as new opportunities for more efficient use of the built environment and better city planning.

- Definition of performance indicators for companies with large intangible asset bases and development of management instruments to evaluate possible investments in the intangible assets of an enterprise.

Type of actions addressed: Accompanying measures and demonstrations.
Links with WP99: Updated version of ALII.1.1.

II.1.2 Knowledge Management for eCommerce and eWork

Objectives: To empower individuals and organisations through novel knowledge management solutions aimed at enhancing creativity, innovation, competencies, and responsiveness. Projects are expected to explore and validate novel “intelligent” knowledge management technologies, applications, methodologies and practices aimed at leveraging numerous and varied sources of often incomplete and/or ill-structured individual and corporate knowledge (e.g. knowledge about products, services, customers, suppliers, business partners as well as in-house and external expertise in all shapes and forms). This includes multidisciplinary solutions for capturing, organising,

mining and, more generally, exploiting, exchanging and trading knowledge in support of both intra- and inter-organisational activities.

Focus:

To develop and validate highly adaptive, context-sensitive and anticipatory knowledge management functionalities capable of dynamically providing individuals (whether as workers or consumers) and organisations with timely knowledge and suggestions relevant to the tasks they are currently engaged in. The challenge is to develop practical, easy-to-use solutions that cut across multiple intra- and inter-organisational functionalities and activities, making it possible to dynamically extract and recombine knowledge across traditional functional and organisational boundaries.

Proposals submitted under this Action Line are expected to develop solutions that address issues falling under one or more of the following Action Lines: II.1.3, II.2.1, II.2.2 and II.3.1.

Type of Actions addressed: RTD.
Links with WP99: Updated version of ALII.1.2.

II.1.3 Mobile and Ubiquitous eCommerce and eWork

Objectives: To explore and validate novel mobile and/or ubiquitous models, solutions and practices for eCommerce, eWork and "smart" organisations.

Focus:

- Development and validation of smart, context-sensitive (e.g. time, location, or task-sensitive) solutions capable of supporting highly personalised mobile/ubiquitous eCommerce and eWork scenarios as well as "smart" organisational practices

- Development and validation of environments for open, seamless and secure integration of heterogeneous mobile/ubiquitous eWork and eCommerce solutions, including wearable ones.

- Development of easy-to-use multi-modal interfaces for mobile/ubiquitous eWork and eCommerce.

Proposals submitted under this Action Line will typically be expected to develop mobility and ubiquity functionalities that address issues falling under one or more of the following Action Lines: II.2.1, II.2.2, II.3.1 and II.4.1.

Type of Actions addressed: RTD.
Links with WP99: This AL can be viewed as a recombination of themes previously covered under WP99 ALII.2.1, ALII.2.2 and ALII.3.2.

II.1.4 Early Exploitation and Adoption of eCommerce and eWork Solutions and Practices

Objectives: The objective is to promote early exploitation and adoption of novel solutions and practices for eCommerce, eWork and "Smart" Organisations. This is done by supporting activities aimed at customising, integrating, validating and benchmarking novel technologies, architectures, business processes and organisational practices for eCommerce , eWork and "Smart" Organisations. Emphasis is on solutions and practices that are directly supportive of the objectives of one or more of the following Action Lines: II.1.2, II.1.3, II.2.1, II.2.2, II.3.1 and II.4.1.

Focus:

- *Trials* are intended to help customise and validate promising, yet untested technologies, applications and organisational practices in realistic and/or operational contexts and, in so doing, help prepare these solutions for rapid transfer to the marketplace. Trials are intended as replicable one-off exercises.

- *Testbeds* are intended to serve as *shared reusable* validation, integration and/or benchmarking vehicles for multiple comparable and/or complementary solutions. Emphasis is generally on interoperability, scalability, dependability and usability. Testbeds can also be used to organise competitions.

Type of Actions addressed: Trials and Demonstrations.
Links with WP99: This AL replaces the formal take-up measures on trials in KAII and introduces test-beds in KAII.

II.1.5 Promoting Broad Adoption of eCommerce & eWork in Regional and Sectoral Settings

Objectives: Promote early and broad adoption of novel solutions and practices for eCommerce, eWork and "Smart" organisations with a special emphasis on regional and sectoral customisation. This includes activities aimed at showcasing the benefits of new solutions and facilitating their deployment in SMEs.

Focus:

Focus is on cost-effective, high impact activities that can serve as catalysts for much broader dissemination and early adoption of novel solutions and practices. Priorities in 2000 are:

- Clusters aimed at coordinating "Trials" and "Best Practice" activities with common needs already launched under the 5th Framework Programme, creating synergy among them and enhancing their overall visibility and impact through coordinated awareness and dissemination activities.

- Advanced business experiments aimed at connecting regional or sectoral communities to the global digital economy. This includes the creation of local and sectoral digital communities as well as their interconnection..

- Early adoption activities aimed at promoting integration of candidate Enlargement countries into the global digital economy.

Type of Actions addressed: Best Practice, Demonstrations, concerted actions, Non take-up accompanying measures
Links with WP99: Subsumes/replaces former best practice measures.

II.1.6 Specific Support Measures

Objectives: To add value to activities launched within this Key Action, help maximise their impact and create synergistic links both within the Key Action and with related activities at the regional, national, Community or international level.

Focus:

- Measures aimed at creating synergy among RTD projects and/or take-up actions within this Key Action as well as with other related activities whether at the regional, national, Community, or international level.

- Strengthening Europe's skill base for the digital economy: measures aimed at identifying and disseminating new skill requirements associated with the emerging digital economy as they relate to work in this Key Action.

- Measures aimed at maximising the impact and visibility of work within this Key Action through broad, yet cost-effective dissemination activities

- Measures aimed at building industrial consensus, promoting interoperability and standardisation in the areas of eWork, eCommerce, Enterprise Systems and Trust&Confidence, including relevant middleware. Emphasis is on cost-effective efforts aimed at bringing together key players and building early critical mass in strategic areas, in cooperation with relevant international initiatives and bodies.

- Measures aimed at promoting international cooperation in the areas of eWork, eCommerce, "Smart" Organisations, and Trust&Confidence with a particular emphasis on addressing cooperation with newly associated countries.

Type of Actions addressed: Concerted actions, Thematic networks and working groups, Accompanying measures (excluding take-up)
Links with WP99: New action line

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

Novel technologies offer the promise of freeing workers and enterprises from traditional spatial, temporal and organisational constraints that too often impede creativity, productivity, agility, learning or cooperation. They also have the potential of significantly enhancing competitiveness, workplace sustainability and quality of work-life.

II.2.1 Sustainable Workplace Design

Objectives: Multidisciplinary development and validation of sustainable workplace designs incorporating emerging technologies into new workplace and workteam concepts. These should enhance creativity and productivity; ensure safe working conditions; improve the quality of working life and reduce the overall resource-use burden on the environment. The activities are expected to bring together ICT technology developers with office equipment designers, architects and urban planning organisations and should reflect user-centred design princples.

Focus:

- Development of novel IST-enabled workplace designs, as well as solutions and organisational practices aimed at supporting mobility, at sharing building facilities and office space, at increasing overall agility and at promoting sustainable use of resources in the workplace

- Development of novel wearable solutions and software upgradable designs aimed at significantly extending the life of workplace equipment and infrastructure and/or at substantially enhancing sustainability

Type of Actions addressed: RTD
Links with WP99: This is a new version of WP99 ALII.2.1. on Workplace Design that has been refocused in complementarity to work in the "Competitive and Sustainable Growth" Programme and in the "Energy, Environment and Sustainable Development" Programme.

II.2.2 "Smart" Organisations

Objectives: To explore and validate novel technologies, applications, architectures and practices aimed at supporting the transformation of profit and non-profit entities into "smart" organisations: knowledge driven, internetworked, dynamically adaptive to new

organisational forms and practices, learning as well as agile in their ability to create and exploit the opportunities offered by the digital economy.

Focus: To develop novel open, interoperable solutions and platforms for flexible working in and between organisations. This includes solutions to support cooperation, flexible workflow management and coordinated planning across extended/virtual enterprises and associated distributed business processes. Emphasis is on easy-to-use, customisable, affordable, interoperable, extensible, evolutionary and legacy-inclusive solutions and platforms. Technical work should focus on embedding knowledge into business processes, supporting process distribution and (re)optimisation as well as mobile practices such as those made possible by wireless communication.

Type of Actions addressed: RTD
Links with WP99: This is an updated version of WP99 ALII.2.3 on Dynamic Networked Organisations.

II.3 Management Systems for Suppliers and Consumers

New technologies offer the promise of completely redefining relations between suppliers and consumers across the value chain, leading to a global digital economy where consumers and businesses can seamlessly and dynamically come together and where value constellations are assembled on the fly in response to constantly changing, highly customised market demands.

II.3.1 Dynamic Value Constellations

Objectives: To explore and validate novel value creation models, technologies and solutions in the context of dynamic virtual enterprises and other market-driven value constellations, where partners dynamically come together in response to or in anticipation of new market opportunities

Focus:

- Novel technologies, systems and business processes aimed at supporting the dynamic creation of highly-customised products and services in response to changing market demands
- Novel market mediation models and solutions to support the dynamic identification and selection of value constellation partners, including contractual and value sharing arrangements
- Novel technologies, systems and business processes aimed at supporting the full life-cycle management of products and services across dynamic value constellations, including conflict mediation and resolution systems as well as solutions to deal with their dissolution, product dismantling and resource recovery.

Type of Actions addressed: RTD
Links with WP99: This is an AL that recombines elements of WP99 ALII.3.1, ALII.3.2 and ALII.2.3 3 with a new focus on product and service creation across dynamic value constellations.

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

A critical challenge in developing IST-based solutions and practices is to ensure trust and confidence at the level of both individual solutions and the infrastructures supporting these solutions.

II.4.1 Technology Building Blocks for Trust and Security

Objectives: To develop and validate novel, scalable and interoperable technologies, mechanisms and architectures for trust and security in distributed organisations, services and underlying infrastructures.

Focus:

- Development and validation of scalable and usable authentication infrastructures, including infrastructures with embedded electronic signature and/or bio-metric solutions. This also includes tools for lifecycle management of keys as well as interoperability of public and non-public key schemes.

- Development and validation of global security architectures aimed at providing an optimised balance between hardware and software while leveraging tamper-proof equipment, such as smart cards, and auditable protocols with strong non-repudiation properties

- Development and validation of protocols and transactional models in support of emerging business organisations, processes and practices. Special emphasis is placed on electronic payments, irrespective of value, and on trustful rights management.

- Definition of novel standards and meta-languages to characterise, measure, and assess quality of service for trust and security management

- Building technologies to empower users to consciously and effectively manage and negotiate their personal “rights and assets” (i.e. privacy, confidentiality, copyright, etc.).

- Develop and validate novel technologies and systems to prevent and fight abuses perpetrated via IST infrastructures and platforms with a particular emphasis on fraudulent and criminal activities.

Type of Actions addressed: RTD
Links with WP99: Recombines and builds on elements of WP99 ALs II.4.1, II.4.2 and II.4.3 reflecting the importance of Trust and Confidence issues.

II.4.2 Large-Scale Trust and Confidence

Objectives: To scale-up, integrate, validate and demonstrate trust and confidence technologies and architectures in the context of advanced large-scale scenarios for business and everyday life. This work will largely be carried out through trials, integrated test-beds and combined RTD and demonstrations

Focus:

- Generic solutions that emphasise large-scale interoperability and are capable of supporting a broad array of transactions (e.g. e-purses and e-money), applications and processes.

- Development of solutions that reconcile new eCommerce models and processes with security requirements, paying particular attention to the needs of SMEs and consumers

- Validation should generally include assessing legal implications of proposed solutions, especially in the context of solutions aimed at empowering users to consciously and effectively manage their personal "rights and assets".

Type of Actions addressed: RTD, Trials and Best practise
Links with WP99: Combines elements of WP99 ALs II.4.1, II.4.2 and II.4.3 reflecting the importance of Trust and Confidence issues.

3.3 KEY ACTION III - MULTIMEDIA CONTENT AND TOOLS

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."

Strategy, Architecture and Focus

The rapid convergence of "mobile communication, digital broadcasting, rich content and network infrastructures" opens up new challenges and opportunities for European citizens, businesses and public organisations. A critical aspect of this convergence is user-centred interactivity with rich multimedia content that enables natural and effective use of the emerging universal info-structure.

In WP2000, Key Action III is concentrating on the following inter-linked themes:

- Promoting creativity in the content industries through new forms of content combining highly visual and interactive media which require innovative ways of design, delivery, access and navigation, in a multilingual and multicultural context.

- Improving natural and user-friendly interaction between humans and the universe of digital services, especially in non-expert, home and mobile environments.

- Empowering the citizen through better access to culture and science, and the development of an Information Society base of knowledge and skills through institutional, corporate and individual learning.

Innovative middleware, including new methods, tools and technologies, has an important role in enhancing content-rich information, communication systems and services, by embedding in these higher levels of interactivity, multilinguality, multimodality and naturalness. It enables, as well, the exploitation of the semantics of content in pursuit of full knowledge acquisition and exchange. The development and integration of cross-media standards and metadata should accelerate the provision of digital content components and systems. Processes, practices and flows associated with the content value chain should become more effective through extensive user involvement in take-up trials.

Impetus is given to (multimedia) business development, that will provide opportunities for new, often small firms, especially those producing creative content. Innovative applications and test-beds in education, training and cultural heritage are all major drivers for the development and validation of new services and systems. European citizens, both as consumers and professionals, can benefit from easier access to

knowledge, and more intuitive, natural ways of interacting with systems, services and other people or communities. These developments will help reduce exclusion from the Information Society. By forging alliances between providers of digital content, online and mobile services, interactive and VR technology, and a wide array of (public and private) users, Key Action III aims at clearly fostering IST integration and convergence.

