EUROPEAN COMMISSION

Information Society Technologies

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

2001 Workprogramme

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.

The IST Programme is implemented through a series of annual workprogrammes, each of which is developed in close co-operation with industry, academia and user organisations. Advice for the workprogramme is provided by the IST Advisory Group (ISTAG) and the Programme Committee. This advice helps define priorities which, with further specifications and consultations, result in the Action Lines described in the workprogramme. The consultation process for the 2001 workprogramme (WP2001) comprised also meetings and workshops that involved more than 400 IST experts from industry and academia. Reports of these meetings can be found on the programme Web site (www.cordis.lu/ist).

The workprogramme follows 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"). The 2001 workprogramme thus lays out the Action Lines for the Calls for Proposals to be published in calendar year 2001 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 2001, though this always remains subject to formal confirmation through publication of each Call.

As a result of the first three IST Calls for Proposals in 1999 and 2000, over 4300 proposals were received, requesting a budget of over 8 billion Euro. Following independent expert evaluation, 950 proposals were selected for support from an available budget of around 1.5 billion Euro. WP2001 builds on experience gained from these Calls, and takes into account the projects now being launched. The fourth IST Call for Proposals was launched on 15 July 2000 and the fifth Call on 15 September 2000. The results of these Calls will be taken into account in future revisions of the workprogramme. Detailed figures and statistics on participation and results of these Calls are available on the programme Web site including an integrated analysis of the programme's portfolio of projects (The IPPA report, www.cordis.lu/ist).

2 PROGRAMME OBJECTIVES, IMPLEMENTATION APPROACH AND STRUCTURE

2.1 THE CONTEXT

Information Society technologies (IST) are increasingly transforming our lives. Their social and economic impact is far reaching and represents key opportunities and challenges for individuals, industry and governments. Beyond new forms of doing business and accessing services, the expectations of citizens for a better quality of life are high as they start to appreciate the wider range of possibilities that IST applications and products can offer. Examples can be seen in the development of worldwide open communities that share knowledge and resources for work, for education, for culture, or for leisure. The ability of Europe to manage successfully this transformation and to contribute significantly to its progress is critical for employment, growth, industrial competitiveness and the living standards of its citizens. As expectations grow so do some risks, such as the social exclusion of the IST "have nots" or violation of information security and privacy. These risks are ones that policy makers, industry and the society as a whole have to address.

The uptake of IST products and services in Europe for private or professional use is accelerating, while technology and commercial leadership is confirmed in several areas such as mobile communications and digital TV. However, IST have still to be more widely deployed in homes, businesses, government and general interest services. At the same time, European IST industry is striving better to master technology and business chains that are critical for its competitiveness and growth. A sustained RTD effort that is driven by challenging applications and that fosters innovation in technology and its uptake is an essential element of this development process.

In its report on *"Orientations for WP2000 and beyond"* (WWW.cordis.lu/ist/istag.htm), the IST programme advisory group (ISTAG) suggested that the Programme should further focus its activities on the realisation of a vision that is user centred and aims at achieving an "ambient intelligence landscape". The vision targets the development of an Information Society that is inclusive for ALL and benefits women and men equally. It builds on Europe's demonstrated strengths in critical sectors such as mobile and fixed communications, consumer electronics, general electronic appliances, software and system integration, advanced service systems, digital broadcasting and rich content and network infrastructures.

The European Commission has also launched in December 1999 the ***e*Europe** initiative which aims at accelerating positive change in the Union and at bringing the benefits of the Information Society within the reach of all Europeans. The main objectives of *e*Europe are: "*Bringing every citizen, home and school, every business and administration into the digital age and online; creating a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas; ensuring the whole process is socially inclusive, builds consumer trust and strengthens social cohesion."* An Action Plan for *e*Europe[1] has been adopted in June 2000 and includes three main lines to be implemented before the end of 2002. It aims at a *cheaper, faster and secure Internet*, *at investing in people and skills and stimulating the use of the Internet.*

The IST programme and *e*Europe have inter-linked objectives and operate at complementary and interconnected time scales. The programme in the 2002 time frame

[1] (http://www.europa.eu.int/comm/information society/eeurope/actionplan/)

will contribute to *e*Europe mainly through its dissemination activities, take-up and demonstration actions in several sectors including electronic commerce, smart cards, health, education, transport and in the upgrade of the research networking infrastructure. Projects that resulted from the first calls of the programme as well as those supported in the previous Framework Programme, will also contribute to the *e*Europe action plan by providing innovative solutions for businesses and public services. Beyond 2002, the programme will reinforce the *e*Europe initiative by providing support for a sustainable development of the Information Society while achieving the programme's vision of the ambient intelligence landscape. This RTD effort at the European level will be also articulated with initiatives in the Member and Associated States to reinforce the establishment of a European Research Area.

2.2 THE PROGRAMME VISION

The Programme, with the help of the ISTAG and the IST Programme Committee and taking into account the policy objectives of the Union, has identified a set of focal directions for the work in 2000 and beyond. These place the needs of the user, i.e. the citizen at home, at work, at leisure or on the move, at the centre of future development of IST.

The vision, on which the Programme directions are based, is very simple: "Our surrounding is the interface" to a universe of integrated services. This will enable citizens to access IST services wherever they are, whenever they want, and in the form that is most natural for them. 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.

The workprogramme 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 these 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 anywhere/any time access to services. This requires new tools and business models for service design and provision and for content creation and delivery.

- 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. It also requires a strong linkage and proper articulation between technology, applications and policy developments and implementation. The vision has already been incorporated in WP2000 and continues to drive the programme activities. It reinforces the *e*Europe initiative by providing a long term perspective for the development of the information society while promoting test beds, user involvement and a strong infrastructure.

Implementing the vision

The progress of the programme against the vision and the business and technology trends is analysed in the IPPA (Integrated Programme Portfolio Analysis, http://www.cordis.lu/ist/) report. The IPPA exercise is conducted by a group of independent experts and comes after each IST Call for Proposals. Following the second call, the IPPA experts concluded that while an important strength of the Programme is the clear focus on market opportunities in the five year range, a longer term effort was also needed better to contribute to the building of future skills and know how.

The ISTAG, taking into consideration the *e*Europe action plan, the results of the IPPA exercise and the conclusions of the programme consultation meetings, have provided additional precision on orientations that the programme should follow to implement the vision. These are provided in the report on *"ISTAG Orientations for WP2001 and beyond, Implementing the vision"* (http://www.cordis.lu/ist/).

In particular, the report identifies a set of key enabling technologies that are critical for the realisation of the vision. The report proposes that these technologies be addressed in terms of applications and underlying technologies in the programme and suggests that the programme should encourage and accommodate longer term research, the results of which should affect the market in the 5-10 year range. It also recommends further stimulation of innovation and high risk, high reward research, and encouragement of participation from new communities and new collaborations between communities. The key technologies and their applications are reflected in the WP2001 priorities.

2.3 PRIORITIES FOR WP2001

WP2001 is focussed on the challenges of realising the vision from its various perspectives and time-scales including technology, applications and policy issues in the context of *e*Europe. The priorities for 2001 are:

- To improve natural and personalised interactions with IST applications and services. This includes multilingual/multimodal interaction systems that are adaptable to the user's preferences and lifestyle (e.g. sensitivity to gender, age and culture).

- To foster the development and convergence of networking infrastructures and architectures, including the integration of fixed, mobile, online and broadcasting technologies, as well as progress towards future versions of the Internet Protocol and broader band communications.

- 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 build on European strength in mobile and wireless technologies and develop next generation systems and their applications in e-Commerce, e-Work, transport, health, governments and other general interest services.

- To develop middleware, distributed systems, multi-layered architectures and agents-based systems to enable interoperability, inter-working, openness and integration of applications and services across platforms. This includes the technologies and methodologies that enable businesses and organisations to deploy agile and integrated processes in support of the development of new value chains.

- To improve the tools and methodologies that enable creativity in content production and presentation, in the context of converging access and delivery systems. Particular emphasis is put on semantic based information management and intelligent agents technologies and applications.

- To emphasise trust and security, including information security, privacy, suppliers and users rights and dependability of systems and infrastructures, as a general requirement for all technologies, applications and services.

- To support the development of large scale demonstrations and trials for the adoption and development of IST products and services that involve citizens and businesses of all sizes across Europe. This will be in support of the implementation of the *e*Europe action plan.

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

In addition, these priorities will be complemented by 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, social cohesion and sustainability in the Information Society.

From a policy integration perspective and in the context of *e*Europe the aims include:

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

- Supporting existing European policy objectives with technological developments, for example in areas such as data security; data protection and privacy; rights management; consumer protection; and 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, e-Commerce and social and economic affairs.

- Supporting non-IST research disciplines by developing the tools that underpin the new models for doing research, in particular in the context of the *e*Science initiative.

- Reinforcing the links to standardisation and industrial consensus development to ensure coherence in Europe wide technology deployment and in the creation of a new, open framework for fair competition and rapid innovation.

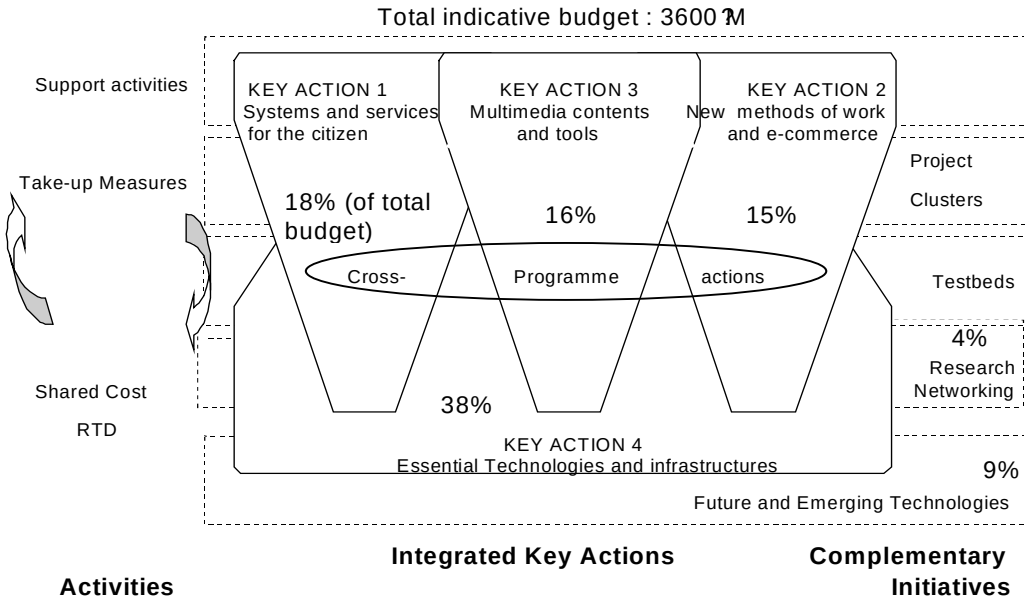
- Anticipating market needs and nurturing emerging technologies where public funding can make a substantial impact, by aggregating fragmented research and building critical mass ahead of market maturity.

The IST Programme supports EU policies, notably in employment, economic and social cohesion 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*".

2.4 A SINGLE INTEGRATED PROGRAMME ARCHITECTURE

The IST Programme is structured around four interrelated Key Actions (KAs) 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.



Programme structure and indicative budget distribution

For the purposes of the workprogramme, the KAs 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. Therefore specific measures are also included to further strengthen Programme integration:

- First, the Programme supports cross-programme actions that focus on a limited number of specific themes relevant to the entire IST Programme.

- Second, 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.

- Third, Project Clusters aim to facilitate synergy between projects that want to undertake part of their work in close co-operation with one another. This means that projects may decide to co-ordinate aspects of their ongoing work, because they have complementary objectives and see added value e.g. to enrich the capabilities of a group of projects because of complementary knowhow and skills or to create a critical mass of resources focused upon issues of strategic importance.

The architecture of the workprogramme should therefore not be perceived as representing rigid boundaries but rather as an opportunity to combine expertise in

proposals which span more than one domain of application or integrate in an innovative way a set of heterogeneous activities.

Work in the IST programme is conducted in close cooperation with other Programmes. This includes close cooperation with the "Competitive and Sustainable Growth Programme", the "Energy, Environment and Sustainable Development Programme", "Quality of Life Programme" and the Programme on "Increasing Human Research Potential and the Socio-Economic Knowledge-Base". This close relationship also extends to issues relating to SMEs and entrepreneurship. The aim is to ensure that complementary areas are addressed adequately across the programmes. Examples of such areas include nano-technologies, micro-systems, Intelligent Manufacturing Systems and smart organisations, health, transport and environment.

In addition, the programme encourages multi-disciplinary research combining IST with other fields such as socio-economic research, biology, genetics and chemistry. It is therefore open to consortia that bring together complementary skills from different research domains.

2.5 SELECTIVITY AND INNOVATION

As explained above, the Action Lines in this workprogramme have been selected to match the Programme priorities and show clear added value in co-operation at European level.

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 state of the art 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. Innovation depends on the area that is covered in a proposal as well as on the type of action addressed. Additional aspects of innovation that are specific to the areas covered in a Key Action are included in its description.

Consortia can propose long term projects with an expected time to market beyond the 5 years or shorter term research and/or demonstration projects. The projects' workplan, management plan, internal review mechanisms etc. must be appropriate to the particular type of project. 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.

2.6 TYPES OF ACTIONS SUPPORTED

The IST Programme is implemented through the indirect actions provided for in Annexes II and IV to the 5th 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 interaction between these actions is sought in the IST Programme and mainly between RTD actions and take-up actions which are the main implementation instruments of the Programme. Take-up activities in 2001 include Trials, Best Practice, Assessment and Access actions. For more details the reader should refer to Annex 1 to the workprogramme or to the documents 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 workprogramme for 2000 (WP2000).

2.7 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[2, 3]. 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, entrepreneurship of Europeans and in ensuring economic and territorial cohesion.

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, the employment policy in the employability, entrepreneurship, adaptability, equal opportunities, social cohesion, public health, public procurement, media, education and training, security, protection of privacy and personal data[4], convergence and telecommunications regulation; and EU enlargement. To this end, IST analysis 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[5] through the IST Programme Committee and to other interested parties.

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2 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

3 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).

4 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.

5 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 2001 IST workprogramme content for:

- The Four Key Actions (KA I-IV)
- Cross-programme Themes
- Future and Emerging Technologies (FETs)
- Research Networking (RN)

Each section starts by *reminding* the objectives given in the IST Specific Programme and is followed by work described in terms of Action Lines.

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 for Proposals 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 for 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 interoperable general interest application systems to meet user demands for flexible access, for everybody, from anywhere, at any time. Work encompasses RTD in the following fields: health, special needs (including ageing and disability), administrations, environment, transport and tourism.

The needs and expectations of the typical users in all fields will be addressed and special attention will be given, in particular, to the usability, acceptability and cost-effectiveness of the new application systems, including the security and privacy of information and the socio-economic and ethical aspects."

Strategy, Architecture and Focus

The priority for KA I is to enable European users (citizens, businesses, public authorities) to take advantage of the recent advances in ubiquitous computing, ubiquitous communication and intelligent interfaces to improve access to and delivery of general interest services.

KA1 focuses on the development of innovative application systems. Proposers should demonstrate that their proposals have the potential to lead, at the end of the project, to a significant qualitative step forward in the provision of new or improved application systems.

The onus is on proposers to demonstrate how their proposed innovative systems represent clear progress compared to the state of the art, in particular with respect to user friendliness and cost effectiveness.

Examples of KA1 innovative applications systems might include: new assistance systems for improving access to and delivery of government online services, new systems for the remote monitoring of health, environment, transport (including intelligent transport systems) or tourism, or new assistive systems for people with special needs.

Work may involve the innovative integration of state of the art IST generic sub-systems or may require research and development of dedicated IST components and tools (e.g. new sensors or new interfaces). In most cases both aspects will be present.

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

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

Specifically, it is intended not only to improve general interest services in the Information Society but also to enable European industry to take advantage of the major opportunities offered to early adopters and promoters of ambient intelligence

technologies. This will help those public and private organisations charged with the provision of general interest services in the health, special needs, administration, environment, transport and tourism fields to achieve an ever higher quality of service. It will also contribute to the *e*Europe initiative.

Research consortia can propose both long term projects with an expected time to market of between 5 to 10 years or medium term research and/or demonstration projects with an expected time to market between 3 to 5 years. Consortium, workplan, management plan, internal review mechanisms etc. must be appropriate to the particular type of project.

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 and user participation in consortia (including public sector users) is needed to further this end.

RTD Priorities in 2001

A total of 7 Action Lines for RTD and 2 for take-up and demonstration actions have been identified as priorities for Calls for Proposals in 2001.

Overview	**Action Lines for 2001**
I.1 Health	• Intelligent environment for citizen centred health management • Intelligent collaborative environments supporting continuity of care • Best practice and trials in e-Health
I.2 Persons with Special Needs, including the Elderly and Disabled	• Intelligent assistive systems for social inclusion.
I.3 Administrations	• Intelligent environment for public sector workers at all levels. • Best practice and trials in administration systems
I.4 Environment	• Best practice and trials in environment management
I.5 Transport and Tourism	• Intelligent transport systems • Integrated vehicle infrastructure systems • Ambient intelligence based application systems for mobile users and travel/tourism business • Take-up in transport and tourism systems

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Action Line Descriptions

I.1. Health

IST2001 - I.1.1 Intelligent environment for citizen centred health management

Objectives: To allow all citizens, including those predisposed to diseases, to respond to risk factors (such as high blood pressure, diabetes or high cholesterol levels) whether at home, work, school or on the sports field, through new generation systems - for example information and decision support systems - which take advantage of advances in ambient intelligence.

Focus:

- User friendly and personalised interactive secure systems to provide citizens with general health information and guidance.

- Portable secure systems for citizens to monitor their health.