Co-operation in this area is planned with the content industries (including INFO2000, MLIS, Internet Action Plan, and relevant follow-up programmes), audio-visual policy (including the MEDIA programmes), cultural initiatives (including CULTURE 2000), and education and training (including SOCRATES and LEONARDO).

The implementation strategy for this Key Action combines applications-oriented research and generic research and development in a number of areas. RTD action lines are reinforced by take-up actions focussing on user-centred trials and best practice, specific support measures addressing working groups on standards and best practice, awareness and dissemination.

RTD Priorities in 2000

Work in Key Action III will focus on specific topics in the multimedia content value chain, where industry's and society's' needs have become increasingly visible. These are: Authoring and personalising creative content for the Web marketplace; access to cultural and scientific collections, including virtual repositories; new systems for schools and lifelong learning that improve knowledge and skills acquisition; naturalness and effectiveness of interactive systems, multilingual communication and knowledge management; interactive multimedia content for new domestic and mobile networks, and information visualisation tools.

A total of 17 Action Lines have been identified for the year 2000, including 11 RTD Action Lines, 5 Action Lines for Take-Up Measures and 1 Action Line for a-specific Support Measure.

Overview	**2000 Action Lines**
III.1 Interactive publishing, digital content and cultural heritage	• Authoring interactive Web content • Personalising content • Trials and test-beds for digital content authoring and personalising systems (Take-up) • Access to digital collections of cultural and scientific content • Trials on new access modes to cultural and scientific content (Take-up) • Virtual representations of cultural objects
III.2 Education and training	• The school of tomorrow • The learning citizen • Trials and best practice addressing advanced solutions for on-the-job training in SMEs (Take-up)
III.3 Human Language Technologies	• Natural interactivity • Cross-lingual information management and knowledge discovery • Multilingual communication services and appliances • Trials and best practice in multilingual e-service and e-commerce (Take-up)
III.4 Information Access, Filtering, Analysis and Handling	• Content-processing for domestic and mobile multimedia platforms • Information visualisation • Trials and best practice in information access, filtering, analysis and handling (Take-up)
III.5 Specific Support Measures	• Working Groups and Awareness and Dissemination

Subject to a detailed analysis of the results from Calls launched in the year 2000, and depending on continuous consultations with the programme committee and advisory group, the following RTD priorities have been tentatively earmarked for beyond 2000:

- Web-based audio-visual production
- Personalised advertising and personalised services for Web communities
- Access and visualisation of cultural and scientific collections
- Intelligent cultural information services for the citizen
- Digital archiving and long-term preservation test-beds
- Advanced learning environments, and strategic follow-up to previous activities
- Natural interactivity
- Cross-lingual information management and knowledge discovery
- Novel approaches and technologies for written and spoken language translation
- Validation projects and take-up measures for multilingual public-interest services
- Mobile cross-media information services for individual information appliances

III.1 Interactive publishing, digital content and cultural heritage

The publishing area is addressed in the broadest sense of providing multimedia content for new marketplaces or according to new and emerging business models. In 2000, RTD work is focussed on two of the key areas of the electronic publishing chain: Improved authoring systems that are capable of handling creative forms of multimedia content, and improved personalisation methods that allow content to be matched more closely to the needs of users' sectors or communities.

In the cultural area, the objective is to improve access for citizens and professionals to Europe's expanding repositories of cultural and scientific knowledge, while contributing to the creation of a sustainable European cultural landscape. This should be built on commonly accepted standards and practices for new data models, architectures, meta-data directories and trust infrastructures.

III.1.1 Authoring interactive Web content

Objectives: To foster creativity in content by developing new multimedia systems that address the areas of authoring, design and cross-media integration and production.

Focus

- natural (immersive) authoring interfaces offering enhanced content interaction, user-friendly data manipulation, digital online artistic creation and experimentation, and
- interactive workflow procedures for handling radically new combinations of highly visual and interactive media forms (3D, VR and audio-visual broadband content).
- new socio-economic and business models for low-cost authoring, production, delivery and exchange of audio and TV content, at regional, national and international level.

The work is expected to achieve enhanced usability of authoring systems, improved functionality and measurable increases in productivity and quality, associated with new multi-platform, cross-media publishing, entertainment and audio-visual broadcast applications.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.2.1, with emphasis on Web publishing.

III.1.2 Personalising content

Objectives: To develop, validate and demonstrate personalised publishing and personalised delivery and advertising solutions for distributed multimedia content.

Focus is on the development and integration of

- personal, user-friendly tools for access, creation, repurposing, management and publishing of multimedia content, by users for users.

At service level, work will address Web based services including

- Web communities, agent-based services, user profiling, and content mediated transactions, together with contextual, intelligent or adaptive access to, and delivery of, heterogeneous assets in large distributed and multi-owner collections.

The work is expected to contribute to technical work in the areas of consumer protection and privacy, IPR, open standards for interoperability and access management guidelines and business models. Proof of concepts in highly innovative areas could also be possible through submission of small preliminary feasibility RTD projects.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.2.2, with emphasis shifted from content management to personalisation.

III.1.3 Trials and test-beds for digital content authoring and personalising systems

Objectives: To promote the use of new multimedia authoring and design systems as well as personalised applications of high-quality multimedia content and services in key areas (knowledge, business and lifestyle publishing, advertising and geographic information).

Focus: Proposals can address one of the following activities

- Trials of new multimedia authoring and design systems by content creators.
- Trials to validate the technologies for personalised creation, publishing, access and delivery of distributed multimedia content.
- Test-beds to validate the functionality, usability and acceptability of Internet authoring and production tools, and personalised delivery of rich multimedia content to users, including the socially excluded.

Type of Actions addressed: Trials, (Take-up Support Nodes are expected to be called separately)
Links with WP99: New Action Line.

III.1.4 Access to digital collections of cultural and scientific content

Objectives: To substantially improve access for citizens and professionals to Europe's expanding repositories of cultural and scientific knowledge.

Focus :

For cultural knowledge focus is on:

- innovative systems integration and reference implementations for advanced digital library applications and test-beds federating content with navigation, search and retrieval functions and tools for very-large, diverse and highly distributed cultural information and concept spaces.
- integrating community building tools for a seamless and tailored approach to sharing and interactive use of internationally distributed and culturally significant resources and collections.

The focus for scientific heritage is on:

- the creation of international science collaboratoria which integrate in a novel way sets of standards, tools and virtual world servers for the collaborative analysis of multi-disciplinary data.

The work should contribute to the creation of a sustainable European cultural landscape and will address global consensus on common specifications and practices for new data models, architectures, benchmarks and metrics, test suites, meta-data directories and trust infrastructures. It will address interoperability layers and establish or enhance

relevant international standards. These objectives will be pursued where possible in collaboration with other programs at Member State and international level.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.2.3, by concentrating on a test-bed approach, the advanced Digital Libraries concept and international science collaboratoria.

III.1.5 Trials on new access modes to cultural and scientific content

Objectives: To foster the adoption and introduction of leading edge technologies for the access to cultural and scientific content.

Focus:

Trials using state-of-the art technologies for memory organisations (archives, libraries, museums, etc) that add value to collections and associated services. Domains of interest include new navigation tools, wireless access to the Web, improved visualisation of artefacts and collections, community building for thematic collections, etc. In all cases the trials should be driven by an authentic need as expressed by a well-defined user profile.

These activities will be pursued in collaboration with other programs and initiatives at national and regional level.

Type of Actions addressed: Trials
Links with WP99: New Action Line.

III.1.6 Virtual representations of cultural and scientific objects

Objectives: To explore and experiment with novel ways of creating, manipulating, managing and presenting new classes of intelligent, dynamically adaptive and self-aware digital cultural objects, either held by memory institutions (archives, libraries, museums, etc) or directly involving digitally born objects or art forms.

The focus is user-centred and includes:

- user interaction and models for interactivity with high-quality virtual representations of valuable cultural objects, and
- the creation and navigation of virtual cultural and scientific landscapes.

The work should focus on and result in the sustainable development of valuable digital repositories in Europe's libraries, museums and archives. This includes models for future virtual collections and guidelines for integrating real and virtual objects and collections. It should provide examples of how dynamic user interaction with the cultural and scientific content can enhance the user experience. It addresses the experiences of learning, exploring and entertaining for the user.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.2.4. Brings forward the active and virtual objects, digital born objects and art forms.

III.2 Education and training

Work will focus on demonstrating benefits resulting from investing in IST for learning, in two domains strategic to the Information Society. Current use of IST in schools aims mainly at supporting existing teaching practice. One of the two new action lines in this field address the whole school environment and how it can be re-engineered, using embedded technology, to develop better learning schemes for a wider part of the society and to provide new relevant knowledge for future citizens. The other action line focuses on life-long learning. It reflects the strong need to help individuals manage and implement a learning path tailored to their needs, whether for professional reasons or for leisure. Both areas are essential for providing the changing skills required for the future competitiveness of Europe and successful results are expected to have a strong overall impact.

The overall research in this area covers both enabling RTD on common methods and tools and specific demonstrations in particular market sectors.

III.2.1 School of tomorrow

Objectives: To improve the quality and accessibility of learning at primary and secondary school level through embedded IST, in particular addressing knowledge and skills required by future citizens of the Information Society.

Focus:

The multi-disciplinary RTD should focus on the development of innovative services, applications and large scale demonstrations of - technology-based school of tomorrow, involving:

- ubiquitous learning environments and innovative learning materials (including remote knowledge sources) which support and manage efficient pedagogical processes and social interaction between learners, tutors and other peer-groups;
- learning of Higher Level cognitive activities with emphasis on autonomy, creativity, problem solving, team work;
- cost-effective and user-friendly solutions for achieving location independence and widening remote access to resources from the school and at home.

A systemic and user centred RTD approach is anticipated in realistic learning settings, encompassing organisational reengineering aspects and a comprehensive pedagogical and socio-economic evaluation. The work is expected to build on and consolidate ongoing national initiatives and should contribute to European best practice recommendations and guidelines in the domain.

Type of Actions addressed: RTD
Links with WP99: New Action Line

III.2.2 The learning citizen

Objectives: To develop, demonstrate and evaluate new IST-based approaches for enhancing and facilitating Life Long Learning for individuals outside formal education and training settings, including the potentially socially excluded.

Focus:

The research should address intelligent, user friendly solutions with innovative integration of emerging technologies (such as telepresence technologies, co-operative work tools and distributed knowledge pools) and test-beds for:

- support for the personal definition of learning goals, including motivational aspects and overall management of the learning process;

- easy and widest possible remote access to innovative learning environments;

- brokerage of relevant learning services; support for assessment and recognition aspects of the acquired skills.

A holistic and multi-disciplinary RTD approach should be adopted, which enables a comprehensive evaluation of the benefits for the user. The work is expected to result in scalable solutions and best practice recommendations and guidelines at the European level.

Type of Actions addressed: RTD
Links with WP99: Recombines Action Lines III.3.1, III.3.2 and III.3.3, with a focus on learning by individuals.

III.2.3. Trials and best practice addressing advanced solutions for on-the-job training in SMEs

Objectives: To foster the adoption of technology-based solutions and services enabling the whole life cycle of on-the-job training services in SMEs, including development of sustainable business models.

Type of Actions addressed: Trials and Best Practise
Links with WP99: New Action Line.

III.3 Human Language Technologies

The objective of HLT is to support business activities in a global context and to promote a human-centred infostructure ensuring equal access and usage opportunities for all. This is to be achieved by developing and demonstrating multilingual technologies and exemplary applications providing functionalities that are critical for the realisation of a truly user friendly Information Society.

Work will address generic and applied RTD from a multi- and cross-lingual perspective, and will undertake to demonstrate how language specific solutions can be transferred to and adapted for other languages.

Multilingual annotated repositories of language and domain knowledge underpinning the above RTD lines will be addressed as well.

III.3.1 Natural interactivity

Objectives: To enhance the naturalness of interaction between humans and digital services and devices, the ease of use of computer systems in non-expert environments, and the richness and effectiveness of technology-mediated interpersonal communication.

Focus:

The strategic focus is on achieving a fuller integration of the speech and language processing communities with other related research communities, thus providing a convergent path for multi-disciplinary collaborations. RTD will be geared towards unrestricted speech and language input-output, multimodal dialogues and keyboard-less operation, and understanding of messages and communicative acts. Work will encompass:

- enabling research and technologies aimed at enhancing the naturalness of conversational interfaces through the integration of multiple modalities, in particular by coupling robust speech recognition and language understanding techniques with facial expression and gesture recognition and rendering, and considering anticipatory characteristics of dialogues.
- applied research and integrative showcases addressing human-computer interaction making use of multiple cognitive features and communicative acts, for interpersonal communication and interaction with virtual worlds, synthetic personae and multimedia systems.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.4.2, with emphasis on human-computer interaction and conversational systems.

III.3.2 Cross-lingual information management and knowledge discovery

Objectives: To empower people confronted with large quantities of digital information and to support them in knowledge intensive tasks, by exploiting the linguistic knowledge embodied in documents, messages, dialogues and audio-visual objects.

Focus:

More intuitive and effective use and assimilation of information content through RTD addressing intelligent agents applying language-processing models and techniques for

- cross-lingual information retrieval and categorisation; information ranking and profiling according to pre-set and dynamically adjustable relevance criteria; topic identification and summarisation, both within and across documents;
- deep semantic information analysis, knowledge detection and extraction, including entity recognition and fact extraction, name and event correlation.

The information may be either structured (e.g. published text) or unstructured (e.g. e-mail, transcriptions of speeches) and is expected to exhibit a combination of text, speech and multimedia features.

RTD will address both applications-oriented showcases and longer-term research challenges, and is expected to build on and interact with concurrent developments at national and international level.

Type of Actions addressed: RTD
Links with WP99: New Action Line.

III.3.3 Multilingual communication services and appliances

Objectives: The overall goal is to make interaction with fixed and mobile communication services and appliances possible independent from the language of the user, and in particular to progress towards a much wider provision of multilingual capabilities within the universal infostructure underpinning the Information Society.

Focus:

RTD will concentrate on the development and validation of robust methods and components for multilingual interpersonal and group communication, e.g. within multi-channel messaging and conferencing systems, including

- adaptive multilingual interfaces to personal appliances and consumer devices, including e.g. mobiles, palm-tops, on-board devices and set-tops;

- cross-modal information selection, conversion and rendering (text, speech, multimedia) according to the capabilities of the access point;

and will address service issues such as

- robustness and real-time performance of embedded language technologies, their scalability and portability across languages and technical platforms, and hardware/software integration within the hosting system.

Type of Actions addressed: RTD
Links with WP99: Re-focussed Action Line III.4.1, with shift toward personal appliances and multi-channel communications.

III.3.4 Trials and best practice in multilingual e-service and e-commerce

Objectives: To stimulate new forms of partnership between technology providers, system integrators and launching users through trials and best practice actions addressing end-to-end multi-language platforms and solutions for e-service and e-commerce.

Focus is on demonstrating and assessing the impact of innovative approaches (e.g. provision of multilingual and multi-cultural on-line content, Web enabled call centres and multi-access portals, multilingual transactions and customer-relationship management, etc.) on business patterns and capabilities, and customer behaviour and acceptance.

Type of Actions addressed: Trials and best practise
Links with WP99: New Action Line.

III.4 Information access, filtering, analysis and handling (IAF)

The overall objective of IAF as set out in the IST specific programme is to develop advanced and generic tools and techniques for the management of multimedia content to empower the user. The main focus of research is to improve the "middleware" representation, management and delivery functions of multimedia systems, for seamless content delivery, provision and access for different applications and across different media. IAF does not concern computer network or hardware development per se. IAF further focuses on audiovisual content which today is streamed over the Web, CD or DVD, but which will also be available in the next years over interactive TV, multimedia home platforms and wireless multimedia networks. The lead-time for RTD in this area can range from medium-term (2-4 years) to longer term for more generic issues (5-8 years).

The work-programme 2000 will focus: Rich descriptive models of digital information content covering all media types especially for emerging wireless and domestic systems, and on radically new cognitive relations between the system and users via individualised metaphors and visualisation techniques, as well as related information categorisation and filtering in two action lines:

- content-processing for domestic and mobile multimedia platforms, especially DVB-based platforms for the home and W3C wireless access protocol-based services on the mobile side;

- information visualisation addresses information presentation, representation and intelligent filtering and agents.

III.4.1 Content-processing for domestic and mobile multimedia platforms

Objectives: To allow content and technology providers to adapt multimedia content – especially streamed audiovisual media and meta-services to the domestic and mobile multimedia platforms which are fast emerging in Europe. To allow the user in normal domestic or mobile environments and living conditions to filter multimedia content and mobile unified messaging through seamless interfaces between wireless, TV, Web and other networks.

Focus:

The research focus is geared toward new notions of human-computer interfaces to multimedia content brought about by ambient domestic and mobile systems. Specific research topics will include advances in scaling multimedia content for multi-bandwidth content delivery as well as the user interface for search and retrieval tools, information filtering and agent technologies both for "positive" information searching and for protection from illegal and harmful content. Specific sub-areas are:

- Content scalability, in particular for adapting Web content applications and presentation formats for delivery and retrieval across wireless access protocols, reviewing mark-up and display languages suited to both environments, e.g. HTML, XML extensions for wireless content delivery, graphics standards (Scaleable Vector Graphics), Document Object Models etc.

- Intelligent and user-friendly content-based retrieval methods (for digital video, images, sound, 3D & animation) for example over DVB- and DAVIC-compliant multimedia home platforms, concentrating on the media content and content-guidance services;

- Cross-media intelligent consumer interfaces and support for information filtering, browsing using personal profiles, group profiles, adaptive agents that predict user's next interests, collaborative filtering, federating mobile agents and information agents, mobile unified messaging (multimedia enhanced e-mail, voice mail, fax, video-based communications) etc.

Type of Actions addressed: RTD
Links with WP99: New Action Line, focused on mobile and domestic platforms.

III.4.2 Information visualisation

Objectives: To allow users to navigate and search "naturally" both through unfamiliar information landscapes and to manage large-scale and complex multimedia data sets.

Focus:

Integration and demonstration of visualisation and management tools (including within geographic information systems) based on new "maps" and "metaphors" of virtual spaces, 3D and 4D (moving) data presentation, immersive virtual reality interfaces, sound localisation, and direct interaction and manipulation of virtual objects. Work will range from the "limited-domain" visualisation of hard data of science and engineering, to the more abstract "open-ended" domains like business, textual and pictorial data types, especially for database access and knowledge discovery.

Specific areas to be addressed are:

- dynamic 3-D / multi-dimensional presentation and graphic representation of information landscapes and complex data sets in real time, especially for Web navigation, database access, access to new interactive TV services, etc

- interactive and highly intuitive visual tools for direct manipulation of static and animated content objects and sequences,

- Advanced storage and management techniques for multimedia content in higher orders of volume than widely available (terabyte volumes and beyond),

Type of Actions addressed: RTD
Links with WP99: New Action Line, with emphasis on information presentation, representation and intelligent filtering and agents. Replaces 1999-IV.3.4 (information management).

III.4.3 Trials and best practice in information access, filtering, analysis and handling

Objectives: To promote the study, realisation, adoption and introduction of state-of-the-art information access tools at end users sites. Research proposals must include significant trials and best practices.

Focus:

- Innovative use and integration of soft computing, statistical, simulation and optimisation methodologies and related solutions and technologies.

- Trials and best practice to encourage further development and use of emerging media and metadata standards in this area,where at present there are relatively few standards, particularly of European origin.

Type of Actions addressed: Trials and Best practise
Links with WP99: New Action Line.

III.5 KA3 Specific Support Measures

This Action Line of support measures aims to increase the overall impact of the RTD work while stimulating synergies across disciplines and communities and building a critical mass of actors. It is synchronised with the RTD action lines (see Roadmap).

Priority is given to working groups and awareness. Other measures like project clustering and studies can be addressed through the general IST programme support measures.

III.5.1 Working groups and, dissemination and awareness actions

Working groups for the stimulation and consolidation of standards and best practice work both at European and global level, in both formal and informal forums and involving national bodies, in the following areas:

- Audiovisual content production and electronic publishing application areas (e.g. knowledge and lifestyle publishing, geographic information)

- Virtual representation and preservation of cultural and scientific objects, including relevant policy issues (e.g. copyright, service models)

- Learning technologies, e.g. open learning architectures, metadata, standard interfaces, models and best practice relating to reusable learning objects, e.g. potentially contributing to IEEE P1484 and CEN/ISSS workshop on learning standards.

- Industry-led work in the human language technologies area addressing end-to-end and system-level interworking of heterogeneous components; common reference architectures and development architectures, including service/application configuration platforms; interoperability and reuse of linguistic data, including automated techniques for extracting application and task specific information from experimental data.

- Media representation and cross-media content interchange, especially for streamed digital audio and visual content, e.g. digital video objects and sequences.

- Information retrieval, metadata, intelligent agents.

Dissemination and awareness actions to cover:

- Measures aimed at a wider exposure of and user access to leading-edge technologies and innovative solutions, through virtual exhibitions and showcases, covering emerging results from previous and ongoing RTD efforts.

- Establishment of focal points in support of national and international communities of human-language technologies researchers, developers and users, with a view to fostering new partnerships and speeding up the deployment of research results.

Type of Actions addressed: Concerted Actions, Thematic Networks, Accompanying Measures (excluding take-up).
Links with WP99: New Action Line, in complement to the Continuous Submission Scheme.

3.4 KEY ACTION IV: ESSENTIAL TECHNOLOGIES AND INFRASTRUCTURES

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."

Strategy, Architecture and Focus

Key Action IV brings together both the essential technology developments underpinning today's converging industries and infrastructures, and the essential component developments, with integrated system and infrastructure developments.

Building on the broad foundations established by the wide coverage of last year's workprogramme, this year's workprogramme for Key Action IV focuses on the creation of an ambient intelligence landscape.

Key Action IV is designed to build on today's European strengths in mobile and fixed communications, digital broadcasting, and rich content and network infrastructures; in consumer electronics and general electronic appliances; in software and embedded systems integration; and in service concept innovation.

In this context, the strategic focus of Key Action IV is on both enabling the widest possible access to essential and interoperable infrastructures and services to underpin the next generations of applications, as well as on contributing to issues of convergence, interoperability and interworking at all technological levels.

The headings of the architecture of Key Action IV are:

- Ubiquitous computing and communications, and
- Open technology frameworks for personalised services.

To realise a **ubiquitous computing and communications** landscape – with embedded, networked (wired or wireless) information systems – the focus is on communicating appliances and consumer devices, in integrated and adaptive networks.

Integration of mobile with fixed, satellite with terrestrial, telecommunication with cable networks – with everything becoming IP (Internet Protocol) based – is part of the short to medium term perspective. In the longer term development of high-capacity, self-aware and self-organising networks is required. Priority in 2000 is on wireless access networks, all-optical core networks, interoperability of a range of heterogeneous networks, and preparation for the likely evolution towards adaptive networks (see, in particular, Action Lines IV. 2.3, 2.4, 5.1, 5.2, 5.3 and 5.4 for RTD, and 5.5 for Take-up Measures).

The appliances and consumer devices combine functions to process and store information with sensing and actuating functions. The work emphasises their operation within networked systems, and, for displays and sensors, the work focuses on mobile

interfaces with a low cost/performance ratio (see, in particular, Action Lines IV. 6.1, 6.2, 7.1, 7.2 and 7.3 for RTD, and 6.3, 7.4, 7.5 and 7.6 for Take-up Measures).

Underlying micro- and opto-electronics work concentrates on development of systems-on-a-chip and reuse of IP (Intellectual Property) blocks for the information and communication terminals and for the communication systems and networks (see, in particular, Action Lines IV. 8.1, 8.2, 8.3, 8.4 and 8.5 for RTD, 8.6, 8.7 and 8.8 for Take-up Measures, and 8.9 for accompanying measures).

Work on **open technology frameworks for personalised services** – irrespective of time, location and context – focus on the technologies and infrastructures needed to provide and to access networked, end-to-end value added services.

The work addresses environments for functional and architectural design, for development and for engineering and management of services, as well as tools that help organise distributed development of software, systems and services. Services are provided from distributed applications, from intelligent packets or nodes and/or from mobile software on top of the network (see, in particular, Action Lines IV. 2.1, 2.2, 3.1, 3.2, 4.1 and 6.2 for RTD, 2.5, 3.4 and 4.3 for Take-up Measures, and 3.5 for concerted actions, thematic networks and accompanying measures).

To help meet the needs of communicating people-to-people, people-to-devices and devices-to-people, and to augment the users' interaction with a set of functionalities, i.e. with a service, the emphasis is on user-centred design and on interfaces for augmented system interaction (see, in particular, Action Lines IV. 3.3, 4.2 and 6.2 for RTD, and 6.4 for Take-up Measures).

The RTD results, complemented by appropriate accompanying measures, will provide information about the implications of novel technologies development and introduction on EU policies such as convergence, telecommunication regulation, spectrum management, space applications and component interoperability (see, in particular, Action Line IV.1.1).

The technology developments emphasise generic building blocks and open platforms and are complemented where appropriate by take-up measures, viz. trials, best practice actions and assessment actions. A number of take-up measures encourage the adoption of open source software for distributed systems and for embedded systems.