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

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: Adaptation from Action Line IST2000 - I.1.1

IST2001 - I.1.2 Intelligent collaborative environments supporting continuity of care

Objectives: To enable patients and health professionals to collaborate and share patient and other health related data for continuity of care. This will help patients who are not confined to hospital to participate actively, in close collaboration with their health care provider, in their ongoing care.

Focus:

This work will focus on technologies and systems supporting care at the point of need and collaborative environments for ensuring continuity of patient care at all levels. It should in particular take into account advances in virtual and collaborative environments including collaboration across medical specialities, sensor technologies, interfaces and intelligent agents, virtual reality and simulation, and 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 telemedicine services for European citizens.

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: Adaptation and merging of Action Lines IST 2000-I.1.2 “Intelligent environment for patients” and IST 2000-I.1.3 "Advanced interactive environment for doctors and nurses".

IST2001 - I.1.3 Best practice and trials in e-Health

Objectives: To promote the uptake of health telematics applications at healthcare provider and healthcare authority/administration level in order to support e-Health

initiatives adopted in Member and Associated States. Such initiatives include: online medical advice and information for citizens; assessment of health telematics applications; collaborative healthcare provision environments supporting inter alia second medical opinions; applications for evidence based medicine; and systems supporting continuing education. These activities may also involve third countries if other sources of funds become available to support participation from such countries.

Focus:

Two domains will be covered:

- Best Practice actions based on assessment of current e-Health practices showing validated use of telematic applications involving at least two key actors (eg. healthcare professionals, patients/citizens, healthcare administration, health telematics industry). The objective of the actions is to promote the adoption of interoperable e-Health solutions through assessment, demonstration, and dissemination activities.

- Demonstration of large scale inter-regional or international integrated secure health information networks with clearly demonstrable European impact, supporting citizens, patients, health care administration and collaborative healthcare provision.

Types of actions addressed: Best Practice and Trials
Links with WP2000: Modified Action Line IST 2000 - I.1.4

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

IST2001 - I.2.1 Intelligent assistive systems for social inclusion

Objectives: To improve IST-based application systems offering new possibilities for full participation in society, including work opportunities, by all persons with special needs.

Focus:

- "Senior-friendly" application systems providing convenient access to services for independent living.

- Intelligent IST-based systems which can support the integration of disabled or disadvantaged persons in the workplace.

The work will cover innovative assistive systems for supporting mobility, orientation, transportation, manipulation, vision and hearing, as well as secure home, living and work environments. It will capitalise on recent advances in intelligent user interfaces and personal devices, both capable of self adaptation and/or easy customisation (the application domains will include interfaces for improved ease of access to common IST and non-IST devices). Longer term research into how advanced interfaces can increasingly compensate for the effects of impaired functionality on human performance is also required. This should be based on an improved and detailed understanding of the nature of cognitive and sensory processes. Significant industrial participation is sought 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, preparatory activities for the uptake of successful results by the relevant authorities should be addressed.

"Assistive" technologies are defined as those technologies which help compensate for functional limitation, facilitate independent living and enable disabled and older people to realise their potential.

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: Adaptation of Action Line IST 2000 - I.2.1

I.3 Administrations

IST2001 - I.3.1 Intelligent environment for public sector employees at all levels

Objectives: To improve the working environment for employees of governmental departments and agencies thus helping them to provide better services to users.

Focus:

- Intelligent systems for administrations (including architectures, tools and platforms). The systems will permit the distributed operation of administrative applications (including components) across Europe and over heterogeneous networks and platforms. Additionally, systems that support the development by governments and administrations of scaleable applications will be supported.

- Standardised, interoperable and reusable IST-based application systems, which can support staff involved in online transactions of modern government (i.e. government to government, citizen to government, business to government).

- Official friendly software agents supporting the work of staff involved in online transactions with citizens and businesses, by combining an easy to use intuitive interface, immediate feedback, autonomous tracking capabilities, mobility, advanced information gathering and knowledge sharing.

Significant industrial participation is required to ensure commercial exploitation. Proposals will be expected to address industrial consensus on common specifications, for example regarding the information format and service interoperability requirements, as well as establishing or enhancing standards, where appropriate.

Types of Actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: New Action Line

IST2001 - I.3.2 Best practice and trials in administration systems

Objectives: To promote the dissemination, early exploitation and adoption by administrations, in the EU and Associated States, of well-founded, mature and established, but insufficiently deployed, methods and technologies that have been successfully developed under the FP4 Telematics Applications Programme.

Focus:

- Uptake by early adopters of up-to-date technologies and systems.
- Upgrading of the standard of existing systems, and the extension of these systems to related specifications.

The actions are expected to have a critical number of sites and appropriate industrial involvement. They should be of short duration (12-18 months). The consortia should also include the actors (e.g. public authorities) responsible for the full-scale deployment of the systems.

Type of actions addressed: Best Practice and Trials
Links with WP2000: New Action Line

I.4 Environment

IST2001 - I.4.1 Best practice and trials in environment management

Objectives : To promote the take-up of advanced, intelligent, environment management systems in the EU and Associated States.

Focus :

– Trials in the following areas:

  - Integrated air quality monitoring, forecasting and early warning systems
  - Integrated citizen-oriented urban environmental information systems
  - Integrated water resources management (quality and quantity)

– Best practice actions based on solutions emerging from these trials are expected to be established.

The activities are expected to have a well chosen critical number of sites and appropriate industrial involvement, short duration (18-24 months) and will help convincing public authorities for triggering full-scale deployment of new systems

Type of actions : Trials and Best Practice
Links with WP2000 : New Action LineI.5 Transport and Tourism

IST2001 - I.5.1 Intelligent transport systems

Objectives: To increase safety and efficiency in intelligent transport systems through RTD on advanced technologies aimed at introducing ambient intelligence concepts into IST based systems for use in vehicles and infrastructure.

Focus:

– Development for advanced driver assistance systems and in-vehicle multimedia platforms which take into account the driver's cognitive load in an optimal way.

– Development of new sensors for positioning, for surveillance, for identification with privacy provision or for very short term weather prediction interacting with new traffic management systems. These IST-based systems will integrate advanced processing, simulation, prediction and decision support tools and will contribute to the provision of optimal environmental traffic performance.

– Development of new GNSS receivers taking into account the frequencies allocated for GALILEO[6] and integrating with - whenever possible- the latest mobile communication capabilities. It is expected that tools to establish coherent links between radio navigation and GIS data will also be covered.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: Adaptation of Action Line IST 2000 - I.5.2

[6] In close co-operation with key action on Sustainable Mobility and Intermodality of the Competitive and Sustainable Growth Programme.

IST2001 - I.5.2 Integrated vehicle infrastructure systems

Objectives: To improve safety, security, comfort and efficiency in all modes of passenger and freight transport and to improve mobility management, through more interaction between in-vehicle systems and infrastructure systems (transport, communication, navigation etc.).

Focus:

- Development of new transport IST based application systems integrating various infrastructures (transport, communication, navigation, and, potentially, observation and surveillance infrastructures). Examples may include:
  - in the case of air transport, co-operation of air and ground systems and processes;
  - in the case of waterborne transport, systems to support automated navigation and traffic control;
  - in the case of road transport, systems for anticipatory, demand-adaptive mobility management systems.
- Development of active safety systems involving the whole emergency service chain. In the case of road transport this will include applications integrating new in-vehicle and infrastructure systems.
- Development of new logistic and freight distribution IST based systems able to cope with the effect of e-Commerce transactions.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: New Action Line, based on similar action lines in WP2000

IST2001 - I.5.3 Ambient intelligence application systems for mobile users and travel/tourism businesses

Objectives: To provide information-rich, mobile and anticipatory environments for tourists/citizens on the move and tourism service providers.

Focus:

- Development and demonstration of innovative, interoperable systems supporting co-operative business models, multi-channel workflow, decision support and quality management. The integration of legacy systems should be considered. Particular attention should be given to the support of new business models relating organisations involved in the promotion or management of tourism destinations with small and medium enterprises in the tourism sector.
- Development of systems and devices providing tourists/citizens on the move with one stop shops and personalised access to interactive information systems. The interfaces should offer on-trip decision support and should be easily accessible, understandable and provide natural interaction modes. Confidence/trust and privacy issues should be addressed in this context.
- Development of new types of passenger info-mobility applications systems covering leisure, culture and infotainment, including those for airborne passengers.

The work will be supported through specific actions on common architectures standards and semantic definitions..

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: New Action Line

IST2001 - I.5.4 Best practice and trials in transport and tourism

Objectives: To promote the take up of advanced intelligent transport systems in all transport modes and to support the tourism business. Trials and, when appropriate, Best Practice actions will be supported.

Focus:

- Trials of application systems for mobile emergency call location, based on geographical information and database technologies and methods for call centres and service providers, including multilingual support;

- Trials of innovative IST systems for:

  - travel and tourism businesses;
  - collective, demand-responsive transport (urban and interurban/regional)[7];
  - freight and logistics[8];
  - urban environments[8].

- Best Practice actions based on technologies emerging from the trials above will also be supported.

Types of actions addressed: Trial and Best Practice actions.
Links with WP2000: New Action Line

7 These actions will be coordinated with energy technologies and transport policies demonstration and assessment activities under CIVITAS combined call of the ENERGY and GROWTH programmes

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:

This Key Action uses the following definitions:

- **e-Work** means IST-enabled workpractices, including mobile, for both the individual and the organisation,
- **e-Commerce** means IST-enabled business to consumer, business to business and consumer to consumer commerce practices, including mobile. The term business covers both profit and non-profit entities.

Strategy, Architecture and Focus

Context

2000 saw a further acceleration in the development and adoption of new solutions and practices for e-Work and e-Commerce. As enterprises, workers and consumers worldwide awaken to the opportunities of the digital economy, there is also a growing realisation that the transition has barely started. A vast number of challenges remain to be addressed before potential benefits can fully materialise. They range from building a global ICT (information and communications technology) infrastructure that promotes trust and confidence, to the research, development and broad take up of novel IST solutions and practices aimed at empowering individuals and enterprises in a sustainable global economy. A key element of the Commission's response is the *e*Europe initiative launched in June 2000 to accelerate the uptake of digital technologies across Europe and to ensure that all Europeans have the necessary skills to use them.

Objectives and Focus

In 2001 Key Action II further strengthens its strategic focus on visionary long term/high risk research complemented by high impact take up activities supportive of *e*Europe objectives. The Key Action will reinforce *e*Europe by ensuring that Europe plays a

prominent role in shaping and capitalising on the next wave of innovation in e-Work and e-Commerce.

RTD Priorities in 2001

Research challenges addressed by Key Action II in 2001 derive directly from the IST Programme's vision. They are to explore and validate novel solutions and practices for a global networked economy in which consumers, workers and enterprises can dynamically interact through a ubiquitous ICT infrastructure promoting trust and confidence. Key research and development requirements include novel architectures and solutions for interoperability, scalability, customisability, multilinguality and dependability, as well as adoption of user centred design principles. Emphasis is on visionary research with high potential payoffs. Key Action II will not fund short term, incremental RTD efforts.

A total of 11 Action Lines have been identified for Calls for Proposals in 2001. They form a coherent set of RTD, take up, and socio-economic analysis activities, as depicted in Figure 1.

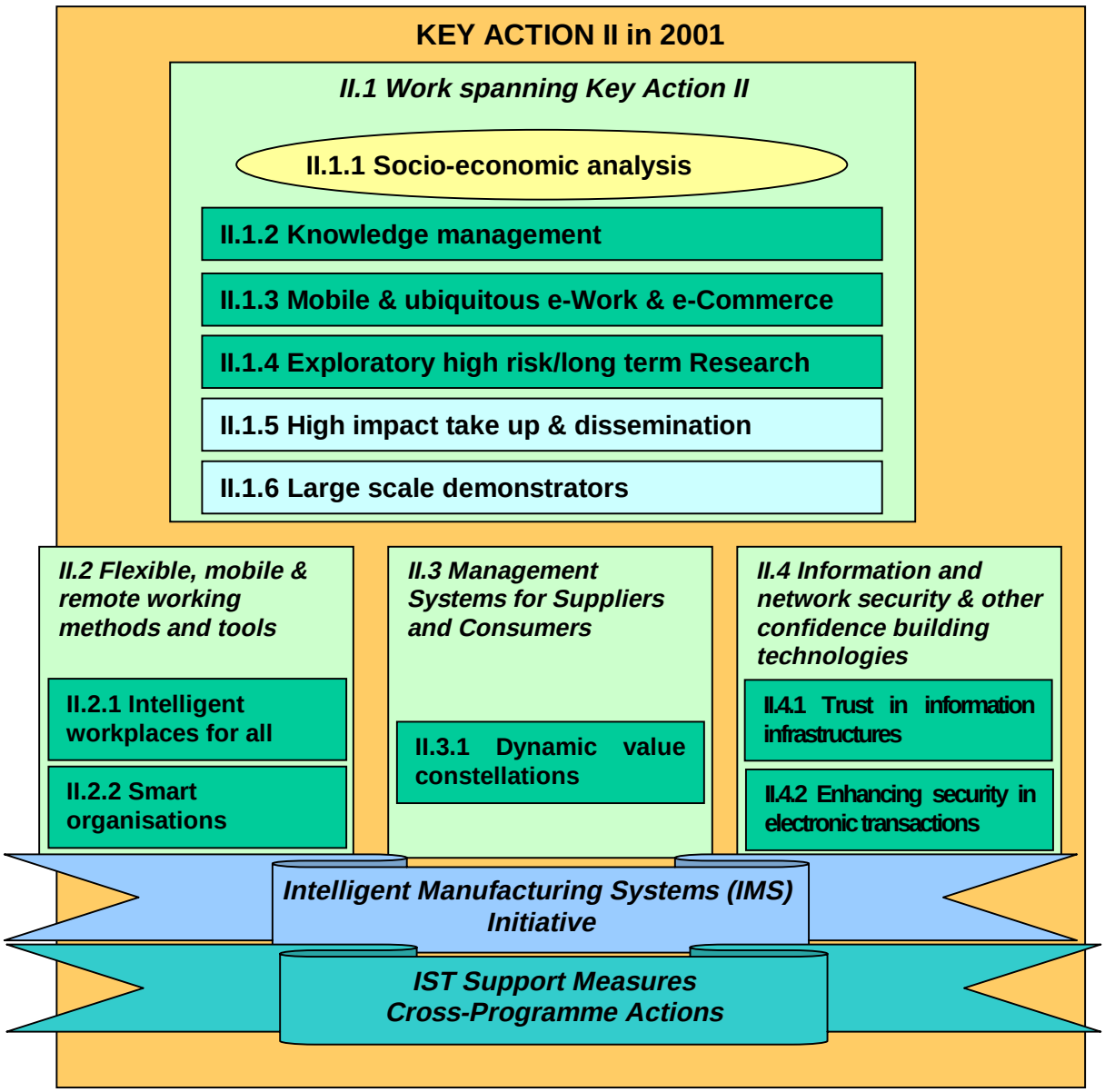

Figure 1

All Action Lines spanning Key Action II cover both e-Commerce and e-Work.

Action Lines are designed to be complementary. A project can cut across several Action Lines, in which case it should be submitted under the Action Line that is closest to its "centre of gravity".

All areas covered under Key Action II are also open to international cooperation proposals, when there is a clear European benefit. In particular, all Key Action II areas are open to RTD and thematic network proposals under the "Intelligent Manufacturing Initiative" (IMS)[8], as further detailed in section 5.1. Work in IST KAII is complementary to activities of KAI of the "Competitive and Sustainable Growth Programme " in the area of "Innovative Products, Processes and Organisation".

Calls for tenders are also planned in 2001 in the domains of KAII. They will cover dissemination activities, trends analysis, as well as identification of opportunities for integrated funding instruments complementing available private and public funding schemes in Europe. The total budget for these calls for tenders is expected to be around 6 MEuro. Details will be provided in the texts of these calls.

8 In Europe, IMS is run jointly by the Information Society Technologies and Competitive and Sustainable Growth Programmes.

II.1 Work Spanning Key Action II

The following Action Lines apply to all domains of RTD covered by Key Action II (i.e. II.2, II.3 and II.4).

IST2001 - II.1.1 Socio-economic analysis

Objectives: To understand better the social, economic, industrial, technological and legal aspects of e-Work & e-Commerce and to develop models and scenarios that can help shape future policy, technology development and deployment strategies.

Focus:

- To identify obstacles to and opportunities for a wider participation in the knowledge economy, addressing equal opportunity and quality of life issues. This includes the identification of new technologies and the definition of implementation strategies to encourage family friendly work conditions and accelerate modernisation of work organisation.

- To assess demand for new skills, competencies and associated training requirements, taking into account opportunities to increase user-friendliness of e-Work and e-Commerce systems.

- To identify obstacles to and opportunities for:

  - Faster take up of e-Commerce by European businesses, especially SMEs, and consumers. This includes analysis of contractual and liability issues arising in the context of e-Commerce transactions.

  - The creation and growth of start ups in Europe.

- To gain a better understanding of the economic impact of the knowledge based economy, its new business paradigms and intangible elements, and its potential impact for sustainable growth.

- To explore the possible impact of radically new business scenarios and roadmaps.

Types of actions addressed: Accompanying Measures (excluding take-up), Research and Development, Demonstration and Combined projects.
Links with WP2000: Updated version of Action Line IST 2000 - II.1.1 reflecting *e*Europe priorities

IST2001 - II.1.2 Knowledge management

Objectives: To develop and validate innovative multidisciplinary solutions and practices aimed at leveraging numerous and varied sources of often incomplete and/or ill-structured individual and corporate knowledge found in dynamic networked organisations and communities of practice.

Focus:

- Integrated ICT platforms, including mobile, to manage the full lifecycle of knowledge (i.e. capturing, organising, maintaining, mining, sharing and trading knowledge) in support of both intra- and inter-organisational activities.

- Personalised, context-, task-, and role-sensitive functionality for the dynamic provision and sharing of timely and relevant knowledge.