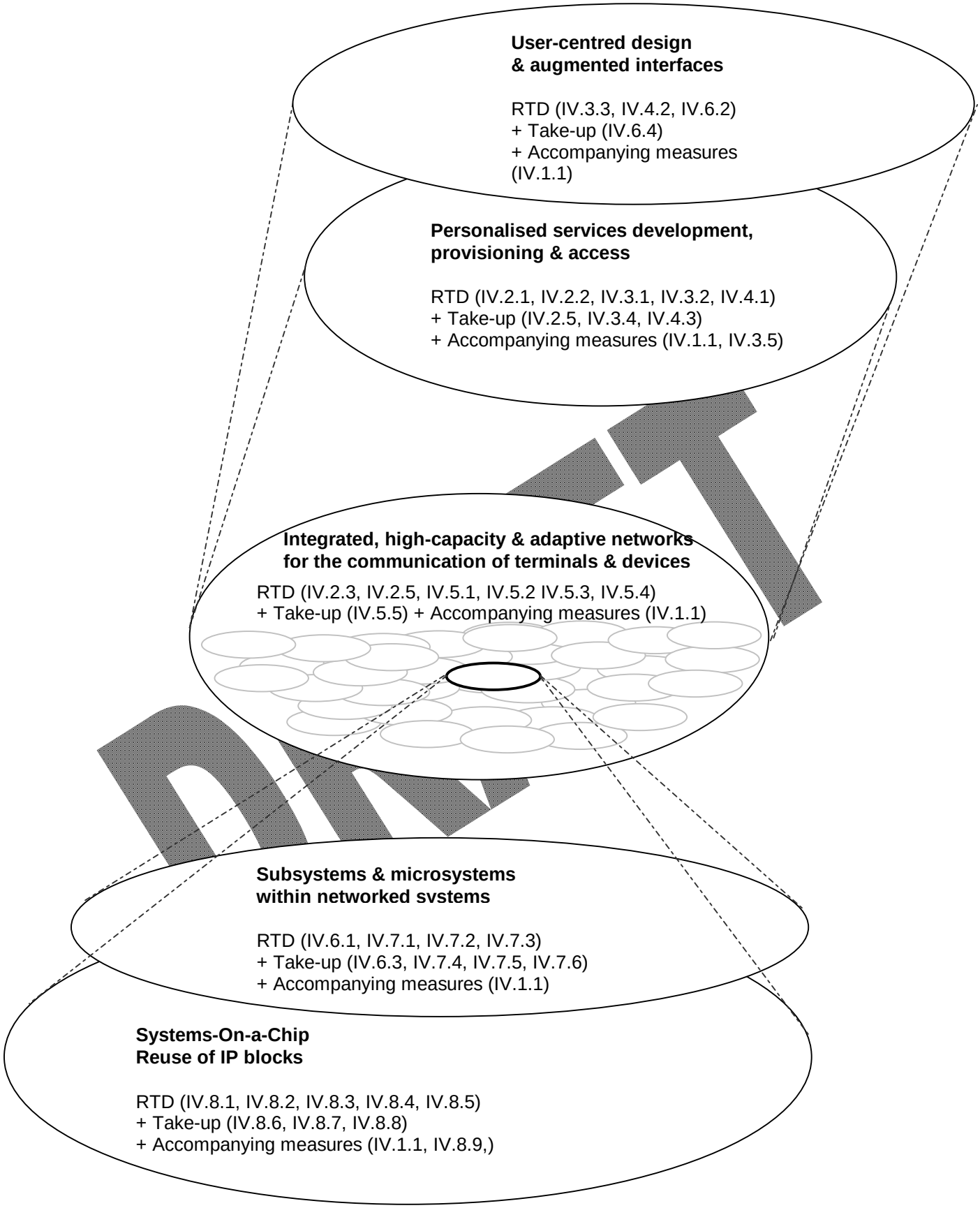
The support and co-ordination needed to cover the individual take-up actions across Europe will be put in place for the actions resulting from the three groups of take-up Action Lines: [2.5, 3.4 and 4.3], [6.3, 7.4, 7.5, 7.6, 8.6 and 8.7] and [assessment actions of 6.3, 7.5, 7.6 and 8.8].

Action Lines in 2000

The Action Lines that have been identified as priorities for Calls for Proposals in 2000 are: 23 RTD Action Lines, 5 groups of Action Lines for take-up and 3 Action Lines for accompanying measures, concerted actions and thematic networks. Proposals addressing interdisciplinary work that cuts across Action Lines are explicitly encouraged.

Overview	Action Lines for 2000
IV.1 Implications Assessment	• VI.1.1 Implications assessment
IV.2 Computing, communications and networks	• VI.2.1 Distributed systems and services provision • VI.2.2 Real-time systems • VI.2.3 Network integration, interoperability and interworking • VI.2.4 Terabit core networks • VI.2.5 Computing, communications and networks – take-up measures
IV.3 Technologies and engineering for software, systems and services	• VI.3.1 Distributed development of software and systems • VI.3.2 Software-Engineering for generic end-user services • VI.3.3 User-centred interaction and functionality design • VI.3.4 Software, systems and services – take-up measures • VI.3.5 Software, systems and services – concerted actions, thematic networks, accompanying measures
IV.4 Real-time and large-scale simulation and visualisation technologies	• VI.4.1 Real-time simulation and visualisation technologies and services • VI.4.2 Mixed realities and new imaging frontiers for innovative applications and services • VI.4.3 Real-time simulation and visualisation, mixed reality – take-up measures
IV.5 Mobile and personal communications and systems, including satellite related systems and services	• VI.5.1 Re-configurable radio systems & networks • VI.5.2 Terrestrial wireless systems and networks • VI.5.3 Integrated satellite systems and services • VI.5.4 Fourth Generation system and network concepts for wireless communications • VI.5.5 Mobile and personal communications and satellite systems – take-up measures
IV.6 Interfaces making use of the various senses	• VI.6.1 Advanced displays and sensors to support system and service level interfaces • VI.6.2 User and service interfaces and buffers for seamless end-to-end services • VI.6.3 Advanced displays and sensors – take-up measures • VI.6.4 Advanced interfaces – take-up measures
IV.7 Peripherals, sub-systems and microsystems	• VI.7.1 Peripherals and networked embedded technologies • VI.7.2 Subsystems • VI.7.3 Microsystems • VI.7.4 Peripherals technologies – take-up measures • VI.7.5 Subsystems – take-up measures • VI.7.6 Microsystems – take-up measures

IV.8 Microelectronics – optoelectronics	• VI.8.1 Microelectronics design and test • VI.8.2 Application-specific microelectronics • VI.8.3 Industrial microelectronics technologies: processes, equipment and materials • VI.8.4 Optoelectronic technology • VI.8.5 Advanced micro- and optoelectronics • VI.8.6 Microelectronics design and test – take-up measures • VI.8.7 Application-specific microelectronics – take-up measures • VI.8.8 Industrial microelectronics technologies: processes, equipment and materials – take-up measures • VI.8.9 Research training in microelectronics – accompanying measures


User-centred design
& augmented interfaces
RTD (IV.3.3, IV.4.2, IV.6.2)
+ Take-up (IV.6.4)
+ Accompanying measures
(IV.1.1)
Personalised services development,
provisioning & access
RTD (IV.2.1, IV.2.2, IV.3.1, IV.3.2, IV.4.1)
+ Take-up (IV.2.5, IV.3.4, IV.4.3)
+ Accompanying measures (IV.1.1, IV.3.5)
Integrated, high-capacity & adaptive networks
for the communication of terminals & devices
RTD (IV.2.3, IV.2.5, IV.5.1, IV.5.2 IV.5.3, IV.5.4)
+ Take-up (IV.5.5) + Accompanying measures (IV.1.1)
Subsystems & microsystems
within networked svstems
RTD (IV.6.1, IV.7.1, IV.7.2, IV.7.3)
+ Take-up (IV.6.3, IV.7.4, IV.7.5, IV.7.6)
+ Accompanying measures (IV.1.1)
Systems-On-a-Chip
Reuse of IP blocks
RTD (IV.8.1, IV.8.2, IV.8.3, IV.8.4, IV.8.5)
+ Take-up (IV.8.6, IV.8.7, IV.8.8)
+ Accompanying measures (IV.1.1, IV.8.9,)

Action Line Descriptions

IV.1 Implications Assessment

IV.1.1 Implications Assessment

Objectives: To guide, monitor and assess the developments and implications of new technologies and infrastructures, their convergence, integration, and evolution. Activities can address areas within a group of Action Lines as well as areas that span across the Key Action.

Focus

(i) To measure and assess their potential socio-economic implications.

(ii) To analyse the likely impact of the evolution of new service requirements on network, system and terminal architectures and features.

(iii) To identify areas where policy, legislation and regulation may need to evolve to fit new technology and infrastructure developments, such as for privacy, security, safety, and licensing issues.

(iv) To provide new knowledge about the policy areas, the regulatory framework and the socio-economic context in which new technologies and infrastructures are developing, so as to better understand what drives RTD and how RTD can better serve other policy areas.

The research will normally be in the form of case studies alongside and within ongoing RTD projects and take-up measures, complemented by targeted dissemination activities.

Type of actions addressed: Accompanying measures (excluding take-up).
Links with WP'99: Refocused IV.1.1.

IV.2 Computing, Communications and Networks

This work addresses distributed systems, services and advanced networks, exploiting in particular distributed object technologies, active and programmable network technologies, and advances in computing, optical signal processing, switching and routing. It provides the means (methods, tools and testbeds) for the platform-independent applications and services development and interworking central to establishing ambient intelligence. The work will focus on the IP (Internet Protocol)-centred network paradigm.

IV.2.1 Distributed systems and services provision

Objectives: 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.

To develop and validate methods and tools to support network inter-working and management at the service levels to increase capacity, flexibility and functionality.

Focus

The focus will be on development environments to support distributed applications.

Virtual Private Networks will be emphasised as well as the use of active and programmable network technologies.

Type of actions addressed: RTD.
Links with WP'99: Combination of IV.2.1 and IV.2.4.

IV.2.2 Real-time systems

Objectives: To develop and assess architectures, technologies and tools for embedded systems and their inter-working. They support the design, implementation and verification and validation of data- and/or compute- intensive, platform-independent real-time applications. To develop and assess innovative approaches to image recognition and signal representation.

Focus

Priority is on development and integration of software and hardware modules solving time critical aspects and enabling embedded systems to be networked and/or communicate via the Internet. Primary application areas are control systems, machine vision and embedded web systems.

Type of actions addressed: RTD.
Links with WP'99: Refocused IV.2.2.

IV.2.3 Network integration, interoperability and interworking

Objectives

(i) To develop and evaluate new cost effective network integration technologies and services that provide the user with high bandwidth and a controllable service quality based on fibre, copper and wireless technologies.

(ii) To specify and demonstrate interoperability with legacy networks and services and a migration path from legacy networks to the new network technologies.

(iii) To optimise overall network resource requirements in terms of effective management of network capacity and traffic.

Focus

The focus is on providing broadband services to the end user, in a cost-efficient manner, with a well-defined service quality, assuring service transparency and dynamic optimisation of network resources.

Type of actions addressed: RTD
Links with WP'99: Combination of IV.2.3 and IV.2.4.

IV.2.4 Terabit core networks

Objectives: To further develop technologies and architectures for managed all-optical core/metropolitan networks, by exploiting advances in optical signal processing, switching and routing, with the aim of developing terabit capacity optical packet network nodes, suitable for interworking in multi-protocol networks (including IP (Internet Protocol)-on-WDM networks). To develop the management interfaces for optical network nodes, and their integration with the overall network management.

Focus

The work will also ensure the interworking of optical core/metropolitan networks with heterogeneous access networks (mobile and fixed), enabling multi-service (IP-Internet Protocol, nomadic and broadcast) support.

Type of actions addressed: RTD
Links with WP'99: Combination of IV.2.5 and IV.2.4.

IV.2.5 Computing, communications and networks – take-up measures

Objectives

(i) To identify, experiment and validate mechanisms for the development of "computing, communication and networking applications" in virtual organisations characterised by dynamic allocation of resources.

(ii) To conduct trials aiming at the adaptation and introduction in new services and/or industrial applications of mobile and intelligent agent technologies and middleware for the management of process flow in distributed applications with shared resources.

(iii) To conduct trials aiming at the introduction and intelligent integration of embedded vision and/or control systems in production environments.

Focus

(i) Extract best practices for different business models and disseminate widely.

(ii) The focus will be on open source software.

(iii) The focus will be on low cost systems based on off-the-shelf components integrated using advanced networking technologies.

Type of actions addressed: Trials and best practice actions.
Links with WP'99: Combination of take-up measures in IV.2.x.

IV.3 Technologies and Engineering for Software, Systems and Services

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.

This area focuses on generic software technologies and engineering. Domain specific software is undertaken in other parts of the programme, e.g. enterprise software in KA II, multimedia software in KA III, distributed systems software in area KA IV.2, and so on.

By stressing open source and/or free software, and by focussing on plug and play capabilities of service engineering environments, and on software development for embedded objects, the work helps software developers and system-integrators to stay competitive.

IV.3.1 Distributed development of software and systems

Objectives: To develop and validate processes, methods and tools for supporting the development of software and systems by distributed teams and individual developers. This should respond to the growing needs of different actors like large organisations or open source and/or free software undertakings to assemble in projects geographically distributed competencies and resources.

Focus

The focus is on supporting distributed development on aspects such as co-ordination of project activities, management of the developed artefacts and documentation, verification and validation, and lifecycle activities (like requirement engineering and architectural design).

Type of actions addressed: RTD
Links with WP'99: Refocused IV.3.1.

IV.3.2 Software-Engineering for generic end-user services

Objectives: To investigate, design and develop architectural frameworks, methods and tools to engineer adaptive, seamless and intelligent end-user services. These services may be enabled by distributed systems.

Focus

The focus is to build service engineering development environments and to enable software developers and system-integrators to implement these services more easily. The combination, integration and interaction of basic software and service components for the interoperability of service elements should be addressed.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.3.2.

IV.3.3 User-centred interaction and functionality design

Objectives: To enhance the creativity in the early stages of software development.

Focus

The focus is on the software development for devices and appliances embedding computing and communication technology. User-centred design for specific devices and appliances (such as information terminals, personal media devices, or other everyday devices and appliances enhanced with intelligent computing and communication components) and related software development will be used as real word test cases.

Projects are expected to build, use and refine light-weight instruments such as: (i) development processes for managing the impact of interaction design on software development, (ii) designs for simple and consistent interaction with high functionality output, (iii) tools for the specification, early experimentation, and assessment of interaction designs, and (iv) software components dealing with intelligent tasks (building blocks of embeddable intelligence).

Type of actions addressed: RTD
Links with WP'99: New action line.

IV.3.4 Software, systems and services – take-up measures

Objectives

(i) Best practice actions to encourage the adoption of open source software.

(ii) Best practice actions to encourage the take up of object oriented techniques for early requirements gathering.

(iii) Trials of processes, methods and tools for development and testing of software systems by teams distributed across different companies.

Focus

(i) The focus is on the adoption of open source software in and for the development of embedded systems.

(ii) The focus is on the adoption of object oriented techniques for the requirements engineering of embedded systems.

(iii) The focus is on software systems embedded in inter-operating devices and appliances.

Type of actions addressed: Trials and best practice actions.
Links with WP'99: Combination of take-up measures in IV.3.x.

IV.3.5 Software, systems and services – concerted actions, thematic networks, accompanying measures

Objectives:

(i) To foster - e.g. via Network of Excellence, or via Fellowships to individuals - the initiation of open source and/or free software development projects.

(ii) To establish a training scheme in how to do process improvement for software, systems and services development, followed by internal try-out mini-projects in the companies.

Focus

(i) The focus is on projects in areas where it would be highly needed and useful but where the critical mass of individuals needs to be formed in order to start the distributed work.

(ii) The focus is on a training scheme for SMEs.

Type of actions addressed: Concerted actions, thematic networks, accompanying measures (excluding take-up).
Links with WP'99: New action line.

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

This work addresses the development and integration of advanced simulation and visualisation technologies with novel virtual and mixed-reality research activities for a range of applications. It supports advanced interaction, within an ambient intelligence landscape, through the development of advanced simulation tools and mixed-reality environments for new generations of IP (Internet Protocol) networks applications.

IV.4.1 Real-time simulation and visualisation technologies and services

Objectives: (i) To develop, enhance and apply open tools for real-time, large-scale, distributed, interactive, multi-object simulation of complex systems and services, (ii) To develop middleware to interface computer graphics, design technologies and mechanistic model specification tools, to assure interoperability of heterogeneous software and hardware systems, intelligent use and 3D visualisation of large data sets, collaborative pre- and post-processing of simulation data, support for the modelling process, and interfacing simulation models with real-time control systems.

Focus

Focus is on mixed discrete and probabilistic models, model exchange and re-use, and control and management of critical systems, information and communications infrastructures subject to natural phenomena, massive failure or man-made attacks.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.4.1.

IV.4.2 Mixed realities and new imaging frontiers for innovative applications and services

Objectives: To bridge the gap between real and virtual worlds for innovative applications including converging conversational and interactive broadcast services based on advanced representation and coding technologies.

Focus

The focus is on the Reality-Virtuality continuum: (i) Augmenting virtuality and bringing virtual worlds to life by enhancing realism and level of detail, introducing intelligence, making them persistent and reactive environments; (ii) Augmenting reality and fusing real and virtual universes by enhancing real environments for a range of applications going from wearable computing for navigation and industrial processes to programme production and interactive entertainment; and (iii) Discovering new sensory frontiers by addressing high definition, 3D, full space imaging, multisensory cues and very advanced display systems to create fully immersive environments distributed over heterogeneous networks and platforms in which users will be able to enjoy rich, multisensory experiences for virtual- or tele-presence. Costs, real-time, human factors, control, protection and ethical issues should be considered.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.4.2.

IV.4.3 Real-time simulation and visualisation, mixed reality – take-up measures

Objectives: Trials and best practice actions that use tools for both consumer and professional uses.

Focus

The focus is on uses in SMEs and/or in industrial/service sectors that traditionally do not use such tools.

Type of actions addressed: Trials and best practice actions.
Links with WP'99: Combination of take-up measures in IV.4.x.

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

The work addresses the move to an integrated seamless network (including digital broadcasting) that ensures global personal connectivity and enables access to broadband wireless multimedia communications and services by anyone, anywhere, at any time and for all purposes, business and leisure.

Foci are: (i) to develop and validate the technologies in the wireless access part of the network, with the objective of enhancing competition in the local loop; and (ii) to promote development of concepts in the area of wireless ambient intelligence.

In complement to the above R&D objectives, accompanying measures and concerted actions activities will be undertaken in relation to (i) standards and regulations; (ii) spectrum, with focus on new sharing and allocation challenges imposed by the introduction of novel technologies in related frequency bands; and (iii) tele-economic issues with focus on the social and economic challenges and impacts related to the introduction of 3rd and 4th generation mobile systems.

IV.5.1 Re-configurable radio systems & networks

Objectives: To allow the radio network, including terminals and base stations, to adaptively/automatically adjust to traffic and user requirements.

Focus

The focus is on re-configurable system, architecture and network concepts applied to emerging 3G cellular systems, advanced wireless local area networks including broadband wireless fixed access, mobile broadband systems, applied to a range of interactive and distributive services. A key goal is the study of mechanisms for secure applications code downloading and of open architectures enabling the development and coexistence of multifunctional applications operating over integrated/heterogeneous networks.

Type of actions addressed: RTD
Links with WP'99: Combination of IV.5.1 and IV.5.4.

IV.5.2 Terrestrial wireless systems and networks

Objectives: To study, develop and validate advanced wireless systems and networks related to (i) the provision of interactive multimedia services for mobile terrestrial broadcasting, the multimedia home platform, and broadband wireless access; (ii) the evolution of UMTS phase 1 with packet and circuit traffics towards IP (Internet Protocol) networks.

Focus:

The work relates to the gradual introduction of IP (Internet Protocol) in the access network with focus on seamless service provision and transparency across a multiplicity of (environment/user dependent) radio accesses and in relation to intra/inter-network hand over, IP (Internet Protocol) Quality of Service evaluation and management, support of discrete and cellular mobility, radio resource control mechanisms and protocols (considering Quality of Service and low-power requirements). It also covers the optimisation of network performance in heterogeneous contexts with a variety of asymmetric services (e.g. call admission policy, customisation of user environment) and multiple radio environments, associated technologies for efficient dynamic spectrum usage/sharing, and technological/system aspects for the roaming of location services exploiting terrestrial or satellite location data.

Type of actions addressed: RTD
Links with WP'99: Combination of IV.5.2 and IV.5.4.

IV.5.3 Integrated satellite systems and services

Objectives: To develop and validate technologies and architectures for the satellite delivery of interactive multimedia services.

Focus

The focus is on (i) enhancement of legacy systems, with provision of interactivity (Ku or Ka band), optimised caching architecture and competitive delivery of IP (Internet Protocol) services; (ii) optimised (technical and economic) architectures for interworking with terrestrial IP (Internet Protocol) based networks, integrated network management and radio resource optimisation for both S-UMTS and broadband multimedia systems (Ku, Ka or V bands). Transparent connection of user equipment to alternative wireless (satellite or not) accesses, re-configurable terminals for access to multiple space segments and technologies allowing efficient radio resource and spectrum usage are common objectives.

Type of actions addressed: RTD
Links with WP'99: Combination of IV.5.3 and IV.5.4.

IV.5.4 Fourth Generation system and network concepts for wireless communications

Objectives: With a long-term perspective the objective will be to prepare the ground for the likely technological and service evolution from current cellular and wireless systems and networks.

Focus

Key goals are: (i) to investigate advanced and innovative concepts such as self-aware, self-organising ad-hoc wireless networks; (ii) air interfaces for scalable pervasive connectivity; and (iii) assess potential spectrum requirements and co-existence issues, including the study of strategies allowing a distributed flexible management of the spectrum resources.

Type of actions addressed: RTD
Links with WP'99: New action line.

IV.5.5 Mobile and personal communications and satellite systems – take-up measures

Objectives: To facilitate the broader application and rapid take up of mobile and personal communications and systems. The work comprises trials that use and evaluate innovative and advanced: (i) wireless data services over cellular, cordless and "indoor", terrestrial and satellite radio systems and networks; (ii) satellite-delivered services in the business-to-business sector; and (iii) wireless technologies for evolving and scalable systems and networks.

Focus

Under (i) the focus is on multimedia interactive, distributive and asymmetric information services. Under (ii) the target is to implement and validate new business scenarios where the benefits of satellite communication systems and services can be clearly established compared to other alternatives. Under (iii) the systems and networks include cellular networks, private wireless networks, fixed wireless broadband access systems, wireless local loop systems, cellular interactive systems, and mobile broadband systems.

Type of actions addressed: Trials.
Links with WP'99: Combination of take-up measures in IV.5.x.

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 targets a mode of interaction that is, at the same time, relaxed and enjoyable, ambient aware, and cost effective.

The focus is on the development and integration of advanced display, sensor, and actuator technologies, software interfaces for human system interaction, and interfaces expressing the 'perceived quality' requirements to the networks for the end-user applications.

IV.6.1 Advanced displays and sensors to support system and service level interfaces

Objectives: To improve cost, size and performance of mainstream display technologies. To develop new materials, processes, equipment and components with better cost and performance considering market opportunities and manufacturability. To develop high

resolution low power displays with sufficient brightness and contrast and very high resolution displays for projection, immersive Virtual Reality and Augmented Reality or synthetic holography, thin flexible displays for smart cards, electronic paper, object conformal visualisation, intelligent clothing and multi-viewer glass-less 3D displays.

Focus

The work focuses on mobile, user-friendly, powerful, and affordable interfaces, including system-on-display integration, display interface / system optimum functional partitioning, authentication, and multi-sensory integration for identification of human expression (facial, gesture, mood) / context, and for sensory feedback.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.6.1.

IV.6.2 User and service interfaces and buffers for seamless end-to-end services

Objectives: To develop network and resource management independent platforms, service enabling interfaces and buffers for networked systems and end-to-end applications for consumer electronics, professional, individual and group users with strong requirements on reliability, timeliness, scalability, and interoperability to guarantee "perceived quality" of service. To develop trusted free-choice environments for content and service location, access and delivery with user navigation supported by intelligent audio-visual customer platforms. To develop multi-modal user interfaces and audio-visual processing, representation and communication functionalities for networked appliances and devices for improving both the capture of user intentions, expressed and solicited, through gestures, sound and facial expression and the anticipation based on ambient relations.

Focus

The focus is on interface description language specifications of open application programming interfaces for ambient, multi-modal and server interaction and on scaleable data representations. Re-configurable interfaced appliances for seamless interactive broadcasting and tele-presence applications will be put on testbeds with technical and user centred evaluation.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.6.1.

IV.6.3 Advanced displays and sensors – take-up measures

Objectives: The aim is to stimulate the take-up of advanced displays and sensors in user friendly interfaces.

Focus

Best practice actions: To improve the design and ergonomics of existing systems by using flat and slim displays for the first time. Innovative use of display technologies through the offering of an ASIC display service to the user.

Trials: To integrate existing displays / sensors / actuators as part of demonstration projects, in testbeds, promoting its benefit for user friendly interfaces.

Assessment actions: In display manufacturing: The assessment of advanced material and prototype equipment for the manufacture and interconnect of displays, and drivers assembly.

Type of actions addressed: Trials, best practice actions, and assessment actions.
Links with WP'99: Combination of take-up measures in IV.6.x.

IV.6.4 Advanced interfaces – take-up measures

Objectives: The aim is to stimulate the take-up of integrated access and interface technologies for providing services on both professional and consumer platforms.

Focus

The work comprises trials and best practice actions. Trials use recent, innovative, open European or International standards and technologies for content-level and service-level interaction with audio-visual media and 3D on home appliances and platforms. Best practice actions perform reliability, conformance and assurance testing of professional and consumer service platforms, with a view to improving open user access to audio-visual services.

Type of actions addressed: Trials and best practice actions.
Links with WP'99: Combination of take-up measures in IV.6.x.

IV.7 Peripherals, sub-systems and microsystems

The area of peripherals[7], subsystems[8] and microsystems[9] has the objective to develop, demonstrate and validate advanced technologies and modules that integrate different functions and components, enabling totally new products and new middleware, and giving rise to a range of new embedded applications. The activities are to provide a route to more integrated, more miniaturised, more intelligent, more affordable, and more user-friendly products and systems. Interoperability, re-usability and improved network communication will be promoted, as well as bringing together engineering expertise of often very different nature.

The work includes the integration into multi-component assemblies, the integration of sensors, actuators with process functions in a highly miniaturised manner and the integration of peripherals in small local networks. Applications range from low cost consumer products in the home to more sophisticated systems and products in mobile communications and will bring IST affordable applications, in visible and invisible form, into the daily life of citizens.

Technology development, design, and manufacturing issues will be addressed in an integrated manner with supporting activities such as standards and take-up activities. Complementarity with national and Eureka initiatives in this field is to be demonstrated.

IV.7.1 Peripherals and networked embedded technologies

Objectives: To develop and demonstrate advanced technologies for the design, manufacturing and deployment of networked peripherals and appliances. The peripherals are considered to be networked to small networks internal to the specific environments of the home, the car and for process control.

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[7] A peripheral is an electronic module with limited autonomy and intelligence of which the full potential will only be exploited when it operates within a networked system.

[8] Subsystems are multi-component assemblies with well defined functionality and interfaces often combining active and passive elements and associated software that constitutes the functional blocks of information processing and communication systems and related products.

[9] Microsystems are intelligent miniaturised systems that combine sensing and/or actuating with processing functions. These would normally be multidisciplinary combining two or more of electrical, optical, mechanical, chemical, magnetic, or other properties and can be integrated monolithically or as a multi-chip hybrid.

Focus

The emphasis is on increased embedded and distributed intelligence, distributed storage and processing; and to improve their network communication. Very high density mass storage will also be addressed.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.7.1.

IV.7.2 Subsystems

Objectives: To develop technologies for the design, manufacturing and validation of multi-component assemblies. This includes innovative approaches to hardware/software integration, and methodologies for system partitioning and system architectures.

Focus

Emphasis is on techniques to accelerate the development of electronic products, to reduce their manufacturing and design cost, and/or to improve specific product features (user-friendliness, reliability, flexibility).

Type of actions addressed: RTD
Links with WP'99: Refocused IV.7.2.

IV.7.3 Microsystems

Objectives: To develop and validate multi-function intelligent microsystems. The work is to concentrate on research and development to enhance the manufacturing and technology base, design tools and methods, test, packaging, assembly and the integration of microsystems into products.

Focus

The task focuses on new types of products only made possible by the use of Microsystems and encompasses all industrial sectors.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.7.3.

IV.7.4 Peripherals technologies – take-up measures

Objectives: The aim is to stimulate the take-up of advanced peripherals or advanced appliances in existing networks.