- Solutions to organise and exploit heterogeneous unstructured information sources, using ontologies, self-organisation paradigms as well as semantic cross-lingual search, in support of e-work and e-Commerce applications.

- Tools and environments for knowledge sharing, collaboration and socialisation within and between organisations, that build on methodologies from areas such as organisational behaviour, cognitive psychology, human factors, man-machine dialogues as well as social and management sciences.

Types of Actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: Updated version of Action Line IST 2000 - II.1.2.

IST2001 - II.1.3 Mobile and ubiquitous e-Work and e-Commerce

Objectives: To explore and validate secure, user centred mobile and ubiquitous (anywhere, anytime) models, solutions and practices for e-Work and e-Commerce

Focus:

Visionary, multidisciplinary efforts that bring together expertise in 3rd Generation mobile, wearable, portable and wireless systems with that of people working in areas such as cognitive psychology, human factors, organisational behaviour, architecture/design and public facilities management.

Focus is on user centred concepts in the following areas:

- Work outside normal offices (e.g. in public spaces, shopping centres, airports, hotels).

- Environments for open, seamless and secure integration of heterogenous context-sensitive (e.g. time, location, or task-sensitive) e-Work/e-Commerce services and business processes.

- Intuitive e-Work/e-Commerce solutions and environments that support novel useful interactions between people (e.g. customers, employees), smart artefacts and services.

Types of Actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: Updated version of Action Line IST 2000 - II.1.3

IST2001 - II.1.4 Exploratory high risk/long term research

Objectives: To explore visionary high risk/long term concepts with a high potential payoff.

Focus:

Novel concepts relevant to this Key Action, especially speculative ideas with potential for important industrial, economic and/or societal benefits. Interdisciplinary proposals combining technological innovation with novel practices (individual or organisational) and/or novel business models are strongly encouraged.

Short assessment proposals (e.g. one year) as well as full scale project proposals are acceptable. Proposed exploitation plans will be evaluated, taking into account the longer-term, exploratory nature of work to be undertaken under this Action Line.

Types of Actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: New Action Line

IST2001 - II.1.5 High impact Take-up, dissemination, and training

Objectives: To promote the adoption and dissemination of novel and secure solutions and practices for e-Work and e-Commerce and to address training and international requirements in these areas.

Focus

- Trials to help customise and validate promising yet untested technologies, applications, standards, and practices in realistic operational contexts and, in the process, to facilitate their early adoption and/or commercial exploitation. Trials should be replicable one-off exercises.

- *Best practice pilots* to promote the broad adoption of novel solutions and practices. Projects that have a high-impact on regional and sectoral customisation for SMEs are also welcome, with preference for those capable of amplifying their impact by leveraging other sources of funding, private or public (e.g. industrial and/or regional, national or structural funds). These actions complement activities funded under Cross Programme Action IST2001 - V.1.11 'CPA11: Regional and Sectoral pilot actions and demonstrations for the Digital Economy'. .

- Awareness and dissemination actions to promote and facilitate the broad adoption of novel solutions and practices, especially by SMEs.

- High impact training actions to address the shortage of skilled people in all areas of e-Work and e-Commerce (e.g. actions to help set up new training programmes, to improve industrial relevance of university curriculums or to raise interest among students).

- Actions to reduce the digital divide through promotion and co-ordination of grassroots activities (e.g. local initiatives, initiatives drawing on the expertise of youngsters).

- High impact support measures (both take-up and non-take-up) tailored to the needs of Enlargement countries in their transition to the digital economy.

- Accompanying measures aimed at promoting mutually beneficial co-operation in e-Work and e-commerce with third countries.

Types of Actions addressed: Trials, Best practice, Thematic Networks and non Take-up Accompanying Measures.
Links with WP2000: subsumes Action Lines IST 2000 - II.1.4, II.1.5 and II.4.2.

IST2001 - II.1.6 Large scale demonstrators

Objectives: To support the development of large scale demonstrators in different business and work settings.

Focus:

Development of open environments to validate, demonstrate and/or benchmark interoperability, scalability, dependability or usability of similar or complementary solutions. When appropriate, demonstrators are expected to include one or more user communities.

Domains of interest include:

- End to end IPR management for secure distribution of digital content
- Interoperability of Public Key Infrastructures
- Novel solutions and business models for digital interactivity
- Large scale e-procurement demonstrators
- Cross border interoperability of financial services
- International and multi-jurisdictional online out-of-court dispute resolution systems and other consumer protection mechanisms.
- Regional and /or sectoral e-communities of SMEs
- International, multilingual, knowledge management environments for business
- Open systems for authentication of employees outside normal offices, using mobile working technologies or through public access telecentres.

Types of actions addressed: Demonstrations

Links with WP2000: New Action Line

II.2 Flexible, mobile and remote working methods and tools

Novel technologies will free workers and enterprises from traditional spatial, temporal and organisational constraints and can help increase creativity, productivity, agility, learning and co-operation. More generally, they have the potential to significantly enhance competitiveness and quality of working life, whilst making the workplace more accessible to all.

IST2001 - II.2.1 Intelligent workplaces for all

Objectives: To integrate emerging technologies such as wireless, multimodal, wearable, or embedded ones with innovative office and workplace designs to create and demonstrate creative work environments and practices suitable for all.

Focus:

Focus is on interdisciplinary projects that bring technologists together with experts from areas as diverse as workplace design, human computer interaction, human factors, social sciences, psychology or architecture. Projects should address one or more of the following challenges:

- Increasing participation in knowledge work and making it more accessible to people marginalised by the digital divide, by developing attractive, safe workplace designs in which integrated information and communication systems are easy to use and reduce information overload.

- Promoting sustainable development through novel workplace concepts and novel work practices that improve efficiency of resource use, both in workplace equipment and in the built environment itself.

- Developing innovative shared e-Work facilities, including multi-purpose telecentres in local communities. Synergy with regional development initiatives will be encouraged, notably within the framework of European Structural Funds and, in particular, the European Regional Development Fund.

Types of Actions addressed: Research and Development, Demonstration and Combined projects; Concerted Actions.

Links with WP2000: A refocusing of Action Line IST 2000 - II.2.1. on sustainable workplace design to reflect the policy priorities of the Lisbon Summit and the *e*Europe Action Plan.

IST2001 - II.2.2 Smart organisations

Objectives: To support the transformation of profit and non-profit entities into smart organisations (i.e. knowledge driven, adaptive and learning as well as agile in their ability to create and exploit the opportunities of an *Internet*worked economy) through a new generation of distributed and interoperable enterprise applications and services.

Focus:

- Development and validation of novel architectures, software platforms and pre-standards to support interoperability, seamless integration and knowledge sharing between heterogenous enterprise applications and services.

- Promotion of industrial co-operation in the development of architectures and building blocks for next generation business applications and services and support of industry led pre-standardisation activities.

- Development and validation of:

    - Interoperable solutions to support co-operation, workflow management and co-ordinated planning across extended/virtual organisations and associated value networks

    - Models and knowledge based methodologies to enhance an organisation's ability to adapt dynamically to ever changing conditions.

Types of Actions addressed: Research and Development, Demonstration and Combined projects; non Take-up support measures; Thematic Networks.
Links with WP2000: This is an updated version of Action Line IST 2000 - II.2.2 on Smart Organisations.

II.3 Management systems for suppliers and consumers

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

IST2001 - II.3.1 Dynamic value constellations

Objectives: To explore, develop and validate innovative and visionary value creation models, systems, technologies and solutions in order to support market driven value constellations, where suppliers and consumers come together dynamically in response to or in anticipation of new market opportunities.

Focus:

- The dynamic creation of highly customised products and services in response to changing market demands.

- E-Market mediation for the dynamic identification and selection of value constellation partners, including for example automated negotiation or advanced auctioning as well as value sharing and other contractual arrangements.

– Full life cycle management based on IST of highly customised products and services across dynamic value constellations, from product conception all the way to dissolution of value constellations, product dismantling and resource recovery. This includes extended products that combine both tangible and intangible elements, as well as lifetime customer relationship management and online solutions for alternative dispute resolution.

Types of Actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: This is an updated version of Action Line IST 2000 - II.3.1. on "Dynamic Value Constellations."

II.4 Information and network security and other confidence building technologies

The proposed work is driven by the need to build:

– trust in order to stimulate the development of e-Work and e-Commerce

– user confidence in information and communication systems and networks.

One important element of Community funded R&D in this area is its contribution to the development, adaptation and implementation of EU policies. Another concerns issues relating to standardisation and regulation. Accordingly, proposers are expected to be knowledgeable about relevant EU policies in trust and confidence where relevant to their proposals.

Key reference policy documents include the *Directive on Electronic Signature*[1], the draft *Directive on Copyright & Related Rights in the Information Society* (technical measures for protection & management referred to in Art. 5 and 6)[2], the *Directive on Data Protection*[3], the draft directive on e-money[4] and the *eEurope 2002 Action Plan*[5]. Additionally, new standards, in particular the *Common Criteria for Information Technology Security Evaluation*[6] and related protection profiles, and the ongoing standardisation activities, such as the *European Signature Standardisation Initiative*[7], should be given due consideration.

As in other areas in Key Action II, R&D in this domain is complemented by Take-up (AL II.1.5) and large-scale Demonstrations (AL II.I.6).

IST 2001 - II.4.1 Trust in information infrastructures

Objectives: To enhance trust in information infrastructures to support e-Work and e-Commerce and other related services.

Focus:

– Development, integration and validation of trust and security technologies in information infrastructures.

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1 Directive 1999/93/EC, OJ L 13 19.1.2000 in http://www.europateam.cc.cec/eur-op/ojol/en/oj/2000/l_01320000119en.html

2 http://www.europa.eu.int/comm/internal_market/en/intprop/intprop/docs/index.htm

3 http://europa.eu.int/comm/internal_market/en/media/dataprot/law/index.htm

4 http://europa.eu.int/comm/internal_market/en/finances/general/727.htm

5 http://europa.eu.int/comm/information_society/eeurope/actionplan/index_en.htm

6 international standard ISO/IEC 15408:1999 in http://www.iso.ch

7 http://www.ict.etsi.org/eessi/EESSI-homepage.htm

- Development of technologies to support scalability and interoperability of security mechanisms and their demonstration in specified application scenarios**.**

- Development and testing of assurance methods and techniques for information infrastructures to guarantee security as well as quality of service.

- Development and application of technologies to prevent, detect and react to attacks on information infrastructures.

- Development and validation of tools and methods to model security policies for networked organisations.

Type of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: Subsumes some of the issues previously covered under Action Line IST 2000 - II.4.1

IST 2001 - II.4.2 Enhancing security in electronic transactions

Objectives: To build trust in the use of information infrastructures by securing electronic transactions and content, and enhancing privacy.

Focus:

- Development of technologies to support auditability and to perform audits of transactions with respect to security (authenticity, non-repudiation, integrity, privacy and confidentiality).

- Development of technologies to enhance privacy of users/consumers and to ensure confidentiality and integrity of electronic transactions.

- Development and application of technologies to secure value (including property rights), content and data of electronic transactions (including financial transactions) and to support their management for trustful trading and use.

Type of actions addressed: Research and Development, Demonstration and Combined projects

- To establish a representative international forum on copyright management in a digital environment to work on common rules and standards. Such forum should organise appropriate liaison with existing standardisation initiatives such as MPEG.

Type of actions addressed: Thematic Networks
Links with WP2000: Subsumes some of the issues previously covered under Action Line IST 2000 - II.4.1

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, 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 and network infrastructures calls for rich multimedia content that is adaptive and responsive to the needs of European citizens, businesses and public organisations. Context based approaches to production, management and exchange of digital content, together with higher levels of interactivity, are a key feature of the ambient intelligence landscape and will enable more natural and effective use of the emerging universal infostructure.

In WP2001, Key Action III concentrates on the following inter-linked themes:

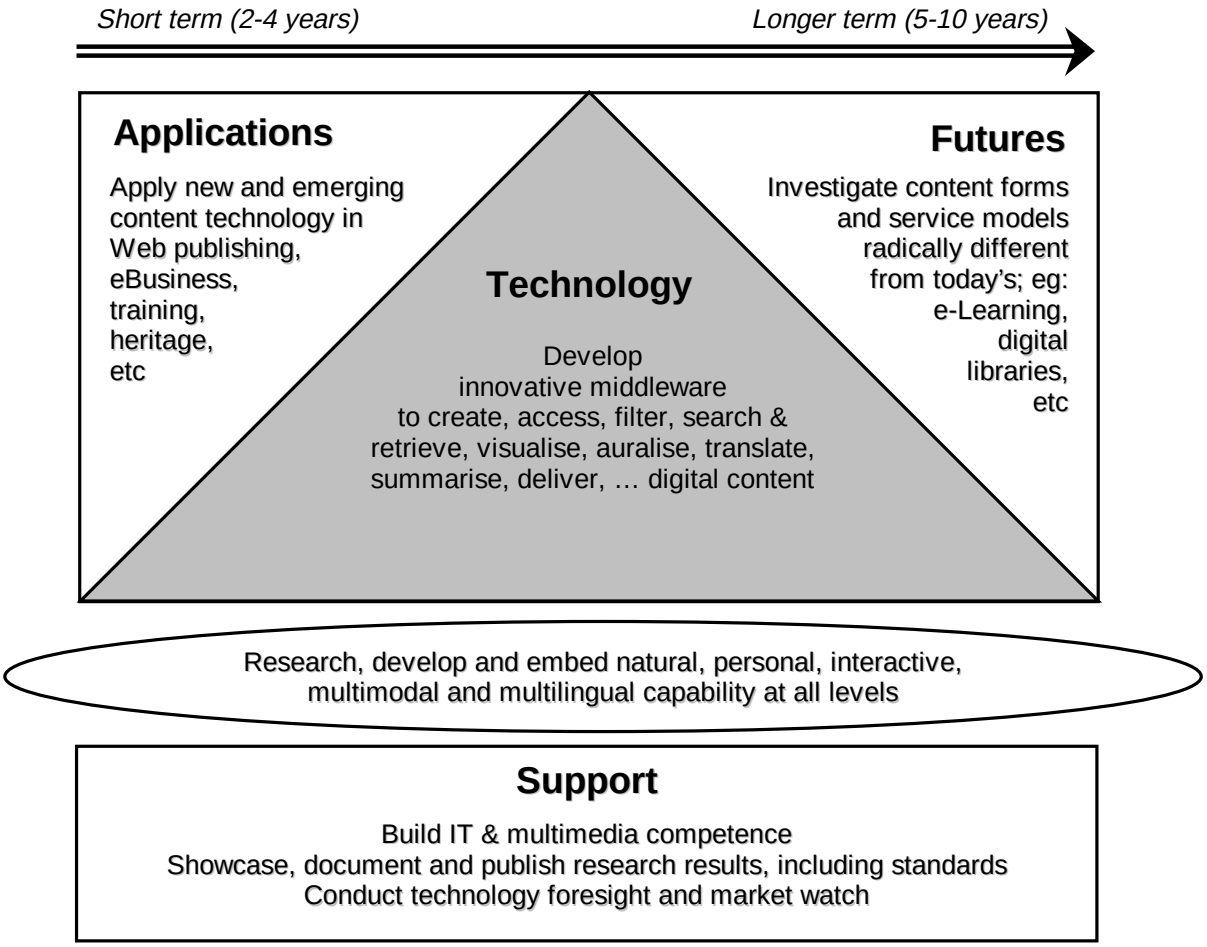
- Investigating paradigm shifts likely to affect multimedia content systems and services in the future, including next generation digital libraries and e-Learning.
- Promoting creativity in the content industries with a focus on content combining highly visual, audio and interactive media.
- Empowering the European workforce to adapt to rapidly changing skills profiles through novel personal training solutions.
- Enabling citizens and communities to create and access the digital records of their societies.
- Improving natural and user friendly interaction between humans and the universe of digital services, especially in non-expert, home and mobile environments.

Innovative applications combined with next generation research in education, training and cultural heritage are all major drivers for the emergent knowledge based economy. This will give impetus to multimedia business development that will provide opportunities for new and often small firms, especially those producing creative content. New middleware, including innovative methods, tools and technologies, has an important role in enhancing content rich information, communication systems and services. This is to embed in them higher levels of interactivity, multilinguality, multimodality and naturalism. It also enables 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. Other enabling measures are foreseen to encourage co-ordination of research across disciplines in the domains addressed by the Key Action.

Key Action III aims at advancing IST integration and convergence by forging alliances between providers of digital content, online and mobile services, interactive and VR (virtual reality) technology, and a wide array of public and private users.

The diagram below summarises the actions foreseen under Workprogramme 2001:



Key Action III contributes to the *e*Europe Action Plan, in particular to Areas 4 - "European youth into the digital age" and 10 - "European digital content for global networks" , and the initiative "eLearning: Designing Tomorrow's Education". In this context, co-operation is planned with the content industries (including follow-up programmes to INFO2000 and MLIS, and the Internet Action Plan), 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 covers the full RTD cycle, combining take up, applications oriented research, generic research and development, and highly exploratory work on paradigm shifts in content, as illustrated in the table below.

RTD Priorities in 2001

A total of 11 Action Lines have been identified for the year 2001, including 9 RTD Action Lines, 1 Take-up Measure and 1 Action Line for specific Support Measures.

Overview of 2001 Action Lines	**Action Line no IST 2001**	**Action Line Title**
Interactive publishing, digital content and cultural heritage	III.1.1	Publishing digital content
	III.1.2	Heritage for all
	III.1.3	Next generation digital collections
Education and training	III.2.1	Self learning for work
	III.2.2	e-Learning futures
Human language technologies	III.3.1	Multilingual Web
	III.3.2	Natural and multilingual interactivity
Information access, filtering, analysis and handling	III.4.1	Semantic Web technologies
Spanning actions	III.5.1	x-Content futures
	III.5.2	Competence building
	III.5.3	KA III specific support measures

Action Line Descriptions

III.1 Interactive publishing, digital content and cultural heritage

New and emerging technologies are exerting significant pressures on the traditional publishing supply chain. Novel forms of content including textual, audio-visual, 3-D, Virtual Reality, and rich-context, call for new approaches to authoring, management and delivery across such platforms as interactive TV, broadband Internet, mobile Internet devices, (e.g. WAP, GPRS, UMTS), e-books, etc. Technological advances and the subsequent convergence towards stable platforms and standards are providing vast opportunities for innovative tools and services associated with the publication of digital content.