Focus

Trials: The integration of different advanced peripherals or advanced appliances in existing networks as part of demonstration projects, in testbeds, promoting their benefits as 'smart' house applications, in the 'smart' car, and for manufacturing / process control purpose.

Type of actions addressed: Trials.
Links with WP'99: Refocused take-up measures of IV.7.1.

IV.7.5 Subsystems – take-up measures

Objectives: Trials: The aim is to stimulate the take-up of advanced subsystems and subsystem technologies in new products.

Best practice actions: To accelerate the first use of advanced subsystems and high density packaging technology to enhance the functionality and/or economy of existing products and systems.

Assessment actions: The target is to stimulate the rapid take-up of advanced material and prototype equipment by industry.

Focus

Trials: Adaptation and introduction in new products of advanced subsystems and subsystem technologies; and the introduction of new system design technologies and methodologies into the design flow of subsystems and subsystem based products.

Best practice actions: Application in industrial sectors where penetration of the particular subsystem technology is currently limited.

Assessment actions: The assessment of advanced material and prototype equipment for the manufacture of electronic subsystems, encapsulation and attachment of semiconductor devices.

Type of actions addressed: Trials, Best practise and Assessment actions.
Links with WP'99: Refocused take-up measures of IV.7.2.

IV.7.6 Microsystems – take-up measures

Objectives: Trials: The aim is to stimulate the take-up of advanced microsystems components and microsystem technologies in new products.

Best practice actions: To accelerate the first use of existing microsystems and microsystem technology to enhance the functionality and/or economy of existing products and systems.

Assessment actions: The target is to stimulate the rapid take-up of advanced material and prototype equipment by industry.

Focus

Trials: Adaptation and introduction in new products of advanced microsystems components and microsystem technologies; and the introduction of new microsystem design technologies and methodologies into the design flow of microsystem components and microsystem based products.

Best practice actions: Application in industrial sectors where penetration of the particular microsystem technology is currently limited.

Assessment actions: The assessment of advanced material and prototype equipment for the fabrication, integration, packaging and test of multi-function microsystems.

Type of actions addressed: Trials, Best practise and Assessment actions.
Links with WP'99: Refocused take-up measures of IV.7.3.

IV.8 Microelectronics - optoelectronics

The proposed work is driven by 4 considerations: (i) market drivers for microelectronics and optoelectronics are better connectivity and mobility, (ii) the need for European semiconductor industry to stay competitive in a global market and to face the challenges posed by the agreed International Technology Roadmap for Semiconductors, (iii) the changing environment of the semiconductor industry with the emergence of chipless/fabless IP (Intellectual Property) companies and high-level design houses and

the changing relations with system developers, and (iv) the need for the research community to concentrate efforts on selected and industrially relevant topics.

As a consequence the focus of the program will be on development of Systems-on-chip (SOC) for (i) information and communication terminals, and (ii) communication systems and networks. The objective is to enable the delivery of networked user devices with the bandwidth required for the applications and at a competitive price, hence supporting the development of ambient intelligence.

IV.8.1 Microelectronics design and test

Objectives: To develop advanced methodologies and tools for microelectronics design and test, to progress towards systems-on-silicon in information and communication terminals and in communication systems and networks. The work should be driven by requirements from concrete product development and lead to clear industrial benefits.

Focus

The following topics are addressed: (i) integration of analogue and RF functions, (ii) low power design, (iii) HW/SW co-design and co-verification, and (iv) re-use of IP (Intellectual Property) blocks, including the support to the consensus building and standardisation in the re-use of IP (Intellectual Property) blocks.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.8.1.

IV.8.2. Application-specific microelectronics

Objectives: To create enabling technologies for low cost mass market customer devices to access networked services. To open up new classes of microelectronics applications by the development, integration and validation of bases such as: (i) adaptations of microelectronics technologies including related tools and methods for embedded software, especially towards low-power, low-cost, (ii) methodologies supporting fast and easy reuse of IP (Intellectual Property), and (iii) advanced RF and mixed-signal building blocks and network interface technologies.

Focus

Of particular interest are applications areas in communicating appliances, in low-power and low-cost devices supporting the development of ambient intelligence.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.8.2.

IV.8.3 Industrial microelectronics technologies: processes, equipment and materials

Objectives and focus:

(i) To drive the research and development of compatible basic CMOS process modules (based on Si and Si/SiGe) and related equipment and materials further to enable increase of data transfer rates of communication systems and processing speed and storage capacities of terminals. Simulation of processes, devices and equipments is included. Particular emphasis is on:

(i.1) Investigation and integration of new materials (copper and/or alternative metal alloys associated with k< 2.5 dielectrics) and equipment for multi-layer metallisation schemes for < 0.13 µm CMOS,

(i.2) Advanced work on the lithography infrastructure for ≤ 0.13µm; focus is on development of resist tracks and technologies (hardware and software) for mask making (work on metrology equipment is not included),

(i.3) R&D on optical lithography for < 0.1µm feature sizes. Focus is on the optical system, including work on source assessment, and on system architecture. System concepts should be demonstrated on test rigs.

(i.4) R&D on the development of equipment and associated materials for gate stacks for < 0.1 µm CMOS, (work on front-end architectures is not included). The main functions of the equipment should be demonstrated with industrial users involved.

(ii) To improve stand-alone process options for non-volatile memory, and to integrate process options for embedding of different circuit functions on a single chip.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.8.3.

IV.8.4 Optoelectronic technology

Objectives and focus

(i) To develop advanced optoelectronic materials, devices and modules for high-speed routing, processing and interconnection with clear industrial motivation. This includes all optical and hybrid, active and passive devices enabling low-cost broadband to- and from-the-home applications.

(ii) To undertake highly integrated micro-photonic material and device research for sensing and manipulation of information that could ultimately contribute to hardware building blocks for an ambient intelligent infrastructure.

Test-beds for device characterisation and industrial validation will be addressed in AL VII.1.4.

Type of actions addressed: RTD
Links with WP'99: Refocused IV.8.4.

IV.8.5 Advanced micro- and opto-electronics

Objectives and focus:

(i) To research on advanced processes, materials and devices based on compound semiconductors and on SOI for very high frequency and low power communication applications and for high power communication applications. Cost/benefit advantages over Si and Si/SiGe for industrial use should be demonstrated.

(ii) To investigate very innovative materials, processes and components for the micro- and opto-electronics industries.

(iii) To investigate opto- and microelectronics integration (homogeneous and heterogeneous) technologies for ultra-compact information and communication components. Particular emphasis is on exploiting synergy with basic CMOS processes by integrating light emitting, photodetection and interconnection functions

Type of actions addressed: RTD
Links with WP'99: Refocused IV.8.4.

IV.8.6 Microelectronics design and test – take-up measures

Objectives: Trials: To implement, adapt and assess new types of tools and methods in close to production conditions.

Focus

For methods, the focus is on collaborative design and on reuse of IP (Intellectual Property) blocks for well identified classes of applications. For tools, all areas of microelectronics design and test can be addressed.

Type of actions addressed: Trials.
Links with WP'99: Refocused take-up measures of IV.8.1.

IV.8.7 Application-specific microelectronics and optoelectronics – take-up measures

Objectives: Best practice actions: To accelerate the first use of existing microelectronics technologies (ASICs, FPGAs, reconfigurable devices and micro-controllers) and/or optoelectronics to enhance the capabilities and/or economy of existing products and/or services.

Focus

The focus is on the integration of new communication capabilities and/or improvement of user interfaces in existing products and services.

Type of actions addressed: Best practice actions.
Links with WP'99: Refocused take-up measures of IV.8.2.

IV.8.8 Industrial microelectronics technologies: processes, equipment and materials – take-up measures

Objectives: Semiconductor Equipment Assessment (SEA): The target is to stimulate the rapid take-up of advanced prototype equipment and related OEM components and materials by the semiconductor industry.

Focus

User driven assessment of advanced prototype equipment and related OEM components and materials for semiconductor manufacture. Facility level equipment is not included. The objective is: (i) to assess beta type equipment under close to production conditions to create reference centres at user sites, or (ii) to have an early proof of innovative process concepts by adapting state-of-the-art equipment, or (iii) to have an early proof of concept for alpha type 300 mm equipment.

Type of actions addressed: Assessment actions.
Links with WP'99: Refocused take-up measures of IV.8.3.

IV.8.9 Research training in microelectronics – accompanying measures

Objectives and focus

To strengthen in critical disciplines of design and test in microelectronics leading educational centres, with the active support and guidance of industry.

To address shortage of skills in the microelectronics industry by encouraging students at pre- and post-doctoral level to carry out innovative research, jointly supported with industry.

Type of actions addressed: Accompanying measures (excluding take-up).
Links with WP'99: New action line.

3.5 CROSS-PROGRAMME THEMES

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.

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. Cross programme clusters are implemented using a support measure as defined in Action Line VIII.1.1

CPA's Priorities for 2000

Seven themes are proposed for cross-programme actions. These are described in the following action lines

V.1.1 CPA1: Extended Home environments

Objectives: to develop and experiment platforms for the integration of applications and services for the "extended" home . "Extended home" environments in this action line refer to Information Society Technologies for private and/or for professional use within homes.

Focus:

The work will focus on convergence of media and integration of broadcasting and interactive services as well as the seamless interconnection and interoperability between networked appliances, and household and consumer devices. Interoperability between home networking technologies and their integration with public networks should be

addressed as well as networked devices embedded in commonplace appliances as means for access to, and generation of combined applications and services. Cost and user-friendliness are key aspects to be considered as well as adaptability to user requirements.

Test-beds combining several services such as multimedia and interactive applications, home healthcare services, remote maintenance and control, energy management, security, electronic commerce and new ways of work are sought.

Type of actions addressed: RTD
Links with WP'99: Re-focussing of CPA1 (V.1.1) on "Integrated applications platforms and services" to better address "Ambient Intelligence" at home.

V.1.2 CPA2: User friendliness, Human factors, multilingual and multi-modal dialogue modes

Objective: To improve the effectiveness of the interaction between people, information appliances and information services through the integration and use of multiple modalities, including language, gestures, emotions, augmented, synthetic and virtual reality. The expected benefits are easier and more flexible access to information and services and, therefore, acceptance by a wider section of users.

Focus:

Focus will be on system-level integration of component technology required for improving the ease of use of complex information and communication appliances and services, such as the next generation mobiles, personal assistants, and devices used in homes, cars, schools and at work. Communication effectiveness will be achieved by avoiding clumsiness and lowering the cognitive load when interacting with rich and complex information devices and services. The work will consist of the novel integration of interaction modalities fitting specific uses and individual requirements, and supporting ubiquity of access. Multilinguality will provide access irrespective of people's preferred language. Particular emphasis will be put on test-beds for assessing the appropriateness of the communication modalities in concrete and realistic contexts, such as mobile e-services, multilingual e-commerce, e-health services, tele-education, community services and user-friendly call centres.

Type of actions addressed: RTD
Annotations: New Action line that provides a comprehensive focus on "natural dialogue and interaction modes".

V.1.3 CPA3: Ubiquitous and intelligent info-mobility and geo-information systems

Objectives: The aim is to develop, demonstrate and validate new/improved user friendly info-mobility services for transport/travel, business, tourism, leisure and other applications. These should be realised by linking fixed/mobile communications with navigation/positioning, efficient transmission and delivery over the network as well geo-information. These services allow the mobile citizen to have seamless access to, and interaction with personalised - location dependent when necessary- rich content multimedia information, and are at the same time essential parts of the autonomous and self-configuring business structures that are emerging in electronic business.

Focus:

The work will address different aspects of mobility (including virtual mobility) and will cover, in particular, the following topics:

- Info-mobility systems and services which exploit and build on the existing and future telecommunications, navigation and positioning networks, based on terrestrial and satellite (GNSS) infrastructures
- Integration of telecommunications, navigation and positioning systems with geographical information systems
- Development of technologies and tools for mainstreaming the use of geographic information also for info-mobility services, including large-scale heterogeneous and distributed collection of geo-spatial data and for creating a sustainable European landscape for geographic data creation, use, management and publishing
- Creation of new models, concepts and functionality into multimedia geo-information content, to improve its availability, accessibility, acceptability and usability, including dynamic environments and 4D applications
- Development and validation of new mobile eCommerce and eWork business models, solutions and practises for travel/transport and related info-mobility services.
- Information access and interaction techniques, including intelligent interfaces for multifaceted presentation of information.

Priority is given to user driven, interactive systems and services simultaneously contributing towards more efficient, information-based use of the transport infrastructure. Due attention must be given to accessibility, usability, dependability, quality, safety, privacy and trust of information and services, and to legal and ownership issues. Test beds can be used for testing interoperability of the developed systems and services, and for demonstrating interoperability and integration.

Type of actions addressed: RTD
Links with WP'99: New action line

V.1.4 CPA4: Large scale systems survivability

Objectives: To develop and validate innovative paradigms (like leveraging and exploiting advanced simulation) and technologies to cope with vulnerabilities of large-scale multi-jurisdictional and unbounded systems. These vulnerabilities are emerging from the tight connectivity of critical service and information infrastructures and from the extensive deployment of tightly networked embedded systems.

Focus :

- Realise dependable and survivable information systems, relying also on self-organising, self-diagnostic capabilities, and on middle-ware mediating between services provided by centrally controlled infrastructures (e.g. telephony) and services provided by self-organised or decentralised infrastructures (e.g. Internet).
- Develop and deploy appropriate information assurance approaches and technologies.
- Provide workable characterisation of affordable dependability, which would support a wide scalability of requirements and operating environment for emergent systems, services and information infrastructures.