In the cultural area, the objective is to develop shared visions, to make globally visible the rich diversity of European cultural heritage content, and to foster the emergence of inclusive and sustainable cultural and scientific collections and related services, in partnership with relevant local and regional organisations.

IST2001 - III.1.1 Publishing digital content

Objectives: To develop, validate and benchmark new methods, services and tools to facilitate authoring, management, production and delivery of digital content appropriate to the broadcasting, entertainment, advertising, publishing and new emerging media sectors.

Focus:

Research is invited in the areas of new audio-visual services, systems and tools, and of cross-media publishing, covering the following issues:

- Interactive authoring, editing and delivery to multiple platforms, including interactive TV, broadband Internet appliances, mobile Internet devices and e-books;

- Content management tools associated with heterogeneous multimedia databases, multi-platform and cross-media publishing and digital content security and protection issues;

- New paradigms and business models supporting the e-publishing value chain in areas such as advertising, virtual communities and personalised services;

- E-production workflow, for seamless integration of interactive and collaborative authoring, production and delivery, including tracking and measurement of user behaviour and delivery informed authoring and production tools.

The work is expected to contribute to open standards for interoperability and to address issues such as consumer protection and privacy.

Types of actions addressed: Research and Development, Demonstration, Combined projects, Trials, Thematic Networks
Links with WP2000: Re-focussed Action Line IST 2000 - III.1.1.

IST2001 - III.1.2 Heritage for all

Objectives: To foster sustainable online communities in creating and documenting the digital record of their societies, including safeguarding its accessibility for the future.

Focus:

- Innovative experiments in creating, manipulating or aggregating local resources and making them sustainable, visible and valid in the global context;

- Digital archiving applications integrating discovery technologies and tools, to provide easy access to the evolving digital record of the peoples of Europe at different levels of complexity and detail;

- Tools and services which guarantee equality of opportunity and quality of discovery service and resource, in support of social and cultural inclusiveness.

Proposals should take account of ongoing national and regional heritage initiatives and digitisation programmes, and should promote cooperation between different types of memory and cultural organisations at local/regional level, as well as appropriate public/private sector partnerships. They might involve work on resource discovery and datafusion, on authentication, integrity of services, on usability and ergonomics, on stable and reusable business models, and on active participation of end users through new online communities.

Types of actions addressed: Research and Development, Demonstration, Combined projects, Thematic Networks
Links with WP2000: New Action Line with medium term/medium risk

IST2001 - III.1.3 Next generation digital collections

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

Focus:

- Advanced digital library applications built on very large scale distributed collections;

- Innovative systems delivering adaptive and intelligent scientific and cultural content, integrating new economic, business and navigational models, sustainable over time;

- Virtual heritage: visualisation and VR as new tools/methods for representation and navigation (e.g. of objects, collections and landscapes).

The work should contribute to the long term development of rich ecologies of cultural and scientific content, focusing on advanced networking of archival, museum and library resources. It should address: dynamic, interoperable and contextualised thematic collections; integration of visualisation technologies into next generation digital libraries; reference and test environments for digital archiving and preservation of dynamic digital content; or user groups/communities, focusing on collaboratories, usability, personalisation and delivery of services. These objectives will be pursued where possible in collaboration with other programmes at a Member/Associate State and international level (e.g. Digital Libraries programme of the NSF).

Types of actions addressed: Research and Development, Demonstration, Combined projects, Thematic Networks
Links with WP2000: Consolidation of Action Lines IST 2000 - III.1.4 and III.1.6 extended to long term/medium risk work on next generation digital library issues.

III.2 Education and training

Actions in this area support improvements to the process of learning through the use of ICT. This year work focuses on the trend towards greater individual control and

responsibility for training, and on the need to encourage more radical thinking as to how ICT can lead to real paradigm shifts in the way we learn.

IST2001 - III.2.1 Self learning for work

Objectives: To empower individuals to define, procure and manage their learning for work, in response to rapidly changing organisational, business and employment needs. Enabling continuous interaction between theory and practice, the ICT supported solutions will be based upon sound pedagogical models and will be fully integrated into the user's environment. The research will evaluate the added value of the new way of learning and its socio-economic impact, demonstrating the benefits for the various actors (learner, tutor, sponsor, etc). Projects are expected to lead to new sustainable business models involving universities, training colleges, professional bodies, corporations, Chambers of Commerce, trade unions, training brokers, etc.

Focus:

Research must address one or more of the following key topics:

- Learner models - flexible, personal models for learning. Supporting automated learner profiling, identification of key competencies and skills gap analysis, personal learning goals definition, individual learning styles, continuous guidance and motivation, self assessment, etc.

- Soft skills and informal learning - supporting the learner to develop soft skills (inter-personal communication, team work, leadership, project management, etc) through the sharing of knowledge, dynamic learning content generation, modelling and representation of domain knowledge for learning, etc.

- Communities of learning - support for the identification and implementation of virtual communities, involving individuals with similar learning needs, within and across organisational boundaries. Work should support user friendly social interaction for group problem solving, knowledge sharing, mentoring, learner-tutor communication, etc.

- Personal intellectual capital - developing electronic CVs to facilitate the recognition and certification of experience by 3rd parties and the transfer of learning profiles across jobs and careers, etc.

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with 2000 WP: New Action Line, with links to Action Line IST 2000 - III.2.2 "The Learning Citizen"

IST2001 - III.2.2 e-Learning futures

Objectives**:** Experimental, longer term research providing significant contributions to insight into next generation e-Learning systems and services, leading to enhancement of human learning and cognitive processes. Envisaged enhancements should respond to anticipated future needs of individual learners. The research should contribute to an overall advancement of the state of the art of learning technologies and their impact as a long term goal and should help to build and sustain a corresponding multidisciplinary research community at a European level through appropriate Accompanying Measures, Networks of Excellence and workshops.

Focus: Intended as longer term research, well beyond the state of the art, for initial and adult learning. Proposals should specify:

- The intended learning aims and the associated theoretical basis, and how they relate to the prevailing and expected future social and economic realities;

- The rationale for the problems or opportunities identified, in terms of relevance and context from a learning perspective;

- The innovative and unique nature of the research proposed;

- The methodology for achieving the operational aims, including the underlying ICT environment needed and its characteristics.

The work must be situated in sufficiently realistic learning settings as to allow a thorough assessment of the impact (including organisational and social) by experts from technological, cognitive, social and pedagogical sciences.

Types of actions addressed: Research and Development, Demonstration, Combined projects, Thematic Networks
Links with WP2000: New Action Line

III.3 Human language technologies (HLT)

The overall objective of HLT is to support e-business 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 multilingual technologies and demonstrating exemplary applications providing functionalities that are critical for the realisation of a truly user friendly Information Society. Projects 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.

IST2001 - III.3.1 Multilingual Web

Objectives: To advance towards a fuller realisation of the multilingual Internet for personal development and informational purposes, and for distributed enterprise knowledge management across languages and delivery platforms.

Focus:

Wider availability and more effective production and use of multilingual information over fixed and mobile digital networks. RTD work will address both integrative showcases and longer-term research endeavours with identifiable short term spin offs, and will encompass three intertwined project lines:

- Collaborative multi-language design, authoring and publishing of online (Web) multimedia documents, including controlled language techniques and cross-lingual terminology support, and the associated need to preserve quality and consistency across parallel language versions through integrated workflow, quality control and update management tools;

- Automated translation of written and spoken language, multilingual generation and cross-lingual gathering and abstracting of online (Web) content, including customised solutions for vertical markets, corporate intranets, and e-Commerce applications;

- Adaptative information delivery through multi-channel services (text, speech, multimodal content and input-output) together with the associated information selection, conversion and rendering according to user preferences (from gisting

through summarisation to full translation) and the capabilities of the access point (e.g. Internet PC browser, GPRS/UMTS micro-browser, fixed or mobile telephone).

Support will be provided for multilingual annotated language resources underpinning the above RTD lines, including methods and tools for automated extraction and labelling from existing data repositories, insofar as they provide a clear path towards industrially relevant applications or can greatly enhance the linguistic breadth and depth of existing systems and technologies.

Types of actions addressed: Research and Development, Demonstration, Combined projects
Links with WP2000: This action line is a re-focused version of IST 2000 III.3.2, and is geared towards multilingual Web content, translation and cross-media delivery.

IST2001 - III.3.2 Natural and multilingual interactivity

Objectives: To progress towards a more intuitive interaction with, and effective use of intelligent network services and appliances. RTD will address both relatively short term applicative showcases and longer term research efforts aimed at robust dialogue and unconstrained speech/language understanding. The intended orientation towards middleware and embedded technologies presupposes significant advances of the component technologies and further progress towards their integration within mass market products and services.

Focus:

RTD will focus on the intersection of multilingual input/output with speech-, language- and multimodal interaction and technology mediated communication, and address service issues such as performance, reliability and scalability of embedded speech and language technologies. RTD work will encompass:

- At home: interaction with network enabled information and entertainment appliances, and command and control of complex home services and appliances, including reliable speech recognition and high quality synthesis in demanding environments and for user groups with special needs (e.g. children and non-native speakers).

- At work: technology assisted interpersonal and group communication, including virtual meetings and multilingual dialogues e.g. for conversational customer support services.

- On the move: interaction with and control of personal information and communication appliances, including next-generation mobiles and digital assistants, on-board devices and in-vehicle services.

Types of actions addressed: Research and Development, Demonstration, Combined projects
Links with WP2000: This action line results from a merger and consolidation of IST 2000 - III.3.1 and III.3.3, and is geared towards intelligent information appliances and advanced communication services.

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

The World Wide Web is becoming a major vehicle for the distribution and delivery of multimedia content including video and audio, accessible from stationary (including domestic) and mobile platforms. It is, however, necessary to impose more semantic structure on Web content in order to facilitate, for example, resource and knowledge discovery, information filtering and intelligent browsing. It is, in short, necessary to make

Web content machine understandable. Given the sheer size and dynamics of the Web this can only be achieved through highly automated procedures.

IST2001 - III.4.1 Semantic Web technologies

Objectives: To enable users to access, retrieve and filter information from the Web, relevant to their interests and needs, and matching their quality expectations. This requires new and advanced methods, models, tools and systems for services related to access, retrieval and filtering of Web-based content, in particular the development of new search systems and machines, in line with existing and emerging relevant standards. These services would typically be provided by intelligent agents.

Focus:

This Action Line focuses on content technologies that contribute to the creation and exploitation of the Semantic Web. It invites projects that develop, apply and benchmark these technologies in a Web context. They include:

- Methods and tools for coding and structuring digital content, for defining and declaring its semantics. These would typically employ XML, RDF and other techniques for semantic interoperability and reasoning such as ontologies for domain specific applications.

- Methods and tools for the derivation of semantic attributes of Web-based content (in particular video, audio and images) through, for example,. automatic feature detection, video segmentation and post-processing. This would facilitate multimedia indexing based on content analysis as well as automated categorization of Web resources.

- Semantics based tools for knowledge discovery and intelligent filtering and profiling such as information agents and specific query languages. Semantics based tools for collaborative filtering and knowledge sharing in specific or general user communities.

- Information visualisation: intelligent and visual interfaces which take advantage of semantic information structures to provide users with radical new ways to navigate and search naturally through unknown and complex information spaces.

Issues to be addressed by projects under this Action Line include the sustainability and scalability of the proposed approaches concerning, for example, metadata repositories and ontologies. Projects may also wish to focus specifically on the constraints and special requirements of domestic platforms (such as WebTV) and mobile platforms (such as WAP and UMTS) for Web access, and their user communities. Ease of access as well as scalability and presentation of content are likely to be the main challenges here. Moreover, the integration of geographic information into Web-based service environments could greatly benefit the usability of mobile platforms.

Types of Actions addressed: Research and Development, Demonstration, Combined projects, Thematic Networks

Links with WP2000: New Action Line

III.5 Spanning Actions

IST2001 - III.5.1 x-Content futures

Objectives: To provide opportunities for high payoff breakthrough research within the scope of the Key Action, yet with a focus on issues not covered at present by its Action Lines.

Focus:

The research will anticipate future developments, explore radically new concepts and paradigms, and address important problems currently impeding progress in the area of multimedia contents and tools, against a 10 year horizon.

Types of Actions addressed: Research and Development (ranging from proof of concept to full-scale R&D)
Links with WP2000: New Action Line.

IST2001 - III.5.2 Competence building

- Acquisition of multimedia skills: user trials of advanced multimedia learning solutions to address the current shortage of trained IT professionals for multimedia in Europe including through international co-operation. Projects will demonstrate and evaluate the added value of their innovative solutions which can cover any of the key stages in multimedia production.

  Types of Actions addressed: Trials.

- Access to competence in multimedia: provide access to advanced emerging technologies and services, knowledge and competence relevant to multimedia systems and services, via world class competence centres already existing or emerging in Europe. A common objective is to benchmark developments and the adoption of new technologies in the domains targeted. Such centres should be able to demonstrate leadership qualities in their respective domains of competence. The sustainability of such services must be established based upon well articulated requirements and convincing business models.

  Types of Actions addressed: Access.

Links with WP2000: New Action Line.

IST2001 - III.5.3 KA III specific support measures

- Surveying the state of the art in the fields addressed by the Key Action, including technology foresight and market watch. This can be combined with benchmarking of research results and progress towards strategic goals, based on a (small) set of performance indicators measuring quality, effectiveness and impact along technical, economic and social dimensions. The work also covers surveys of the position of European research in this area with respect to similar efforts carried out under national or industrial projects or in competitor countries.

- Identification, documentation and dissemination of knowhow, in the design, implementation and use of systems, tools and methods addressed by the Key Action. Projects will actively seek out results emerging from user trials (EU funded or otherwise), analyse strengths and weaknesses, disseminate conclusions and foster their deployment in other European programmes, national or regional initiatives including those supported by Structural Funds. In the case of de facto standards, emphasis will be on channelling them through relevant international and professional bodies.

- Evaluation of advanced multimedia products and applications through open competitions and/or award schemes, with a view to establishing excellence in a variety of categories, based on innovation, creativity and other criteria. This action is expected to give rise to highly visible showcases, for exemplification and illustration.

All research activities and outcomes are to be published using print and electronic media and disseminated through a variety of channels at project, cluster and programme level, and promoted at relevant conferences and trade shows, where appropriate through dedicated actions.

Types of Actions addressed: Accompanying Measures (excluding Take-up).
Links with WP2000: Re-focussed Action Line IST 2000 III.5.1, complementing those available under 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 covers the development of the essential component technologies and integrated systems and networks underpinning today's converging industries and infrastructures.

The Key Action is designed to build on today's European strengths in communications and network technologies, digital broadcasting, consumer electronics, software and embedded systems, and service concept innovation.

In this context, the strategic focus of the Key Action is on enabling the widest possible access to essential and interoperable infrastructures and services to underpin the next generations of applications. This year's workprogramme strengthens the focus on the development of a pervasive computing environment for seamless access to services.

The emphasis on embedded information systems and devices in adaptive networks is increased by addressing a number of key aspects in an Action Line (AL IV.1.1) that cuts across the Key Action and complements closely related area specific ALs (cf. IV.8.1, IV.7.1, IV.5.1 and IV.3.1, in particular). The interoperability among heterogeneous networks and their increased capacity, agility and functionality remain priorities in 2001 (cf. IV.2.2, IV.2.3 and ALs in IV.5, in particular). Likewise, the underlying micro- and opto-electronics based components and subsystems, including microsystems, stay concentrated on the development of systems on a chip and reuse of Intellectual Property blocks for information and communication terminals, sensors and other devices and for communication systems and networks (cf. ALs in IV.7 and IV.8, in particular).

Another cross Key Action AL (IV.1.2) helps strengthen the focus on architectures and technology frameworks for seamless access to and provisioning of services. Complementary aspects of service engineering and management and of augmented human/system interaction are addressed in closely related area specific ALs (cf. IV.2.1, IV.2.2, IV.2.4, IV.3.2 and ALs in IV.4 and IV.6, in particular).

Work established by previous years' workprogrammes already provides substantial support to the objectives of the *e*Europe initiative, and this year's priorities aim to reinforce this support. Not only does the work in the Key Action contribute to the main objective of a cheaper, faster and more secure Internet: it is also active in addressing the skills gap by promoting exploratory training actions (cf. IV.1.3), and it promotes the development and use of free software (cf. IV.3.3).

All developments emphasise generic building blocks and open platforms and are complemented where appropriate by Take-up measures. The results will inform and guide EU policies developments related to issues such as convergence,

telecommunication regulation, spectrum management, space applications and component interoperability.

Work in the Key Action is complementary to and co-ordinated with work in national and European level programmes, in particular the FPV/Growth and EUREKA Programmes.

Action Lines in 2001

The following table provides an overview of the Action Lines that have been identified as priorities for the Calls for Proposals in 2001. Proposals addressing interdisciplinary work that cuts across Action Lines are explicitly encouraged.