- Manage dependability and risk in largely distributed and open systems-of-systems also leveraging on decision mechanisms that allow for trade-offs between various types of dependability attributes.

Type of actions addressed: RTD
Links with WP'99: Re-focussing of CPA2 (V.1.2) on Dependability

V.1.5 CPA5: Smart cards

Objectives: To further the development and acceptance of smart cards and electronic tags (in all shapes and forms) that ensure mobile and secure access to information society services and that accommodate a large scope of citizen and business requirements.

Focus:

- On holistic approaches spanning from usability to new business models and enabling technologies for cards, card accepting devices and back-end infrastructure. The work will cover security, mobility, interoperability, multi-functionality and harmonisation of smart card platforms. New generation smart cards are also targeted as well as the development of common tools and system interface specifications and,

- On fostering European-wide deployment across activity sectors (e.g. health, retailing, finance and banking, electronic business, communications, transport, tourism, loyalty, access control) while preserving an appropriate level of data privacy.

Type of actions addressed: RTD, Trials, Accompanying measures (excluding take-up)
Links with WP'99: New action line

V.1.6 CPA6: Next generation networks

Objectives: To foster deployment and early market adoption of an "open" modern networking infrastructure that results from the convergence of IP (Internet Protocol), fixed, mobile and wireless technologies by supporting industry driven experimentation, integration, validation and deployment of cross-boundary applications and technologies addressing interoperability and scalability. These experiments will complement laboratory testbeds and trials conducted in other parts of the programme and allow testing usability and user-friendliness in a larger scale in terms of both number of users and duration of the experiments.

Focus:

The work focuses on novel infrastructures that results from the convergence of IP (Internet Protocol), fixed, mobile and wireless technologies and architectures from a technological and service perspective. The availability of large scale converged network experiments will permit to validate technological choices in relation to issues such as scalability, security and Quality of Service and to experiment and demonstrate full service and application capabilities particularly in the context of specific industries and application sectors. Complementary dimensions are the testing of effective management tools (possibly using agent technology) across all network layers and the exploration of integrated accounting, billing and payment systems.

V.1.7 CPA7: Socio-Economic Analysis and Statistical Methods for the Information Society10

Objectives: To develop a better understanding of the challenges, impacts and opportunities associated with the deployment and use of new IST solutions whether in everyday life, at work or in business. This includes studying the interplay between a broad range of technological, human, social, economic, environmental and policy issues that critically impact effective use and adoption of new IST solutions and developing novel approaches and indicators aimed at identifying and quantifying the many new facets and trends of the Information Society and the emerging digital economy.

Focus:

This Cross-Programme Action complements and supports other more specific socio-economic activities to be undertaken within individual Key Actions. This is done by focusing more specifically on the macro-economic dimension of the Information Society and on challenges relating to usability and broad adoption of IST solutions with a particular emphasis on design requirements, skill requirements and policy requirements as they relate to job creation, equal opportunities and social inclusion. This includes (but is not limited to):

- Definition, measurement and exploitation of new socio-economic statistical indicators for the Information Society. This includes development and demonstration of new methods and tools for the collection, interchange, harmonisation, quality assurance and dissemination of statistical data.

- Understanding design requirements for usable and effective IST solutions and development of novel methodologies aimed at facilitating interactions between users and developers through the entire solution lifecycle.

- Activities aimed at exploring socio-economic issues that cut across multiple IST projects, extracting future scenarios, developing consolidated European and global analyses and identifying their potential implications for future policies activities and future work in the Programme.

Type of actions addressed: RTD
Links with WP'99: Replaces CPA4 on Statistical Methods and tools. Aims at strengthening the Socio-Economic impact of the programme including aspects like acceptability/usability of technology

[10] This cross-programme action will be elaborated in co-ordination with Eurostat.

3.6 FUTURE AND EMERGING TECHNOLOGIES

Objectives and Structure

"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 transdisciplinary or in an emerging discipline. It will reinforce the link and flow of ideas, initiatives and people between academia and industry in the EU."

This area is 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 call for proposals will be open throughout the duration of the programme.

The **proactive initiatives** have as objective the focusing of resources on a few key emerging visionary and challenging long-term goals. The selection of Action Lines for proactive initiatives is 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.

Networks of Excellence may also be launched to support a given proactive initiative in terms of cross-project coordination and of ensuring that research visions and results are shared with the broader scientific community.

RTD Priorities in 2000

Overview

In addition to the open domain and thematic networks, the following proactive initiatives are identified as priorities for the year 2000:

(1) The disappearing computer

(2) Neuroinformatics for "living" artefacts

Further initiatives for the year 2001 and beyond will be identified through appropriate consultations.

Open Domain

VI.1.1 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) 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 supports the Human Frontiers Science Programme (HFSP) - see section 5.1.

Type of actions addressed: RTD, Accompanying measures (excluding take-up), thematic networks
Links with WP'99: Same action line

Proactive Initiatives

VI.2.1 The disappearing computer

Objective: To explore how everyday life can be supported and enhanced through the use of collections of interacting artefacts. Together, these artefacts will form new people-friendly environments in which the computer-as-we-know-it has no role. The aim is to arrive at new concepts and techniques out of which future applications can be developed.

Specifically, the initiative will focus on three inter-linked targets: 1) Developing new tools and methods for the embedding of computation in everyday objects so as to create artefacts. 2) Research on how new functionality and new use can emerge from collections of interacting artefacts. 3) Ensuring that people's experience of these environments is both coherent and engaging in space and time.

In the course of the execution of the projects to be launched, further projects may be initiated at the recommendation of independent reviewers of the initiative. Such new projects will be dedicated entirely to new technologies, or approaches, that emerge from several ongoing actions and will involve appropriate combinations of partners. The aim of these new project would be to exploit opportunities to integrate components into coherent systems or architectures or to achieve interworking between them. The selection of partners amongst the researchers of the ongoing actions, as well as the outline specification of these projects, will follow advice of independent experts in consultation with the Network of Excellence co-ordinating the initiative. The financial contribution to such additional projects will not exceed 30% of the financial contribution to the projects selected in the call.

Type of actions addressed: RTD, thematic networks
Links with WP'99: New action line

VI.2.2 Neuroinformatics[11] for "living" artefacts

Objective: To explore new synergies between Neurosciences and Information Technologies in order to enable the construction of hardware/software "artefacts that live and grow", i.e. artefacts that self-adapt and evolve beyond pure programming.

Preference will be given to work that demonstrates adaptability and growth in the "real world" and that does not simply extrapolate from an already established research field (such as neural-networks or genetic algorithms).

Type of actions addressed: RTD, thematic networks
Links with WP'99: New action line

[11] This proactive initiative will be implemented in collaboration with the action "Neurosciences" under the thematic programme "Quality of life and management of living resources"

3.7 RESEARCH NETWORKING

Context, Challenges and Opportunities

Over the past years the European Commission (through the specific Programmes Esprit, Acts and Telematics) has provided crucial investments for network research and the interconnection of European National Research Networks. In the IST Programme these contributions will continue to sustain European co-operation and cohesion, foster European competitiveness and engage new players from industry, academia and start_ups.

Action line 1 (RN1) of Work Programme 1999 will contribute to upgrade the present infrastructure to Gbit/s thereby providing the opportunity for more intense inter-European research collaboration and encourage the deployment of testbeds for network research.

Europe has a unique opportunity to build, together with the National Research Networks, a world-class research network infrastructure for the research community with enough capacity to allow for the deployment of new applications and testbeds.

To stay in the forefront, Europe will also have to invest in future network technologies that are not gradual improvements, but rather constitute a parallel development that may lead to a replacement of present technologies.

Objectives

The first objective (action line RN1) is to build a world-class Gbit/s network to ensure continuity by upgrading the existing European interconnection of national research and education networks. The resulting networking services and capacity must match the aggregated needs of European researchers and allow for the deployment of application experiments and address the needs of virtual institutes and labs.

The second objective (action lines RN2, RN3 and RN4) is to support the use of advanced network features and testbeds that are needed to test, validate and demonstrate new technologies and services in “real-world” settings. The practical experience gained in deploying emerging technologies in realistic settings will help European research and industry to play a leading role in defining the next generation of networking and application technologies that go beyond the state-of-the-art.

Architecture and Implementation

The first action line concerns the provision of networking capacity and services. It will be implemented in concertation with the National Research Networks who will organise competitive tenders, according to the public procurement rules and in compliance with market regulation.

Usage and access costs to the interconnection infrastructure should be supported at project level.

The second objective will be implemented through RTD activities, demonstration projects and complementary IST Support Measures.

Both objectives are related in the sense that the provision of advanced network features and testbeds can be based on the services provided by the trans-European research networking infrastructure (for example to interconnect local testbeds). Within the IST workProgramme 2000, all the four action lines are designed to play a central role in supporting services for research networking and networking research. Openness, scalability, interworking and convergence of technologies are fundamental issues to be addressed.

The action lines described here should be understood in the context of the results from the Call opened during 1999.

Action Line Descriptions

VII.1.1 RN1: Interconnection of Research Networks

Objective: To procure and manage state-of-the-art trans-European broadband interconnections amongst National Research Networks. That will lead to a scalable, smoothly expandable pervasive European interconnection network that can serve the growing needs of national research networks, scientific labs, industrial research institutions and IST projects. This implies upgrading existing capacities to multi-Gbit/s, introducing end-to-end support for different levels of 'Quality of Service', improving connectivity to third countries, and includes monitoring the usage of such services and the capability to track evolving user requirements.

VII.1.2 RN2: End-to-End Application Experiments

Objective: Support large scale experimentation with middleware and end-to-end applications making use of innovative types of terminals. This experimentation calls for the involvement of real users in the context of problem-oriented testbeds. The applications addressed might require non-disruptive network services such as ad hoc (plug and play) connectivity, active networking, reliable multicast, security, mobility, seamless transition over heterogeneous networks, QoS and scalable and adaptable network protocols for evolving applications. In this context IPv6 is seen as a key enabler for future testbeds, applications and middleware running on them.

Type of actions addressed: RTD
Links with WP'99: Re-focussing of RN2

VII.1.3 RN3: Testbeds for Integration of Access Technologies

Objective: To support the use of testbeds to promote the rapid deployment and integration of competitive access technologies and their seamless integration with existing fixed infrastructure, through validation and demonstration in realistic settings. The aim is to provide support for improving the availability of applications and services and their accessibility by a realistic user base. Focus is on integration and interworking of various access technologies (e.g. fixed, mobile and wireless) and mobile devices enabling increased levels of mobility across local and wide area networks.

Type of actions addressed: RTD
Links with WP'99: Re-focussing of RN2

VII.1.4 RN4: Testbeds for Future network technologies

Objective: To support the use of long term testbeds to foster experimentation with alternative/disruptive network technologies (all optical networks, terabit and petabit-routing, IP(Internet Protocol) over WDM, optical packets, wireless core networks, …) and their proof-of-concept demonstration. Such testbeds may also include the industrial validation of newly-developed optoelectronic components.

Test-beds which cannot be accommodated on the research networking infrastructure resulting from RN1, and which require a separate infrastructure capable of supporting trials which could cause network disruption, can be considered in this context.

The work will lay the foundation for future advancement and accelerate the availability of new components, services and applications. The establishment of the right partnerships amongst research organisations, industry, equipment manufacturers and carriers is essential.

Type of actions addressed: RTD
Links with WP'99: Re-focussing of RN2

4 IST SUPPORT ACTIVITIES

Many accompanying measures and concerted actions relate directly to the support of specific research activities undertaken by the Key Actions, FET or Research Networking. These are defined as Action Lines in the related sections of this document. The support measures and action lines described in this section confine themselves to the more common issues where more than one part of the programme is essentially seeking the same kind of support.

IST Support Activities run in parallel with the RTD, and are employed to *prepare* (before), *support* (during) and facilitate the rapid adoption 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 projects (sharing common objectives), concertation between projects (needing to exchange information), and working groups and networks of excellence (to encourage flexible collaboration between leading researchers both inside and outside of the programme). Support to the standards and pre-standards process are encouraged in all areas.

Support activities may be submitted at any time (refer to the current *call for proposals*) and are evaluated in batches. Further detailed guidance on how to prepare and submit these type of proposal are contained in the *Guide to Proposers*. Some IST dissemination and awareness actions may have to be subject to specific calls for tender, following the procurement rules applicable to the Commission. Support to conferences, seminars, workshops or exhibitions are part of a call for grants that has been already published.

VIII.1.1 Project Clusters

Objectives: To facilitate synergy between existing projects that have agreed to undertake part(s) of their work in close-co-operation with one another. Clusters can address areas within one key-action or cross-programme themes. Participation of relevant interest groups (that may not otherwise be present in IST) is specifically to be encouraged.

Focus:

Though the issues to bear as addressed in this action line are left totally open to suggestions from proposers, the analyses of results of previous calls and consultations with funding partners concur on several domains where projects clustering can bring a significant added value. These domains include: The 21st century home, service dialogues and interoperability, cross-sensory transposition of content and - internet services on mobile networks.

Type of actions addressed: Concerted actions

VIII.1.2 Networks of Excellence and working groups

- Networks of Excellence aim at bringing together a critical mass of industrial and academic research groups to co-ordinate their research or other activities in order to advance towards common strategic goals. Networks of Excellence can be particularly beneficial for groups and organisations 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 share a common theme in RTD or take-up activities

  Working groups and networks of excellence are also used to support co-operation in areas that are complementary to the RTD work such as fostering the entrepreneurship culture in academic curricula and normalisation and standardisation activities.