Overview	**Action Lines for 2001**
IV.1 Work spanning Key Action IV	• Design of networked embedded systems • Multiservice networks - middleware for seamless access to services • Development of skills in micro- and opto-electronics
IV.2 Computing, communications and networks	• Real time distributed systems • Network and services interoperability, interworking and management • Terabit optical networks • Computing, communications and networks - Take-up measures
IV.3 Technologies and engineering for software, systems and services	• Software architecture • Functionality models and building blocks for end-user services • Free software development: towards critical mass
IV.4 Real time and large-scale simulation and visualisation technologies	• Simulation and visualisation • Mixed realities and new imaging frontiers
IV.5 Mobile and personal communications and systems, including satellite related systems and services	• Reconfigurable radio systems and networks • Terrestrial wireless systems and networks • Satellite systems and services
IV.6 Interfaces making use of the various senses	• Advanced displays and sensors • Interfaces and buffers for seamless end to end services
IV.7 Peripherals, sub-systems and microsystems	• Subsystems • Microsystems • Subsystems and microsystems - Take-up measures
IV.8 Microelectronics – optoelectronics	• Microelectronics design and test & application specific microelectronics • Microelectronics technologies: processes, equipment and devices • Optical and opto-electronic technologies • Industrial microelectronics technologies - Take-up measures

IV.1 Work spanning Key Action IV

IST2001 - IV.1.1 Design of networked embedded systems

Objectives: To integrate and validate concurrent design and validation tool frameworks for resource constrained (low power, small memory, small form factors, low cost, etc.) hardware/software systems embedded in intelligent devices and their networking.

Focus:

Emphasis is given to reconfigurable hardware and mobile code for intelligent sensors, terminals and other devices, and on their decentralised networking. The areas of consumer applications and wireless networking in limited mobility environments are of particular interest. Projects should improve hardware/software design efficiency in the context of a defined class of applications.

Multidisciplinary work is expected on:

(i) Fast prototyping, hardware/software co-design, architecture simulation, software engineering supporting hardware resource optimisation, support for concurrent engineering, and use of high level languages. Work should address inter alia the methods and tools required for a product line approach as opposed to the conventional single product design.

(ii) Innovative hardware/software architectures pushing the limits of computing efficiency (in operations per Watt), in particular for signal processing applications. Architecture based engineering should be explored as an extension to component based engineering in order to increase the integration and standardisation of complex reusable functions.

(iii) Run-time embedded software components, efficient power management, device scalability and adaptation to dynamic propagation environments, operation in different spectrum bands, and cost effective packaging techniques.

(iv) Low cost intelligent sensors, terminals and other devices, and their related interface circuitry for a wide range of applications, their integration and embedding in systems, their communication capabilities and their networking.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: New Action Line

IST2001 - IV.1.2 Multiservice networks - middleware for seamless access to services

Objectives: To allow open seamless access to new, affordable, scalable, personalised and interactive services over a range of heterogeneous access networks (terrestrial and satellite, mobile and fixed, wireless and wire based, symmetric and asymmetric, public and private). Networks should support multiple services, and service provision should not be limited to specific infrastructures.

Focus:

The work addresses the middleware/adaptation layer architectures and technologies allowing for secure delivery and portability of services (including broadband) seamlessly across any network.

It allows for personal mobility, to facilitate location and terminal independence, service customisation and service portability through support of various service profiles, user interface profiles and subscriber profiles.

Also covered is the impact of the architecture on the link attributes and terminal design and functionalities. In this respect, the applicability of multi-bearer streaming techniques (namely splitting multimedia traffic between bearers of different latency, bandwidth, etc) is also of interest.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: New Action Line

IST2001 - IV.1.3 Development of skills in micro- and opto-electronics

Objectives: To address the shortage of highly skilled staff (designers, engineers and R&D staff) in the industry that designs or manufactures microelectronics and opto-electronics based components and subsystems, including microsystems.

Focus:

The focus is on actions driven by this industry, including:

(i) Set-up and demonstration of new schemes, modules and courses for education and training. These can be for pre- and post-graduate students and for industrial staff; for graduates from related disciplines and mid-career staff to be retrained.

(ii) Actions to improve the utilisation of such existing schemes and modules at a European scale, and/or to promote their replication in Europe. These may involve also the training of trainers.

(iii) Actions to improve the industrial relevance of the education at universities and engineering schools.

(iv) Actions for graduates from candidate countries for EU membership associated to the 5th Framework Programme, to develop the skills of these graduates and their links with EU countries. An example of this is helping them to do the final years of their master studies in EU countries.

(v) Actions to raise the interest level amongst high school and university students for the related sciences and professions.

To achieve greater impact the Commission may, as a result of proposal evaluation, recommend combining related elements of different proposals into single actions.

Types of actions addressed: Accompanying Measures (excluding Take-up) and Thematic Networks.
Links with WP 2000: Further focused Action Line IST 2000 - IV.8.9

IV.2 Computing, communications and networks

The work addresses distributed systems operating under real time conditions, service enabling and customisation, and advanced networks. It exploits in particular: distributed object technologies, active and dynamically reconfigurable network technologies, and advances in computing, optical transmission, switching and routing. It provides the means (methods, tools and testbeds) for the platform independent applications, location independent services, and network interoperability. The Internet Protocol remains a defining element of the work.

IST2001 - IV.2.1 Real time distributed systems

The objectives are:

(i) To develop and assess models, technologies and tools for sharing and interactive use in real time of applications and resources in geographically dispersed locations, in the context of heterogeneous components and architectures. The focus is on development environments to support real time, distributed applications.

(ii) To develop robust cognitive vision systems acquiring and using knowledge for decision making. The focus is on adaptive systems, real time platforms and vision architectures permitting the development of novel computational frameworks, integrating multiple cues for scene modelling and capable of recognising large numbers of different objects. Approaches to achieving cognition such as temporal reasoning and incremental learning should be addressed.

(iii) To support the development of high performance, distributed control systems that are composable and meet stringent real time requirements. The focus is on novel scientific and technological concepts, algorithms, methods, architectures and tools for the design, implementation, validation/verification, testing and integration of robust and fault tolerant, distributed, real time controls for complex uncertain systems.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Thematic Networks, Accompanying Measures (excluding Take-up).
Links with WP 2000: Subsumes priority topics from Action Lines IST 2000 - IV.2.1 and IV.2.2

IST2001 - IV.2.2 Network and services interoperability, interworking and management

The objectives are:

(i) To increase the bandwidth capacity, Quality of Service and functionality of communications networks, and to support seamless interoperability among heterogeneous networks. The focus is on network gateways and protocols to support the full range of advanced (Internet, nomadic and interactive TV) services and applications.

(ii) To increase network agility and functionality, and to support service interworking and management. The focus is on active and dynamically reconfigurable network technologies, methods and tools.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Thematic Networks, Accompanying Measures (excluding Take-up).
Links with WP 2000: Subsumes priority topics from Action Lines IST2000 - IV.2.1 and IV.2.3

IST2001 - IV.2.3 Terabit optical networks

The objective is to further develop technologies and architectures for managed all-optical networks, by exploiting advances in optical transmission, switching and routing, with the aim of developing terabit capacity WDM optical networks which are capable of supporting heterogeneous, multi-protocol services and applications.

The work will ensure the interworking in the physical layer of optical core/metropolitan networks with heterogeneous access networks (mobile and fixed).

Types of actions addressed: Research and Development, Demonstration and Combined projects, Thematic Networks, Accompanying Measures (excluding Take-up).
Links with WP 2000: Further focused Action Line IST 2000 - IV.2.4

IST2001 - IV.2.4 Computing, communications and networks – Take-up measures

The objectives are:

(i) To conduct Trials and Best Practice actions 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. The focus is on open source software.

(ii) To conduct Trials and Best Practice actions aiming at the introduction and intelligent integration of leading edge and/or insufficiently deployed embedded vision and/or control systems in industrial environments. The focus is on low cost systems based on off the shelf components integrated using advanced networking technologies.

Types of actions addressed: Trials and Best Practice actions.
Links with WP 2000: Further focused Action Line IST 2000 - IV.2.5

IV.3 Technologies and engineering for software, systems and services

The work addresses generic technologies and engineering for the development, deployment, operation and evolution of software intensive systems embedded in goods and services, as well as facilitating production and enterprise processes. The focus is on software architecture and adaptive end user services on mobile devices, as well as on stimulation of open source software developments. Work will complement activities in other international programmes, e.g. EUREKA/ITEA.

Accompanying Measures, including Take-up, form an important part of the work.

IST2001 - IV.3.1 Software architecture

Objectives: To ensure at the architectural level that required properties for the final software system will be met.

Focus:

The focus is on models and notations for describing systems architectures and being able to reason about them. The main concern is to guarantee required quality attributes (for instance on scalability, performance and reliability) of systems. Related aspects include:

(i) Constraints coming from existing components in an architecture definition process,

(ii) Support for structural variability and system families,

(iii) Run time system evolution, especially dynamic components interconnection for the deployment of agile and integrated processes cutting across organisations, and

(iv) Domain specific architectural styles.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Refocusing of Action Line: IST2000 - IV.3.1

IST 2001 - IV.3.2 Functionality models and building blocks for end user services

Objectives: To enable adaptive end user services on mobile devices for information creation, exchange, storage and access.

Focus:

(i) Reference models for the content and functionality of end user services: open and extensible frameworks for meta-information on services and their components, including semantic information (what functionality does the component or the service provide) and dynamic behavioural and operational aspects (how does it interact, collaborate and negotiate functionality and behaviour).

(ii) Architectures and mechanisms for automated brokering of service components through dynamic registration and discovery mechanisms in mobile environments.

(iii) Trials for usage centred interaction and functionality design for software on mobile devices

Projects in (i) and (ii) must include relevant testbed implementations for proof of concept.

Types of actions addressed: For (i) and (ii): Research and Development, Demonstration and Combined projects. For (iii): Trials.

Links with WP 2000: Further focused Action Line IST 2000 - IV.3.2

IST2001 - IV.3.3 Free software development: towards critical mass

Objectives:

(i) To foster in Europe a critical mass of development of free software released under GPL-compatible licenses.

(ii) To make available European based support services for free software projects.

Focus:

(i) Support services for free software developers at all stages of the project lifecycle: project hosting, certification, release, repositories, dissemination.

(ii) Trials of free software development in the following fields: media technology for personal users, co-operative information production and sharing, and usability.

(iii) Socio-economic studies on technology assessment, economic assessment and derived business models

Types of actions addressed: Trials and studies Accompanying Measures.
Links with WP 2000: Further focused Action Lines IST 2000 - IV.3.4 and IV.3.5

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 information and communication technology (ICT) applications.

IST2001 - IV.4.1 Simulation and visualisation,

Objectives: To develop real time, large-scale simulation and visualisation technologies, tools, applications and environments that will, in turn, support the design and development of highly complex and dynamic information processing and telecommunications infrastructures and services.

Focus:

- Modelling and simulation tools for control and management of the real time behaviour of large-scale, multi-domain ICT systems/networks, protocols and services.

- New visualisation applications, including data mining on very large, multi-terabyte, data sets.

Type of actions addressed: Research and Development, Demonstrations and Combined projects.
Links with WP 2000: Subsumes priority topics from Action Line IST 2000 - IV.4.1

IST2001 - IV.4.2 Mixed realities and new imaging frontiers

Objectives: To develop imaging technologies that enable powerful synergies between people and information appliances in person to person communication, work, education and entertainment.

Focus:

- Bringing virtual worlds to life by enhancing realism and level of detail, introducing intelligence, making them persistent and reactive environments.

- Augmenting reality by enhancing real environments for a range of applications, from wearable computing for navigation and engineering processes to content production and interactive entertainment,

- Improving sensorial acuity by high definition, 3D, full space imaging, multi-sensory cues and very advanced display systems to create fully immersive distributed environments for applications such as virtual- or tele-presence,

- Supporting the projection of a more expressive representation of users into display spaces, enacting users' intentions and activities through intuitive and textless interaction paradigms.

Experiments, standardisation, cost reduction, real time, human factors, safety and ethical issues should be considered as relevant.

Type of actions addressed: Research and Development, Demonstrations and Combined projects.
Links with WP 2000: Subsumes priority topics from Action Line IST 2000 - IV.4.2

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

The work addresses reconfigurable radio systems and networks, terrestrial wireless systems and networks and satellite systems and services. It aims at providing the means to firmly establish the area of reconfigurable radio as a key R&D area that will ensure the sustained and competitive development of mobile and wireless communications. On terrestrial wireless systems and networks the focus of the work is on the study of novel wireless concepts applicable for both current and future (e.g. 4th generation) systems while seeking to further develop and validate network architectures. Particular emphasis is given to integration of satellite broadcasting, Internet Protocol, multicasting etc. and to the development of next generation technologies for satellite based interactive systems.

IST2001 - IV.5.1 Reconfigurable radio systems & networks

Objectives: To support evolution towards 4^{th} generation wireless systems through creation of an open service/application development environment that allows heterogeneous radio networks (including terminals and base stations) to inter-work and adjust adaptively to traffic load and characteristics, services and user requirements, targeting dynamic spectrum sharing.

Focus:

Key goals are the development of:

(i) Novel techniques and technologies in the area of combined DSP/RF design that will lead to the realisation of efficient and cost-effective adaptive transceivers (terminals as well as base stations). The combinations of and trade off between dedicated ASIC implementations and reconfigurable logic as well as optimised algorithmic partitioning are of particular interest.

(ii) Open architectures and service/applications development environments, enabling the co-existence, interoperability, portability and adaptation of services, across heterogeneous wireless network platforms. Aspects of particular relevance are those related to self adaptation to traffic load and characteristics, including multi-streaming, dynamic bandwidth allocation, and spectrum sharing.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Further focused Action Line IST 2000 - IV.5.1

IST2001 - IV.5.2 Terrestrial wireless systems and networks

Objectives: To study, develop and validate novel terrestrial wireless systems and networks including fixed wireless access systems, advanced public/private wireless local area networks, and interworking mobile/broadcasting systems supporting the provision of broadband multimedia services for interactive and distributive services.

Focus:

Key aspects concern:

(i) The development and validation of novel systems and networks where the work relates to Quality of Service evaluation and management, support of mobility, radio resource control mechanisms and protocols including intra- and inter-network handover, and interworking and seamless roaming between public and private networks. Of particular relevance is the optimisation of network elements and terminal performance in heterogeneous (e.g. mobile/broadcasting, public/private) contexts with a variety of symmetric, asymmetric and broadcast services, the roaming of location based services and the further enhancement of mobile related IPv6 capabilities for improved addressing and security.

(ii) The study of novel concepts and architectures for systems and networks offering significant advances in terms of performance, cost, spectrum sharing, service capabilities and network management features. Of particular relevance is the study of novel wireless radio access for multiple radio environments, including high altitude platforms, and for various spectrum regions, allowing for the dynamic communication and interworking between terminals and networks and the associated Quality of Service/load sensing mechanisms supporting full service mobility as appropriate.

(iii) Technological and algorithmic development and demonstration with the objective of enhancing network performance.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Further focused Action Line IST 2000 - IV.5.2

IST2001 - IV.5.3 Satellite systems and services

Objectives: To study, develop and validate technologies and architectures for the support of multimedia services in the context of advanced mobile systems and of next generation interactive broadcasting systems.

Focus:

Key aspects concern:

(i) The technologies and demonstrators based on architectures demonstrating a viable evolution towards advanced MSS/FSS systems. The work relates to integration of satellite key features such as broadcasting (e.g. S-DAB or S-DVB), optimised support of Internet Protocol including voice transmission by IP protocol using

satellite wideband networks and multicasting, delivery of multimedia services through supplemental, complementary, or extension strategies with the mobile terrestrial networks.

(ii) The development of advanced technologies and architectures allowing for introduction of novel BSS systems with scalable support of multimedia services. The work relates to support of broadcasting technologies supporting novel interactive multimedia applications, optimised multicasting and caching architectures and to the associated FCAPS management functions. Technologies for dynamic optimisation of spectrum and network resources are common objectives.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Further focused Action Line IST 2000 - IV.5.3

IV.6 Interfaces making use of the various senses

The work addresses interfaces for service delivery platforms that take into account the advanced requirements and their variety of service providers, user terminal technology and user skills and knowledge in order to offer services that attract the highest number of customers. The focus is on the development and integration of advanced display, sensor, and actuator technologies, software interfaces for flexible human system interaction, and interfaces expressing the perceived quality and the service protection requirements to the networks for end user services and applications.

IST2001 - IV.6.1 Advanced displays and sensors

Objectives:

(i) To develop multimodal interface devices able to capture user commands and deliver enriched audio-visual content from nomadic, wearable and stationary terminals while causing minimal interference with the user's activity.

(ii) To overcome the usability problems of portable systems limited by the performance and size of their display and sensory interface.

(iii) To take profit from display limited system size by on-board integration of processing and sensing/actuating functions.

(iv) To demonstrate new technologies able to bring high quality displays to the mass consumer market especially for large area or low power.

Focus:

(i) Development of high information content displays with acceptable performance for portable devices. Particular issues are low power and autonomy, visual coupling between the user and the display for small form factors, endurance and flexibility for smart cards, e-paper and wearable terminals.

(ii) Innovative concepts for the disappearing display: high resolution immersive devices, holographic and 3D rendering.

(iii) Adding value to existing display technologies through customisation, performance improvement based on innovative key components and system integration, manufacturing cost reduction based on new processes and equipment, and reuse for other applications.

(iv) Multi-sensor/actuator optimisation and integration to interface systems with user senses, posture and environment.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Further focused Action Line IST 2000 - IV.6.1

IST2001 - IV.6.2 Interfaces and buffers for seamless end to end services

Objectives:

(i) To develop flexible, dependable and predictable network independent platforms for seamless open interactive services, including broadcasting, with protection of IPR and enabling easy development of new business models.

(ii) To improve the quality, affordability and usability of these services to continually attract users from all ranges of wealth, age and education.

Focus:

(i) Standardised interfaces, storage and buffers (DVB, MPEG, IETF, W3C, TV-Anytime etc.) for: services and service management on networked systems; end to end consumer electronics applications, supporting professionals, individuals and groups with strong requirements on reliability, timeliness, scalability and interoperability to guarantee perceived quality of service.

(ii) High quality audio-visual representation and coding.

(iii) Reconfigurable networked appliances for seamless interaction across home, access and core networks.

(iv) Network programming interfaces.

(v) Trusted free choice environments for more intuitive and natural navigation and interaction with advanced content and services. Work is expected on location, access and delivery supported by intelligent audio-visual customer platforms, metadata and portals.

(vi) Testbeds with applications for technical, service provider and user centered evaluation of new services.

Types of actions addressed: Research and Development, Demonstration and Combined projects.

Links with WP 2000: Further focused Action Line IST 2000 - IV.6.2

IV.7 Peripherals, sub-systems and microsystems

The work addresses the complete product life cycle of subsystems and microsystems including R&D on new device structures and concepts, design and testing techniques, and technologies for packaging and manufacturing capabilities. The major objectives of the area are (i) to improve the design, validation and manufacturing of intelligent multidisciplinary functions and their integration in single monolithic or multi-component assemblies, and (ii) to improve the functionality, performance, power consumption and cost effectiveness of improved structures, devices and systems. Various fields of application such as communications, automotive, medical, industry and home may be addressed.

Co-operation between research and industry, notably in the longer term research projects, is encouraged to stress the industrially driven nature of the work. Close contact between the technology providers, designers and users is considered a primary condition for successful projects. Complementarity and coordination with work in other European projects (e.g. EUREKA/Eurimus/PIDEA) and in the FPV/Growth Programme (see http://www.cordis.lu/growth) is considered an asset.

IST2001 - IV.7.1 Subsystems

Objectives: To develop the critical building blocks (electronic multicomponent assemblies) of future applications while also addressing the underlying design, manufacturing and verification technologies.

Focus:

Emphasis is on improvement of attributes of electronic subsystems for portable and wireless applications (miniaturisation, low power, low cost); and on user friendliness, reusability and scalability. Innovative developments with a medium to longer term exploitation potential (4-8 years after project start) are expected.

Integrated developments may address the hardware and software aspects of multicomponent subsystems that can be tailored to specific applications. This includes hardware/software system co-design and partitioning for RF; high power/high speed devices; distributed intelligence, storage, and signal processing; techniques and devices for improved data storage and interfacing; integration, interconnection and manufacturing technologies.

Types of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP 2000: Further focused Action Line IST 2000 - IV.7.2

IST2001 - IV.7.2 Microsystems

Objectives: To develop multi-function intelligent microsystems and to integrate and validate these in real application systems.

Focus:

Emphasis is on developments that greatly increase the performance of systems, processes or tools, or that allow the creation of entirely new systems or functions; on microsystems with a high information processing content; on miniaturisation, low cost, reliability and reusability; and on industrialisation aspects. Activities on MOEMS, on bio, gas and chemical based microsystems are encouraged.

Activities may include research and development towards new device structures and innovative micro or nano-systems, work to enhance the manufacturing and technology base, work on design tools and methods, test, packaging and assembly, and work on the integration of microsystems technology into products.

Multidisciplinary developments with a short to mid term exploitation potential (4-8 years from project start) are expected. Developments that address new device structures or nano-systems may have a longer term exploitation potential.

Projects should have a high microsystems development content. Projects with a high application content (high amount of resources allocated to the development of the application itself) are to be dealt with in other parts of the Programme (V.1.4 or in the relevant action lines of Key Actions I, II and III).

The work is complementary to and coordinated with the mid- and long-term oriented activities in Key Action I of the FPV/Growth Programme, targeted research action on product services, including miniaturised systems.

Types of actions addressed: Research and Development, Demonstration and Combined projects.

Links with WP 2000: Further focused Action Line IST 2000 - IV.7.3

IST2001 - IV.7.3 Subsystems and microsystems – take-up measures

Objectives: To stimulate, facilitate and accelerate the take up of advanced microsystems, subsystems and their underpinning technologies, equipment and materials in new products and processes and in manufacturing.

Focus:

Activities may include:

(i) Trials to adapt and introduce (a) advanced microsystems, subsystems and their related innovative technologies in new products or processes, and (b) new design technologies or methods in existing design flows.

(ii) Best Practice actions such as first use of existing but innovative technology to enhance the functionality or economy of existing products and systems with particular emphasis on application in industrial sectors where penetration of the particular microsystem, subsystem or technology is currently limited.

(iii) Assessment of advanced material and prototype equipment for improved fabrication, integration and test.

(iv) Activities to create research infrastructures and networks or other support or infrastructure activities that increase or facilitate access to innovative industrially offered microsystems or subsystems technologies, that increase access to the required design and market knowledge and that facilitate applied research in this field.

The activities are expected to have the minimum of partners required, a short duration and short term exploitation. Infrastructure or service activities are expected to lead to self-funding. Major emphasis is on dissemination of the results and awareness creation. A broad coverage of market sectors is expected.

Types of actions addressed: Trials, Best Practice, Access and Assessment actions.
Links with WP 2000: Subsumes priority topics from Action Lines IST 2000 - IV.7.4, IV.7.5 and IV.7.6

IV.8 Microelectronics - optoelectronics

The proposed work in the areas of micro- and optoelectronics is of mid- to long-term nature, focussing on critical technological issues described hereunder. Main application areas envisaged are components for information and communication terminals and for communication systems and networks.

General objectives are to improve the productivity of microelectronics design and test, to further push miniaturisation, power consumption, performance and cost effectiveness of micro and optoelectronic devices and technologies, and to integrate more system functions on chips.

The work is complementary to and coordinated with work in national and European level programmes (e.g. EUREKA/MEDEA+ and FPV/Growth). In particular, proposals centered on development of materials should be submitted to the FPV/Growth programme (see http://www.cordis.lu/growth).

IST2001 - IV.8.1 Microelectronics design and test & application specific microelectronics

Objectives: To develop new specific tools and reusable Intellectual Property blocks to be integrated in design platforms in order to improve the efficiency of design teams for a family of IC products.

Focus:

Elements of interest include system specification, architecture exploration and optimisation (including hardware/software co-design), modelling, validation, verification and test, and support for the on-chip integration of different functions (e.g. mixed signal and RF). Platform integration is supported in Action Line IV.1.1.

Proposals must position themselves in the context of the target platform with clear indication of the concerned product families, identify the potential platform users, and show how the results will become available to these users. The work should focus on aspects specifically needed for the target platform and product family chosen, rather than generic developments.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Trials and Accompanying Measures (excluding Take-up).
Links with WP 2000: Subsumes priority topics from Action Lines IST 2000 - IV.8.1 and IV.8.2

IST2001 - IV.8.2 Microelectronics technologies: processes, equipment and devices

Objectives: To enable the increase of data transfer rates of communication systems and processing speed and storage capacities of terminals.

Focus:

(i) New solutions for basic CMOS process modules (Si and Si/SiGe on bulk Si or SOI), on equipment related to the sub-topics below, and on integration of new materials. Simulation of processes, devices and equipment is included. Particular focus is on:
- Front-end CMOS for technology nodes equal or below 70 nm; focus is on transistor architectures allowing low off currents, on alternative gate materials and on high k materials for gate insulators and capacitors;
- Back-end CMOS for technology nodes equal or below 100 nm; focus is on low k (<= 2.2) materials, new metalisation techniques and their integration in multi-layer interconnect schemes;
- Mask making for 193 and 157 nm lithography for 100 and 70 nm feature sizes; focus is on reticle enhancement techniques and defect reduction.

(ii) Integration of system functions on a chip. Emphasis is on embedding of memory, RF, mixed signal, passive or sensor functions in CMOS logic for technology nodes equal or below 130 nm.

(iii) High power/high frequency and on low power/high frequency devices, including the use of compound semiconductors and of SOI where cost/performance advantages over Si and Si/SiGe can be expected.

(iv) Innovative solutions for the major device, process and material integration challenges anticipated for the microelectronics technologies planned for industrialisation in the next 8-12 years. . Focus is on:
- Innovative solutions addressing difficult challenges of the International Technology Roadmap for Semiconductors (ITRS). In the area of Next Generation Lithography (NGL) the focus is on creating IPs complementary to the know-how produced in national and EUREKA/MEDEA programmes and projects. A Concerted Action is also envisaged in order to provide a forum for the exchange of ideas and results to improve synergy between NGL programmes and projects at national and European level.
- Approaches based on alternative devices or architectures. The target performance and integration levels should be competitive with the 50 nm node of the ITRS roadmap and be viable beyond that point.

The industrial relevance of the work must be proven through adequate industrial involvement (e.g. participation, sponsorship).

The formation of Thematic Networks around critical themes is encouraged to organise the information exchange between involved researchers and industries and to facilitate the coordination of their work.

When required and practicable, research teams that need access to manufacturing facilities for implementation of research samples could seek such access through ongoing access actions in microelectronics and microsystems.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Trials, Access actions, Accompanying Measures (excluding Take-up), Concerted Actions and Thematic Networks.
Links with WP 2000: Subsumes priority topics from Action Lines IST2000 - IV.8.3 and IV.8.5

IST2001 - IV.8.3 Optical and opto-electronic technologies

Objectives: To further develop optical, opto-electronic and photonic functional components, devices and systems for information processing, telecommunication, storage, sensing and imaging.

Focus:

(i) Low cost, manufacturability, scalability and optical packaging issues for large computational and communication bandwidth components. It includes active and passive component integration with VLSI technologies, free-space optics switching technologies, and optical or hybrid devices/subsystems for telecommunication and information processing. The industrial motivation must be clearly demonstrated through appropriate plans for the exploitation of the proposed activities

(ii) Advanced long term research activities with a planned 5 to 10 year industrial impact in the areas of smart imaging, optical sensing, optical interconnects and components for all-optical networks. The industrial relevance of the work must be proven through adequate industrial involvement (e.g. advisory board, participation, sponsorship).

In addition to RTD activities, Thematic Networks around critical themes are encouraged for information exchange and co-ordination of research activities between industry and academic or research centres.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up) and Thematic Networks.

Links with WP 2000: Subsumes priority topics from Action Lines IST 2000 - IV.8.4 and IV.8.5

IST2001 - IV.8.4 Industrial microelectronics technologies - take-up measures

The objective of the Semiconductor Equipment Assessment (SEA) initiative is to stimulate the rapid take up of advanced prototypes by the semiconductor industry.

Focus:

The focus is on user driven assessment of advanced prototype equipment, of related OEM components and of materials for semiconductor manufacture. Facility level equipment and tools for pattern transfer are not included. The aim is:

(i) To assess and improve the performances of beta type equipment under close to production conditions, thereby creating reference centres at user sites.

(ii) To have an early proof of innovative process concepts by adapting state of the art equipment.

(iii) To have an early proof of concept for alpha type equipment.

Types of actions addressed: Assessment actions.
Links with WP 2000: Continues Action Line IST 2000 - IV.8.8

3.5 CROSS-PROGRAMME THEMES

Objectives

Cross-programme themes are the most practical manifestations of both the integrated nature of the 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 Programme stems from the breadth of research subjects brought together as one 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 multidisciplinary 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. They are expected to be grouped into cross programme clusters once they are launched.

- On the other hand ***Cross-programme clusters (CPCs)*** will build a-posteriori links between ongoing projects throughout the Programme and provides the glue that 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

CPAs for 2001

Thirteen themes are proposed as Cross Programme Actions in WP2001 and are described in the following Action Lines.

IST 2001 - V.1.1	CPA1: Home environments
IST 2001 - V.1.2	CPA2: Multimodal and multisensorial dialogue modes
IST 2001 - V.1.3	CPA3: Use of Geographic Information
IST 2001 - V.1.4	CPA4: Towards dependable and survivable systems and infrastructures
IST 2001 - V.1.5	CPA5: Smart cards
IST 2001 - V.1.6	CPA6: Next generation networks
IST 2001 - V.1.7	CPA7: Socio-economic analysis and indicators for the information society
IST 2001 - V.1.8	CPA8: eLearning for European youth in a digital age
IST 2001 - V.1.9	CPA9: Grid test beds, deployment and technologies
IST 2001 - V.1.10	CPA10: Next generation micro- and nano-technologies
IST 2001 - V.1.11	CPA11: Regional and sectoral pilot actions and demonstrations
IST 2001 - V.1.12	CPA12: Application services provision
IST 2001 - V.1.13	CPA13: Advanced signal processing systems and applications

IST 2001 - V.1.1 CPA1: Home environments

Objectives: The aim is to extend home systems and platforms better to support the seamless access to, and delivery of, integrated applications and services. Examples of services include multimedia and interactive home environments for learning, education and training, entertainment, home healthcare, independent living for all and especially elderly and disabled persons, home safety, e-Commerce and e-Work at home. The scope covers also test beds in the form of mid to large scale demonstrations that combine several services. By addressing cost, reliability and ease of use, demonstrators should provide models for low cost, user friendly systems and services that are configurable to users' needs.

Focus**:**

- Convergence of data transport media integrating broadcasting, interactive services and in-home control applications.

- Seamless interconnection and interoperability between networked appliances, (household and consumer devices), and between home networking technologies and global networks, as a means for access to applications and services.

- Distributed home control and server systems as well as in-home content management supporting individual and group customisation of services and adaptation to various delivery channels.

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links with WP2000: Reshaped Action Line IST2000 - V.1.1 (CPA1)

IST 2001 - V.1.2 CPA2: Multimodal and multisensorial dialogue modes

Objectives: To enrich the way people communicate with digital services and artefacts through research, development, integration and use of multiple modalities, including spoken and written language, facial and prosodic expressions, gestures, emotions and haptics. The goals are easier and more effective interactions, better usability, efficiency, quality, enjoyability and an increased sense of realism of information, communication and virtual reality platforms.

Focus:

- Research and development in gesture, motion, eye and gaze tracking, recognition and analysis, affective interpretation and synthesis, gestural images and motion coding. Emphasis is (i) on the telecommunication aspect addressing distant and shared gesture-like control as well as the efficient use of available network bandwidth, (ii) on synchronisation and new concepts of real time systems and (iii) on aspects relating to ambient awareness, modelling, simulation, visualisation and virtual worlds incorporating computer vision, games and user agent technologies.

- System level integration of multimodal and multisensorial component technology, including the supporting middleware, new displays, sensors and actuators. These are required to improve the communication with complex digital artefacts, including information and communication appliances and services such as next generation mobiles and personal information assistants, and their use at home, on the move, in schools and at work.

The work will consist of the novel combination and integration of interaction modalities fitting specific uses and individual requirements, and supporting ubiquity of access. Particular emphasis will be put on test beds for assessing the appropriateness of the interaction modalities. Application of these technologies should also enable the learning of technical gestures – e.g. of surgeons, musicians, and manual operators – or make machines learn human gestures and manual abilities, e.g. writing and driving. Design for all will be taken into account as far as possible, by ensuring universal service access and quality in use for people with different cultural, educational, training and employment backgrounds, for ageing people and people with disabilities. Results will include coding standards for multimodal data in view of rule extraction and dynamic modelling, and data banks of gestures and manual expertise .

Types of actions addressed: Research and Development, Demonstration and Combined projects
Links to WP2000: Reshaped Action Line IST2000-V.1.2 (CPA2)

IST2001 - V.1.3 CPA3: Use of Geographic Information

Objectives: To help improve citizens' awareness and comfort, industrial competitiveness and the efficiency of public administrations by enhancing and supporting the use, access and management of geo-information.

Work will cover research and development, demonstration and validation of geo-information and is expected to contribute to the *e*Europe initiative and in particular to the priority actions on 'government online', 'citizen environmental awareness', 'intelligent transport systems', to the recommendations of the green paper on access to public information and to the actions on European digital content. Target application domains include transport, mobility, tourism, entertainment, e-map, e-Commerce, statistics, meteorology, environment (e.g. modelling systems for preventive, early warning and relief purposes, environmental monitoring, risk assessment and decision support, environmental data management), as well as intelligent publishing and delivery mechanisms.

Focus

Projects are expected to:

- Develop and validate GI (Geographic Information) technologies, including dynamic environments, interactive 3D-4D information visualisation, combination and analysis, and augmented reality environments including projection systems.

- Develop engineering techniques for designing and providing generic spatial data services and software components based on standardised interfaces that can be reused and integrated in future applications and other contexts.

- Design, develop, validate and demonstrate location based and/or mobile services using GI and related reference data, integrating global positioning and earth observation systems, fixed and wireless network technologies, advanced sensors, large database technologies, intelligent agents and rich multimedia content for context based information management, retrieval, publishing and delivery in a variety of thematic applications.

- Experiment with new business models for the production, distribution and usage of spatial data in mass market applications.

– Improve accessibility, usability and exploitability of GI and related reference data with focus on metadata interoperability, standards, and semantic and ontological compatibility issues.

– Support the setting up of the European Spatial Data Infrastructure and a Common Reference System, and contribute to global initiatives like GMES, GSDI, OGC, ISO, JTC, in conjunction with existing national and international work, through national mapping agencies and others.

Types of actions addressed : Research and Development, Demonstration, Combined Projects, Concerted Actions and Thematic Networks, Accompanying Measures (excluding Take-up).
Links with WP 2000 : Refocused Action Line IST 2000-V.1.3 (CPA3)

IST 2001 - V.1.4 CPA4: Towards dependable and survivable systems and infrastructures

Objectives: To develop and validate new approaches and technologies aimed at enhancing the dependability and survivability of the global information infrastructure, including requirements of and applicability to application domains of general interest (e.g. environment monitoring, transport, health, etc.).

Focus:

– Develop innovative (for instance, based on epidemiological paradigms) and multidisciplinary approaches, methods and technologies to build and manage dependability properties (especially timeliness) of large scale infrastructures composed of tightly networked embedded systems.

– Develop and validate methods and technologies to model and manage dependability and survivability of globally interdependent systems and highly interconnected critical infrastructures.

– Develop and validate technologies to measure, verify and monitor dependability properties and behaviours of large scale unbounded systems.

– Develop international co-operation on R&D in technical areas like those of globally interconnected systems, information assurance and survivability of critical infrastructures.