Type of actions addressed: Thematic networks

VIII.1.3 Channelling of Standardisation and Interoperability initiatives

Objectives: To maximise the openness, balance, the coherence and timeliness of contributions channelled towards specific standardisation and interoperability initiatives

Focus:

Networks of excellence and joint working groups bridging IST researchers and the competent technical committees of standards bodies and other open fora

Type of actions addressed: Thematic networks

VIII.1.4 Improving Human Capital in IST-Research (IHC)

Objectives: To help improve Europe's knowledge base by developing the professional skills of academic graduates working in fields related to the "User-friendly Information Society". Funded actions should aim to reduce existing knowledge gaps, and stimulate progress in the societal and economic aspects of what is to be an Information Society, also from the viewpoint of non-technological disciplines. Co-operation and exchange between industry, academia and research centres will play an important role in this context.

Focus:

Specific individual measures, or framework structures for inter-alia, broadening the expertise of senior personnel; efficient use and / or transfer of knowledge from those about to leave their jobs; training of younger personnel.

Cross-disciplinary co-operation in the training of researchers, which might variously take the form of "on-the-job" training schemes, educational courses or other appropriate actions; either as local "*IHC* training measures" or "*IHC* training networks" or "Marie Curie Industry Host Fellowships "(see Guide for Proposers)

Type of actions addressed: Training accompanying measures, training networks, training fellowships,.

VIII.1.5 Enabling RTD Co-operation with Newly Associated States[12]

Objectives: To build awareness of IST and facilitate the formation of project consortia that will include partners from the Newly Associated States

Focus:

Support will be considered for working groups and thematic, information, and partnering networks, for regional information centres, facilities and web-sites, and for the organisation of events, in conjunction with the horizontal programme on "confirming the

[12] Newly Associated States are the States that are associated with the 5th Framework Programme and were not associated with the for the previous Framework Programmes

international role of the European Community". Sub-regional activities (e.g. in the Balkan area) are encouraged.

Type of actions addressed: Thematic networks, Accompanying measures (excluding take-up)

VIII.1.6 Enabling RTD Co-operation with 3rd Counties

Objectives: To build awareness of IST and facilitate the formation of project consortia that will include partners from 3rd countries. To support and develop more efficient means of co-operation with such countries.

Focus:

Support will be considered for working groups and thematic, information, and partnering networks, for regional information centres, facilities and web-sites, and for the organisation of events, Co-ordination with other major RTD frameworks via “business partnership workshops” and via international conferences and forum is encouraged.

Type of actions addressed: Thematic networks, Accompanying measures (excluding take-up)

5 CO-ORDINATION ARRANGEMENTS WITH OTHER EU RESEARCH INITIATIVES, AND RELATED SUPPORT MEASURES

To help prospective proposers situate their ideas in a wider context of opportunities, a number of related initiatives known to be taking place outside of the IST programme are presented here. These are variously elsewhere within the 5th Framework programme, or in related frameworks such as COST and Eureka, or in various support activities being out-sourced by the Commission (through Calls for Tender).

5.1 INTERNATIONAL CO-OPERATION

The strategic objectives of this theme are to encourage the widest possible international co-operation to: *achieve upstream global consensus* for interoperability and standardization; *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 and the Balkan region, while protecting European IPR.

International co-operation activities will be implemented through the participation in the IST Programme of entities from non-EU countries, the co-ordination of activities with European and non-European schemes outside of the IST Programme, and dedicated accompanying measures.

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 countries[13].

Cross participation in other major RTD frameworks (such as the ATP programme in the US, "Electronic Commerce" programmes of MPT and MITI in Japan, and established frameworks such as IMS[14]) on specific Action Lines in the Programme will be stimulated through the co-ordination or synchronisation of focused Calls for Proposals. Considering the unique skills encompassed by the Human Frontier Science Programme (HFSP), a subvention will be made available for the whole duration of the 5th Framework Programme.

Actions for undertaking wider information exchange at the international level on the development of the information society are also called for, to liase with national foresight organisations, including 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 or Russia. Focused workshops will be supported to bring key contributors together and to consolidate ideas. In 2000 priority will be given to international exchanges on the implications of electronic commerce for international trade, taxation and economic governance (in conjunction with the activities of the Global

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/)

Business Dialogue), and on the impacts of globalisation and de-localisation of economic activity in both industrialised and developing countries.

5.2 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.

5.3 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. 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 2000, 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 2000, 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". 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.

5.4 STANDARDISATION INITIATIVES

International consensus and standardisation will be a priority in IST work and in international co-operation. In 2000, 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 are also to be established to support European involvement in the Global Business Dialogue focused on the global regulatory environment and common business guidelines for electronic commerce.

5.5 OTHER, INITIATIVES

Cost

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 co-operation

activities may also be implemented through the modalities and objectives described in the work-programme of the horizontal programme "Confirming the international role of European Research", including through subventions to the COST actions.

Ten-Telecom and Eureka

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 EUREKA projects and about activities of TEN-Telecom support will be made available to all IST programme participants.

Co-ordination with other major RTD frameworks in emerging economies on sets of Action Lines in the Programme will be implemented through arrangements with funding agencies in the third countries. Support measures will be designed to maintain links with EU-trained IST specialists in third countries, which will target emerging economies, and will be launched in 2001.

6 AN INDICATIVE TIMETABLE FOR IMPLEMENTATION

The programme is implemented over 4 years.

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.

The first Call for Proposals (the third IST call) in 2000 will be published in February 2000. This will allow new RTD projects to start work, with signed contracts, before the end of 2000.

A fourth Call for Proposals will be published on 15 June 2000. The proposals submitted in response to this call will be evaluated in October 2000, and will take up part of the provision for budget commitment in 2001, with projects starting in early 2001.

A fifth Call for Proposals will be published on 15 September 2000. The proposals submitted in response to this call will be evaluated in January 2001, and will take up part of the provision for budget commitment in 2001, with projects starting in mid 2001.

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 for coherence within each call and to address strategic themes in a structured fashion.

The indicative timetable and scope for Calls for Proposals in 2000 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.

6.1 CALLS FOR PROPOSALS IN 2000

First Call

Publication Date : 15/02/2000	Indicative Budget:

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals					
RTD	**Health (3 Als) (I.1.1,I.1.2, I.1.3)**	**II.1.3, II.2.1, II.2.2, II.4.1**	**III.1.2,III.1.4, III.2.1, III.2.2, III.3.1, III.3.2, III.3.3**	**IV.5.2, IV.5.3**	**V.1.4 CPA4** **V.1.5 CPA5** **VI.2.1 FET P1** **VII.1.2 RN2** **VII.1.3 RN3** **VII.1.4 RN4**
TAKE-UP/support measures	**1.1.4**	**II.1.6 KA 2 Specific Support Measures**	**III.5.1 KA 3 Specific Support Measures**		
Continuous Submission Procedures until					
RTD					**VI.1.1. FET O**
Support Measures					**VIII.1.X IST Support Activities,**

Second Call

Publication Date : June 2000	Indicative Budget :

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals					
RTD	**All other RTD AL's** **(I.2.1, I.3.1, I.4.1, I.4.2, I.5.1, I.5.2, I.5.4)**	**II.1.1, II.1.2, II.1.4, II.3.1, II.4.2**	**III.1.1, III.1.3, III.1.5, III.1.6, III.2.3, III.4.1, III.4.2, III.4.3**	**IV.2.2, IV.2.4, IV.3.1, IV.4.1, IV.4.2, IV.5.4, IV.6.2, IV.7.1, IV.7.3, IV.8.1, IV.8.3,**	**V.1.1 CPA1** **V.1.2 CPA2** **V.1.3 CPA3** **VI.2.2 FET P2**
TAKE-UP/support measures		**II.1.6** **KA 2 Specific Support Measures**	**III.5.1** **KA 3 Specific Support Measures**	**IV.2.5, IV.3.4, IV.4.3, IV.6.3, IV.7.5, IV.7.6, IV.8.6, IV.8.7, IV.8.8**	
Continuous Submission Procedures until					
RTD					**VI.1.1 FET O**
Support Measures					**VIII.1.X** **IST Specific Support Activities**

6.1.3 Third Call

Publication Date : September 2000	Indicative Budget :

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals					
RTD			**III.3.4**	**IV.2.1, IV.2.3, IV.3.1, IV.3.2, IV.3.3, IV.5.1, IV.5.5, IV.6.1, IV.7.2, IV.7.5, IV.7.6, IV.8.2, IV.8.4, IV.8.5,**	**V.1.6. CPA6 V.1.7 CPA7**
TAKE-UP/ support measures	**I.4.1, I.5.3**	**II.1.6 KA 2 Specific Support Measures**	**III.5.1 KA 3 Specific Support Measures**	**, IV.3.5, IV.6.4, IV.7.4, IV.8.9**	
Continuous Submission Procedures until					
RTD					**VI.1.1 FET O**
Support Measures					**VIII.1.X IST Specific Support Activities**

6.1.4 Intelligent Manufacturing Systems Initiative (IMS) Call

A separate *joint* call for the "Intelligent Manufacturing Systems Initiative[15]" (IMS) has been published in conjunction with the Specific Programme "Competitive and Sustainable Growth" (see Section 5.1 on international cooperation). The indicative budget is 35 M EUR for 1999-2000 of which 15 M EUR is foreseen for 2000. The IMS "continuous submission" call has been 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.

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

7 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:	Type of **Take-up measure**. See definition in Annex 1.
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	Type of **Take-up measure.** See definition in Annex 1.
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	Type of activities supported by the programme: See definition in Annex 1.
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
Research Infrastructures	Facilities necessary for conducting research or for supporting the researchers. These may include research institutions, laboratories, test-beds 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. RTD is also used to indicate one of the "types of actions addressed" in the Action Lines description. It then refers to R&D, Demonstration or Combined projects as defined in the Guide for Proposers.
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** supported by the programme: See definition in Annex 1
UMTS	Universal Mobile Telecommunications Services
W3C	World-Wide Web Consortium

8 INDEX OF ACTION LINES

ANNEX 1: TYPES OF ACTIONS SUPPORTED IN WP2000 - IMPLEMENTATION MODALITIES

The IST programme is implemented through the indirect RTD actions as provided for in Annexes II and IV to the fifth framework programme. These indirect RTD actions comprise: shared-cost actions, which is the principal mechanism for implementing the specific programmes, as well as support for networks, concerted actions, accompanying measures and training activities. These actions are presented briefly in this annex. For more details the reader should refer to the document entitled "G*uide for Proposers"* of the IST programme. The general rules[i] are as follows:

(a) Shared-cost actions

- **Research and technological development (R&D) projects** – projects obtaining new knowledge intended to develop or improve products, processes or services and/or to meet the needs of Community policies (financial participation: 50 % of total eligible costs[ii,iii])

- **Demonstration projects** – projects designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly (financial participation: 35 % of total eligible costs[4,5])

- **Combined R&D and demonstration projects**– projects combining the above elements (financial participation: 35 to 50 % of total eligible costs[4,5])

- **"SME Co-operative" research projects** – projects enabling at least three mutually independent SMEs from at least two Member States or one Member State and an Associated State to jointly commission research carried out by a third party (financial participation: 50 % of total eligible project costs[4])

- **"SME Exploratory" awards** – support of 75 % of total eligible costs[iv] for an exploratory phase of a project of up to 12 months (e.g. feasibility studies, validation, partner search).

(b) Training fellowships

Marie Curie fellowships are either fellowships, where individual researchers apply directly to the Commission, or host fellowships, where institutions apply to host a number of researchers (financial participation: maximum of 100 % of the additional eligible costs necessary for the action[v]). The IST programme support the following type of training fellowship: Industry Host fellowships.

(c) Thematic networks

Thematic networks for bringing together e.g. manufacturers, users, universities, research centres around a given S&T objective. Support will cover maximum 100 % of the eligible costs necessary for setting up and maintaining such networks. The IST programme support Research Training Networks and the following types of Thematic Networks: Networks of excellence and Working groups.

(d) Concerted actions

Actions co-ordinating RTD projects already in receipt of funding, for example to exchange experiences, to reach a critical mass, to disseminate results etc. (financial participation: maximum of 100 % of the eligible costs necessary for the action). These include co-ordination networks between Community funded projects. The IST programme support the following type of Concerted Actions: IST project clusters.

(e) Accompanying measures

Actions contributing to the implementation of a Specific Programme or the preparation of future activities of the programme. They will also seek to prepare for or to support other indirect RTD actions (financial participation: maximum of 100 % of total eligible costs). The IST programme support the following types of Accompanying Measures: Studies, Dissemination and awareness actions and training actions and Take-up Measures.

Take-up Measures

Take-up measures in the IST Programme are a special kind of accompanying 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 in the IST Programme 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).

- *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).

- *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.

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. The support Nodes will be called through Calls for Tender.

The IST Programme will not necessarily open all the above mentioned types of actions in all calls. Please refer to the 'road-map' , the Call texts in the Official Journal and section V of the Guide for Proposers to see which actions are called for in the different calls.

Support to conferences, seminars, workshops or exhibitions are part of a call for grants that has been already published. Application forms for these grants can de found on the programme web site.

[i] In the Decisions adopting the Specific Programmes, there can be no derogation from the financial participation rates set out here, with the exception of duly justified special cases

[ii] The rates may need to be adjusted in individual cases to comply with the Community framework for State aid for R&D (O.J. C 45, 17.2.1996) and with article 8 of the WTO Agreement on subsidies and countervailing measures (O.J. L 336, 23.12.1994). If the project is supported financially by a Member State or one of its public bodies, the cumulation rule applies, according to item 5.12 of the above mentioned Community framework.

[iii] In the special case of legal entities which do not keep analytical accounts, the additional eligible costs generated as a result of the research will be financed at the rate of 100 %

[iv] EC funding up to maximum of €22,500

[v] In the case of industrial host fellowships, this will normally approximate to 50 % of the total eligible costs