Type of actions addressed: Research and Development, Demonstration and Combined projects.
Links with WP2000: Reshaped Action Line IST2000 - V.1.4 (CPA4)

IST 2001 - V.1.5 CPA5: Smart cards

Objectives: To accelerate, consolidate and harmonise the usage of smart cards (in all shapes & forms, including tags) across Europe in all application areas of the information society where security, data privacy and consumer protection are of critical importance. Indeed, although the wide use of smart card in Europe is already a strength, further efforts are needed to overcome the market fragmentation between countries and sectors. The work is driven by the "Smart Card Charter" referenced in the *e*Europe 2002 Action Plan[9].

[9] http://europa.eu.int/comm/information_society/eeurope/actionplan/index_en.htm

Focus:

The focus is on cross sector applications of smart card based infrastructure (cards, terminals and back end systems). The aim is to facilitate secure individual access to electronic services and to build trust and confidence while protecting privacy and confidentiality.

For each of the focus areas described below, a different type of actions is addressed:

a) Deploying innovative applications & services to foster the build up of critical masses of users for smart card applications. These applications should help materialise and validate new business models and technical developments. For this purpose, demonstrators are sought at the European level on: government online, automation of administrative procedures, secure public procurement over the Internet, public transport and health care administration, public key infrastructure, electronic identification, digital signature and secure payments. Projects may promote either reusable solutions resulting in economy of scale or pan-European interoperable applications.

   Types of actions addressed in a): Demonstration.

b) Improving the acceptance of smart cards, to ensure access to services from any terminal, any time, anywhere, including for disadvantaged groups. Priorities are to ensure easy access to smart card based infrastructures by designing it for all; to broaden access to services to the widest range of smart card terminals in different locations, improving interoperability between card and terminals (including home, mobile and/or Internet based terminals).

Types of actions addressed in b): Best Practice, Trials.

c) Advancing smart card technology: Priorities to be addressed are: advanced mechanisms for seamless use of multi-application cards and accepting devices; solutions required by contact-less cards to reach industrial maturity and to complete their standardisation; and productivity improvement in smart card system development.

Types of actions addressed in c): Research and Development, Demonstration and Combined projects.

d) Consensus building among users to accelerate the deployment of smart cards: To build consensus within specific sectors and/or across sectors, to ensure compatibility of smart card based infrastructures; to encourage interoperability via business reciprocity agreements; and to ensure fair access to user or system requirements for all players.

Types of actions addressed in d): Thematic Networks, Accompanying Measures (excluding Take-up).
Links with WP2000: Reshaped Action Line IST2000 – V.1.5 (CPA5)()

IST 2001 - V.1.6 CPA6: Next generation networks

Objectives: To foster deployment and early market adoption of open converged networking infrastructures by supporting industry driven experimentation, integration, validation and deployment of cross boundary applications and services.

These large scale experiments will complement laboratory testbeds and trials conducted in other parts of the Programme and will allow for testing usability and user-friendliness on a larger scale in terms of both number of users and duration of the experiments.

Focus

The work focuses on novel IP infrastructures that result from the convergence of fixed, mobile and wireless technologies and architectures from a service perspective.

The availability of large scale converged network infrastructures will permit the validation of technological choices related to issues such as interoperability, scalability, security and Quality of Service and to experiment and demonstrate full service and application capabilities in the context of specific application sectors.

Complementary dimensions are the testing of new business models for the service provision.

Type of actions addressed: Research and Development, Demonstration and Combined projects, Best Practice and Trial actions
Links with WP2000: Reshaped Action Line IST2000 – V.1.6 (CPA6)

IST 2001 - V.1.7 CPA7: Socio-economic analysis and indicators for the information society

Objectives: To develop a better understanding of the challenges, impacts and opportunities associated with the transition to the knowledge based economy and society, and of the conditions under which sustainable economic development, favourable employment conditions and secured social inclusion and protection can develop and prosper.

The Action Line focuses in particular on the fundamental economic, societal and social issues highlighted by the Presidency Conclusions of the Lisbon European Council and by the *e*Europe initiative.

Focus:

- Mid- to long term social and economic modelling and scenario development for the new economy; studies of the relationship between social and economic transformations and technological innovation, notably in IST; identification of the opportunities and risks on the way towards social and societal integration.

- Work on statistical methods and tools that support the development of indicators for the new economy including new forms of data collection, processing and dissemination. As partial and dispersed information is more and more available on the topic, development are encouraged in new approaches like referenced data warehousing, textual analysis, knowledge formation, etc. The envisaged work should complement and support other more specific socio-economic activities undertaken within individual Key Actions. On a shorter time scale, this Cross-programme Action will address socio-economic indicators as identified in the current *e*Europe initiative.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures, Concerted Actions and Thematic Networks.

Links with WP2000: Extends the scope of Action LineIST2000 V.1.7 (CPA7).

Work in the Action Line will be co-ordinated with the thematic programme “Improving human research potential and the socio-economic knowledge base”. Work on indicators will be elaborated in co-ordination with Eurostat.

IST2001 - V.1.8 CPA 8: eLearning for European youth in a digital age

Objectives: To pull together a critical mass of key actors, from various European sectors, to research, develop and perform large scale validation of novel ICT based systems and

services, at a trans-European level, for improving eLearning in schools and higher education institutions. The research should demonstrate scalable and efficient solutions for users to collaborate and share high quality digital learning resources and infrastructures at European level, enabled by optimised broadband communications and new software and service solutions.

Focus:

To establish a small number of strategic, large scale experiments in learning, on the basis of pedagogically sound principles, addressing operational and scalable technologies, applications and services for:

- Facilitating the acquisition of key skills for the digital age, such as collaborative working, creativity, multidisciplinarity, adaptiveness, intercultural communication and problem solving.

- Accessing and sharing digital multilingual learning resources and objects across Europe (including concepts of a European Open Source initiative for learning software).

- Improving and validating broadband access to ICT based learning at home or in geographically remote regions, with seamless access to education content across a range of access infrastructures (satellite, mobile, including 3rd generation systems , fixed etc).

- Integrating new high quality digital European knowledge sources from science, libraries and cultural heritage into learning.

- Supporting real time and interactive collaboration between learning institutions and between learners.

- Establishing new sustainable models for trans-European digital learning services, structures and business cases (including concepts of personal knowledge brokers and Learning Service Providers).

- Working closely with local business communities to ensure that learning is relevant to changing employment needs, and to help bridge the gap between education and lifelong learning for work.

The proposed application experiments are expected to demonstrate added value for learners at school or higher education level by addressing one or more of the identified key RTD issues, building upon relevant national initiatives. The work should encompass appropriate evaluation to allow for impact assessment and should also address the wider exploitation aspects of the proposed technologies and services. It is anticipated that the basic necessary underlying communication and computing infrastructures are already in place, facilitating further research. The work should also encompass supporting measures to ensure collection and dissemination of best practice at European level.

Types of activities addressed: Research and Development, Demonstration, Combined projects, Accompanying Measures (excluding Take-up)
Links with 2000 WP: New action line.

IST2001 - V.1.9 CPA9: Grid test beds, deployment and technologies

Objectives: To foster and encourage community-wide (research and industry) development, deployment, experimentation, and integration of the Grid in order to incorporate it as an instrument for European competitiveness in research, industry and business.

The Grid aims at the effective harnessing of computing and data resources available world-wide and at making them seamlessly accessible as a single resource for any user on the web. The Grid is a platform heavily driven by compute-, and data-intensive scientific and industrial applications (meteorology and environment management, earth observation, biology and health, aeronautics, automotive etc).

Focus:

The work focuses on:

- Test beds for progressive full end to end service deployment and utilisation of the Grid through integration and implementation of relevant components, such as network technologies (routers, protocols, etc.), middleware (security, authentication, authorisation, resource scheduling, accounting, etc.) and application toolkits. These test beds should be conducted *in the context of* full scale applications (e.g. from those mentioned in the section on objectives) to understand and assess implementation problems as well as sociological and organisational issues. They should help construct gradually a unique infrastructure for ubiquitous computing and ubiquitous access to information.

- The development of Grid-specific toolkits and software and system architectures that ensure performance and scalability of solutions together with usability and functionality

- Interoperability between different Grid test-beds, the promotion of standards and reusable elements of broad utility and the exploitation of commonalties to reduce the barriers to deployment.

Types of actions addressed: Research and development, Demonstration and Combined projects
Links with WP2000: New action line to be conducted in collaboration with the eScience (DG Research) initiative.

IST2001 - V.1.10 CPA10: Next generation micro- and nanotechnologies for highly integrated miniature applications

Objectives:

- To foster development, validation, deployment and early market adoption of micro and nanotechnologies for miniaturised structures, microscopic products, miniature multifunctional components and systems and their use in several industrial sectors; to develop highly dependable and affordable solutions for health care and to monitor the environment and natural resources.

- To foster the interaction and convergence of different scientific disciplines including materials, electronics, physics, chemistry, medical and biological sciences, and system engineering with the goal to develop fully integrated miniature solutions.

Microtechnologies (µT) include device technologies such as for MEMS (micro-electro-mechanical), MOEMS (micro-opto-electro-mechanical); microsystems engineering, micro-machining and precision mechanics; microsensors and actuators, microfluidics, microrobotics and their related techniques and interfacing or manifolding from the micro-scale to the real world.

Nanotechnologies require the ability to work at molecular level and to combine different scientific disciplines to create structures with fundamentally new organisation, new properties or new processes.

CPA10 addresses part of the IST Programme's activity on nanotechnology that is also addressed by action line VI.2.1 (the FET Nanotechnology Information Devices initiative). The Programme's aim is to ensure a seamless coverage, from fundamental research to industrial platforms, in particular through cross-linked proposal evaluation. Proposals for training or for shared nanofabrication facilities, or other relevant nanotechnology infrastructures, are welcome in both action lines. The Programme's activity on nanotechnology is also expected to be complementary to work in the Growth Programme.

Focus

- Developments fostering the integration of novel materials, structures, devices and processes that result from micro- and nanoscale technologies. These developments should lead to highly integrated, miniaturised and intelligent products, processes and services combining IT techniques with non-IT technologies (bio, energy, environment). Hardware/software components aspects as well as their functional use may be addressed.

- Target areas include: life sciences and health systems (health care, bio-nano- and micro-biodiagnostic devices, remote and in-vivo devices, sensor systems, lab-on-a-chip and DNA chips, etc.), environmental systems (customised sampling and monitoring, water and air treatment, etc.), as well as industrial and communication systems and their applications. Bio-inspired systems, new energy cells or energy saving devices and micro spacecraft technologies are also covered.

- Design tools and methodologies, simulation, process and manufacturing aspects, including novel tools for micro- and nano-fabrication, with emphasis on higher throughput and lower cost are within the scope of the target work.

Work is encouraged on a platform for multidisciplinary micro or nanotechnology infrastructures necessary to develop, produce and exploit micro and nanoscale integration technologies in future applications.

Dependent on their nature, developments should have a medium to long term exploitation potential: 4-7 years from start of project. Developments with an even longer term exploitation potential or using nanotechnologies in order to exploit the novel or improved properties of materials or in order to exploit new phenomena in processes and devices, are to be dealt with in other parts of the IST Programme (e.g. Future and Emerging Technologies, FET) or in other Programmes (e.g. the Growth Programme).

Types of actions addressed: Research and Development, Demonstration and Combined projects, Trials and Access actions.
Links with WP2000: New Action Line

IST2001 - V.1.11 CPA11: Regional and sectoral pilot actions and demonstrations for the digital economy

Objectives: To support the development of pilot actions and demonstrations for regional or business-sector specific approaches to the digital economy, providing clear added value and benefit at a European level. Emphasis will be put on mid to large scale projects enjoying a high support from the key regional players and therefore capable of leveraging additional private or public funds (regional, national or European, including structural funds) for a later full deployment.

Focus:

Focus is on enabling information society technologies that support access, connectivity, content, and the reengineering of processes and practices as catalysts for much broader dissemination and adoption of novel solutions and practices. Priorities are:

- Development of pilots and large scale demonstrations to support the access of SMEs to the digital economy and the interaction with their natural business environment (trade associations, public administrations/agencies, training and research centres, cultural organisations, consumer organisations, large companies, content providers, etc.) and to demonstrate innovative examples of public services in the digital age, notably in the fields of cross-border interactions, e-Democracy, health, culture, road transport and environment, in the various regions including mountain and rural areas. This includes the establishment of e-communities to network and exploit regional assets.

- Support measures for co-operation among regions, diffusion of best practices and benchmarking in their initiatives towards the digital economy. This includes the co-operation of private and public organisations from different regions on the development and implementation of information society strategies and initiatives.

Types of actions addressed: Research and Development, Demonstration and Combined projects; ; Best practice; Other non Take-up Accompanying Measures
Links to WP2000: New Action Line

IST2001 - V.1.12 CPA12: Application services provision

Objectives: To develop and validate open architectures, technologies and tools to allow for the provision of a variety of applications as networked services over a commonly available infrastructure; to develop methods for the management and dynamic allocation of computing, storage and communication resources and for the monitoring of usage and service quality by providers and users; to enable experimentation with new business models, taking into account requirements of low entry costs for suppliers and adequate provision for privacy.

Focus:

- Development of open and reusable middleware for the efficient and flexible deployment of application services leased to an organisation and making use of external resources, possibly in combination with internal resources. The reuse of computing and data grid research prototypes and their integration with existing application development frameworks (CORBA, Java, etc.) could also be included.

- Development of service management frameworks with adequate provision for resilience, persistence, security, confidentiality and end user privacy.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Best Practice and Trials actions
Links with WP2000: New Action Line

IST2001 - V.1.13 CPA13: Advanced signal processing systems and applications

Objectives: To foster interdisciplinary research and development of high performance applications based on signal processing technology and to exploit synergy between a range of application requirements and their technological implementation; to contribute to the vision of ambient intelligence landscape by improving embedded systems based on advanced signal processing and to stimulate support for open software and hardware technologies.

Focus:

The work focuses on applications, algorithms, devices and appropriate tools. It includes:

- Achieving next generation system performance in the application areas of biomedical processing (e.g. ultrasonic echography, multimodal imaging, devices for personal health and special needs), multiple media (video, images, music, speech, language engineering), communications (fixed, mobile, wireless, navigation) and security (enhanced e-Commerce transactions).
- Designing advanced algorithms to support such applications including amongst others: physical modelling, multidimensional filtering, neural networks, wavelets, chaos theory, recognition, synthesis, coding, compression, modulation, watermarking and cryptography. Realisation of algorithms via codecs with the following properties: adaptive, (quasi) real time, secure and robust/reliable (graceful degradation and error recovery). Codecs are expected to support multiple data rates and data fusion and to handle large data sets.
- Implementing algorithms in embedded systems with innovative approaches including: signal processing devices, sensory and acquisition subsystems (biometrics, conditioning, analogue/digital conversion). Device properties comprise: low power, high performance, (re)configurable and portable with small footprints for embedded systems.

Support is encouraged for an open approach to standards, methodologies, support tools (languages, real time operating systems), reusable blocks, new open cores and emerging algorithms/codecs. Initiatives to provide the sharing of know-how in this field are also encouraged.

Types of Actions addressed: Research and Development, Demonstration and Combined projects; Accompanying Measures (excluding take-up).
Links with WP2000: New Action Line

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 and in Newly Associated States."

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 co-ordination and of ensuring that research visions and results are shared with the broader scientific community.

RTD Priorities in 2001

Overview

In addition to the open domain and Thematic Networks, the following proactive initiatives are identified as priorities for the year 2001:

(1) Nanotechnology information devices

(2) Global computing

(3) Lifelike perception systems

Further initiatives for the year 2002 and beyond will be identified through appropriate consultations.

Action Line Descriptions

Open Domain

IST2001 - VI.1.1 Open domain

Objectives: 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.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up), Thematic Networks
Links with WP2000: Continues Action Line. IST2000 - VI.1.1

Proactive Initiatives

IST2001 - VI.2.1 Nanotechnology Information Devices

Objectives: To develop novel devices and systems for information processing and storage with critical dimensions in the nanometre regime, that are scalable to ultra high level integration. The proposed devices/systems should be expected to have superior performance in terms of power consumption, operation speed, input/output compatibility, robustness, and defect tolerance, driven either by new applications or by the need to develop beyond the International Technology Roadmap for Semiconductors (ITRS) once CMOS limits are reached.

This initiative on Nanotechnology Information Devices is part of the Programme's activity on nanotechnology that is also addressed by action line V.1.10 (CPA10). The Programme's aim is to ensure a seamless coverage, from fundamental research to industrial platforms, in particular through cross-linked proposal evaluation. Proposals for training or for shared nanofabrication facilities, or other relevant nanotechnology infrastructures, are welcome in both action lines. The Programme's activity on nanotechnology is also expected to be complementary to work in the Growth Programme.

Focus:

– Beyond CMOS silicon compatible devices

  This addresses concepts that go beyond the ITRS () roadmap. Proposed devices and circuits should be expected to be superior to "ultimate CMOS" and might be implemented through concepts such as interband tunnelling, single electronics, 3D approaches, sub-20nm gate ballistic devices, etc., or be of hybrid nature integrating magnetic, superconducting or other effects with a silicon interface.

– Molecular Computing

  This addresses novel devices and systems operating at the atomic or molecular scale on the basis of chemical, electronic, photonic, biological and/or or mechanical

principles. The scope covers hardware implementations of pre-defined architectures using molecular scalable devices at the level of a logic gate or memory cell, as well as highly parallel systems that use the intrinsic properties of molecules to solve specific computational problems.

The development of nanofabrication techniques for below 10 nm, including self-assembly, are included in the scope.
All proposals should address the issues of integration, expected power consumption and speed, and input/output compatibility.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up), Thematic Networks
Links with WP2000: There has been a call for proposals for the Nanotechnology Information Devices (NID) initiative in 1999. The first projects have been launched in January 2000. This call is complementary to the previous one. Complementarity with activities in the Growth programme are also sought.

IST2001 – VI.2.2 Global computing: co-operation of autonomous and mobile entities in dynamic environments

Objectives: To harness the power of rapidly growing and changing computational environments composed of highly diverse interconnected devices. In these environments, everything is dynamic: physical devices are mobile, connectivity and bandwidth are changing and computational processes and data migrate. The aim is to develop techniques for engineering systems that are dependable, flexible, secure, robust and efficient. This initiative addresses fundamental work that may be beneficial to the evolution of the grid.

Focus:

The initiative will focus on three key aspects :

- The design of systems composed of autonomous entities whose participation in the computation is dynamic and where activity is not centrally co-ordinated.

- Analysing and reasoning about the behaviour of such systems, both qualitative and quantitative, even when very large numbers of entities or interactions are involved.

- Avoiding and/or detecting undesirable behaviour through control of the system and/or its environment.

An important issue in each of these points is methods for controlling the use of resources which facilitate stability and evolution of such systems, for example, the utilisation of idle resources in a transparent way but not against their owners' wishes and interests.

Types of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up), Thematic Networks
Links with WP2000: New action line

IST2001- VI. 2. 3 Lifelike perception systems

Objective: To create integrated perception-response systems that are inspired by the sophistication of solutions adopted by living systems. "Perception" is meant to include sensorial, cognitive, and control aspects, whether it refers to vision or hearing, or to any other element of interaction with the environment by a biological organism. Such systems would extend the capabilities of machines or be used to augment the human senses.

Focus:

The focus is on a systems approach integrating perception with the appropriate action resulting thereof. This systems approach should prevail over specific implementation issues, for example over the intended use of such systems in robots or in humans. Desirable features include task-specific adaptability of the perception system, processes of association (e.g. memory), and fusion of sensory modalities. An understanding of the internal representation of real world stimuli in biological systems is expected to be an important element of project work in this area. Work should consist of a balance of experimental and theoretical research and is expected to combine RTD in novel sensors, computational neuroscience, cognitive science, computer science, control, signal processing, cellular engineering, (bio)mechatronics (microrobotics and microsystems), and other areas.

Types of action addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up), Thematic Networks
Links with previous WP: New action line

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.

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 test beds.

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 continuous upgrade of the existing European interconnection of national research and education networks provided by the Géant project. 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 laboratories. The ultimate objective is to provide the hundreds of Gbit/s connectivity necessary to support the deployment of the WorldWide Grid according to the objective of the *e*Europe 2002 action plan and the *e*Science initiative.

The second objective (Action Line RN2) is to support the use of advanced network features and test beds 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 (RN1) concerns the provision of networking capacity and services. It will be implemented in concertation with the National Research and Education Networks that will organise additional competitive tenders, according to the public procurement rules and in compliance with market regulation, to complement the infrastructure already provided by the Géant project.

Any legal entity participating in projects selected under the 5th Framework Programme may use and access the interconnection infrastructure. Usage and access costs should be supported in the framework of these projects.

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

Action Line Descriptions

IST2001 - VII.1.1 RN1: Interconnection of Research Networks

Objectives: To complement the activity supported by the Géant project by providing complementary support where necessary to reach the connectivity objectives of the *e*Europe2002 action plan. That will lead to a scalable, smoothly expandable pervasive European interconnection network that can serve the growing needs to network the European scientific laboratories, industrial research institutions and IST projects in a worldwide grid. Particular focus will be given to the introduction of end to end support for different levels of Quality of Service (QoS), to the procurement of improved connectivity to third countries.

IST2001 - VII.1.2 RN2: Technology and Application Experiments

Objectives: Support large scale experimentation with middleware and end to end applications to provide the seamless integration of competitive access technologies with existing fixed infrastructure. These experiments, will build on the infrastructure provided by the RN1 activities and call for the involvement of real users in the context of problem oriented test beds, including the support of virtual communities.

Focus is on integration and interworking of various services, technologies for core and access networks, to enable increased levels of interactivity and mobility across local and wide area networks.

Test beds which cannot be accommodated on the research networking infrastructure resulting from RN1, such as disruptive optical protocols and equipment, and which require a separate infrastructure capable of supporting trials that could cause network disruption would also be considered in this context. The establishment of appropriate partnerships amongst research organisations, industry, equipment manufacturers and carriers is essential.

Type of actions addressed: Research and Development, Demonstration and Combined projects, Accompanying Measures (excluding Take-up).
Links with WP2000: Re-focussing of Action Lines IST2000 - VII.1.2, VII.1.3 and VII.1.4.

4 IST SUPPORT ACTIVITIES

This section describes generic Action Lines, aimed at supporting RTD activities. Support activities which relate directly to specific research activities undertaken by the Key Actions, FET or Research Networking are defined as Action Lines in the related sections of this workprogramme.

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.

Support activities may be submitted at any time (refer to the current *Call for Proposals*) and are evaluated in batches. The type of actions used are Thematic Networks and Accompanying Measures (excluding Take-up). Further detailed guidance on how to prepare and submit these type of proposal are contained in the *Guide for Proposers*. Support for conferences, seminars, workshops or exhibitions are part of a call for grants that has been already published.

IST2001 - VIII.1.1 Clustering of Projects

Objectives: To facilitate synergy between existing projects that see an added value in working together on common objectives. 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.

Types of actions addressed: Thematic Networks, Accompanying Measures (excluding Take-up).

IST2001 - VIII.1.2 Networks of Excellence and working groups in IST

Objectives: to facilitate the collaboration in an IST field between research groups from industry, academia and public organisations.

Focus:

- *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.

  Networks of Excellence and Working Groups 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.

Type of actions addressed: Thematic Networks.

IST2001 - VIII.1.3 Channelling of standardisation and interoperability initiatives

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

Focus:

Bringing together IST researchers and the competent technical committees of standards bodies and other open forums.

Type of actions addressed: Thematic Networks.

IST2001 - VIII.1.4 Improving human capital in IT by competence building (IHC)

Objectives:

To help build more professional competence in IT related disciplines by developing need oriented professional skills of academic graduates working in fields relevant for the activities of Europe's industries and research in the area of the User-friendly Information Society. Funded actions should aim to reduce the qualitative and quantitative skills gap in technological and non technological disciplines in order to stimulate economic and societal progress on the way to the Information Society. Various forms of co-operation and exchange between industry, academia and research centres will play an important role to this end, while at the same time improving the transfer of research results to industry..

Focus:

Measures for Improving Human Capital (IHC) in order to broaden and/or adapt expertise of senior staff including retraining, efficient use and transfer of knowledge from experienced to younger personnel, and building up need oriented skills of young graduates.

Actions may have various forms, i.e. preparation or carrying out of cross disciplinary co-operation on concrete subjects for providing training on the job, educational courses (learning or teaching), participation of professionals in activities of public research bodies or any other appropriate action.

Types of actions addressed: Training Accompanying Measures, training networks, fellowships (Marie Curie Industry Host Fellowships), Non Take-up Accompanying Measures.

IST2001 - VIII.1.5 Bridging the IT skills gap through development of Training Infrastructures

Objectives: In the framework of the *e*Europe initiative, innovative approaches to improvement, co-operation and creation of Training Infrastructures (in-house universities) will be supported. This includes the IT industry's own training infrastructures that can significantly contribute to bridging the existing skills gap.

Focus:

Preparation and implementation of the following measures:

- building up, improving or optimising corporate infrastructures for graduate and post-graduate training and qualification enhancement;

- necessary action in view of co-operation and synergy building between such institutions, e.g. networking, co-ordination of activities or other forms of co-operation;

- shared programmes for competence building, development and implementation of necessary training tools and actions to train the trainers as well as other related activities.

Types of actions addressed: Thematic Networks, training networks, Accompanying Measures (excluding Take-up)

IST 2001 - VIII.1.6 Enabling RTD co-operation with Newly Associated States[10]

Objectives: To build awareness of IST and facilitate the formation of project consortia that include partners from the Newly Associated States. To better link the Newly Associated States' IST research base to that of the EU and vice versa. To support and develop more efficient means of co-operation with these countries.

Focus:

Support will be considered for working groups and thematic, information, and partnering networks, for regional information centres, facilities and Web sites, for enhancing the scope of existing IST actions, and for the organisation of events, in conjunction with the horizontal Programme on "Confirming the international role of Community Research". Sub-regional such activities (e.g. in the Balkan or the Baltic regions) are encouraged.

Types of actions addressed: : Research and Development, Demonstration and Combined projects, Thematic Networks, Accompanying Measures.

IST 2001 - VIII.1.7 Enabling RTD Co-operation with 3rd Countries

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. To increase access to niches of excellence and skills in universities and research centres, and to market opportunities in emerging economies of the developing world.

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. Target activities should bring added value for the European industrial and research communities. Co-ordination with other major RTD frameworks via business partnership workshops and via international conferences and forums is encouraged.

Types of actions addressed: Thematic Networks, Accompanying Measures.

IST2001 - VIII.1.8 Dissemination and awareness of IST programme results

Objectives: To stimulate and promote the dissemination and awareness of the IST programme activities and to help maximise the exploitation of results and their socio-economic and policy implications.

Focus

- Accompanying measures and thematic networks that help disseminate the programme results to a broad community of suppliers and users of information society technologies and their applications.

Types of action addressed: Accompanying Measure (excluding take-up) and thematic networks.

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10 Newly Associated States are the States that are associated with the 5th Framework Programme and were not associated with previous Framework Programmes

IST2001 - VIII.1.9 Studies

Objectives: To provide both technology and market analysis to the research community, with a view to matching the research activities with international and socio-economic trends.

Focus: Projections and roadmaps of future development of information society technologies and applications and their socio-economic impact including benchmark studies and socio-economic analysis.

Types of action addressed: Accompanying Measures (excluding Take-up)

5 CO-ORDINATION ARRANGEMENTS WITH OTHER EU RESEARCH INITIATIVES

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 elsewhere within the 5th Framework Programme, or in related frameworks such as COST and Eureka.

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 standardisation; promote exchange of scientific information and best technological know-how worldwide; 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 entities from other countries as well as international organisations[11]. Specific measures will be introduced, in certain areas, in 2001 for enhancing the scope of existing IST actions by adding partners from the Newly Associated States to on-going activities.

Cross participation in other major RTD frameworks (such as the ITR programme of the National Science Foundation and the ATP programme in the USA, and the Electronic Commerce programmes of MPT and MITI in Japan) 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.

A *joint* call for the Intelligent Manufacturing Systems Initiative[12] (IMS) will be published in conjunction with the Specific Programme "Competitive and Sustainable Growth" (see also Section 3.2 on New Methods of Work and Electronic Commerce). The indicative budget for this call is 30 MEUR. The IMS continuous submission call is expected to be published on January 15, 2001 with a final closing date of September 15, 2001. IMS proposals should be for RTD projects or Thematic Networks. Besides the IMS Technical

11 The rules of participation are set out in the Council Decision of 22/12/98 (1999/65/EC), see also the "Guide to Proposers".

12 For complete documentation on the joint IMS call, see http://www.cordis.lu/

Themes, they can address any of the areas covered under the 2001 workprogrammes for IST Key Action II and Competitive and Sustainable Growth.

Actions for undertaking wider information exchange at the international level on the development of the global information society are also called for. This will include liaising with the programme "Confirming the international role of Community research", Non-EU funding agencies and organisations, including for example: the Club of Rome; the inter American bank of development, the Smithsonian and Futures Institutes in the USA, and with other similar organisations in, for example, the Mediterranean partner countries, China, Japan, Asian members of ASEM (Asia-Europe Meeting), Russia and developing countries. Calls for tenders for a maximum of 500 kEuro related to assistance in the co-ordination with non EU programmes are foreseen in 2001.

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, and 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.

In 2001, the programme will issue calls for tenders for assistance in the implementation of the above activities including the annual publications of programme achievements, brochures and multimedia productions as well as special information services to stimulate innovation. The maximum overall budget allocated to this activity will be of 5 mEuro.

The IST Programme will also implement special measures to facilitate and encourage the participation of SMEs in RTD and Demonstration activities in conjunction with the programme "Innovation and participation of SMEs". These measures consist of:

- SME Exploratory Awards (EA).

- SME Co-operative Research (CRAFT).

Exploratory Awards cover part of the cost of developing SME partnerships and RTD ideas which show great innovation potential for the preparation of future collaborative research (RTD) proposals or co-operative research (CRAFT) proposals.

Exploratory Award proposals intended to prepare RTD projects must conform to the priorities of the periodic call in response to which they are submitted (even if these priorities have changed compared to those on the base of which the Exploratory Award

proposals were selected). In addition, they must be submitted sufficiently in advance of the closing date of the envisaged periodic call (i.e. at least 9 months between the chosen cut-off date for the submission of the Exploratory Award proposal and the closing date of the periodic call).

CRAFT projects will allow SMEs with limited or no in-house R&D capability, but facing technological problems, to entrust the necessary research to third parties (the RTD performers). In this context, the SMEs themselves may carry out part of the research.

CRAFT proposals and Exploratory Awards proposals aimed at preparing CRAFT proposal must 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 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, the so-called economic and technical intelligence measures.

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. 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.

In addition, it is envisaged to continue providing support to the European IST Prize scheme. The objective of the Prize is to promote European innovation and entrepreneurship in IST by providing public recognition to companies that excel in turning technology and research results into products for the market. The Prize scheme will be organised by the European Council of Applied Science and Engineering, Euro-CASE, building on experience they have acquired over the last six years. Euro-CASE status as a non-profit association of 17 European Academies allows it to ensure an effective and impartial evaluation of the applications received. The foreseen expenditure will include appropriate operation costs and a total of 700,000 Euro per annum to be handed out as monetary prizes.

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.

Socio-economic research can be funded by both the thematic programmes, as well as by the Key Action on "Improving the Socio-Economic Knowledge Base" of the horizontal programme "Improving the human research potential and the socio-economic knowledge base". Taking into account the philosophy of the 5th Framework Programme, socio-economic research is present in the thematic programmes as an integral part of the technological research activities. The integration of the socio-economic dimension in the IST programme is addressed in two ways: (1) through a number of Action Lines explicitly geared towards socio-economic problems, and (2) through encouragement to proposers to integrate a socio-economic dimension and socio-economic research in their projects.

Specific measures will be taken by the horizontal programme to ensure co-ordination of the socio-economic research to be implemented within the current programme. The horizontal programme will draw up an annual report on socio-economic research in the 5th Framework Programme (http://www.cordis.lu/improving/home.html). The work in the IST Programme will contribute in a consolidated form to this annual report on socio-economic research Information exchange between projects will be facilitated by a series of concertation workshops on specific themes related to EU policy priorities. In 2001, priority will be given to activities which can contribute in various ways to the *e*Europe Action Plan.

Marie Curie Training Fellowships are aimed at supporting the training and mobility of researchers throughout Europe. In addition to the support provided in all scientific areas by the horizontal programme "Improving the human research potential and the socio-economic knowledge base", Marie Curie Fellowships are offered in the thematic programmes. The implementation of these fellowships will follow rules common to all the thematic programmes 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 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. The IST programme supports the following type of training fellowship: Industry Host fellowships.

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

European policy development support in the IST Programme will be co-ordinated with the activities of the Commission’s Forward Studies Unit (*Cellule de Prospective*), the relevant JRC's institutes and in particular the Institute for Prospective Technological Studies, as well as the Information Society Forum. Jointly organised workshops and conferences will complement co-ordination by an Interservice Group within the Commission. In 2001, the IST Programme will support the exploration of priority themes to be selected in consultation with those bodies.

5.4 CONSENSUS AND STANDARDISATION SUPPORT INITIATIVES

International consensus and action in support of standardisation will be a priority in IST work and in international co-operation. In 2001, 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 as well as in initiatives such as ISIS (Information Society Initiative on Standardisation), EISS-PUB (European Information Society Standardisation in support of Public interest) and ECOM-IS and ECOM-BS (Electronic Commerce Open Market place for Industry Sectors and for Business Services).

5.5 OTHER INITIATIVES

COST

Co-operation with Actions in the **COST framework** (see http://www.belspo.be/cost/) 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 workprogramme of the horizontal programme "Confirming the international role of Community research", including through subventions to the COST actions.

Ten-Telecom and Eureka

Co-ordination with the **EUREKA** (see http://www3.eureka.be/Home/ and **TEN-telecom frameworks** will also be used to encourage industrial co-operation in down-stream product and pan-European service innovation.

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

Calls for Proposals for a selected set of Action Lines in the current year's workprogramme will be published as indicated in the tables below in § 6.1. 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 total indicative budget distribution for the IST programme is as follows (in MEuro):

KA1: Systems and services for the citizen	646
KA2: New methods of work and electronic commerce	547
KA3: Multimedia content and tools	564
KA4: Essential technologies and infrastructures	1 363
FET: Future and emerging technologies	319
RN: Research networking	161
Total[13]:	3600

Of this, at least 10% is for cross-programme themes, and a minimum of 2% for integrated application platforms.

The indicative budget allocation to programme areas is as follows:

Area/year	WP1999	WP2000	WP2001	WP2002	Total
KA1	189	150	134	52	526
KA2	160	127	114	44	445
KA3	165	131	117	46	459
KA4	441	291	267	110	1.109
FET	106	84	75	29	295
RN	47	37	33	13	131
CPA	90	129	109	36	364
Total IST	1.200	950	850	330	3.330
Number of programme calls	2	3	2	1	8

Notes:

(i) Nominal IST budget figures that do not include the contribution of EEA and other Associated States
(ii) Administrative expenditure (7.5%) has been deducted pro-rata
(iii) The number of programme Calls correspond to the fixed deadline Calls and does not include the continuous submission scheme.

The sixth IST Programme Call for Proposals (the first IST Call in 2001) is planned to be published in January 2001. This will allow new RTD projects to start work, with signed contracts, before the end of 2001.

The seventh Call for Proposals will be published in June 2001. The proposals submitted in response to this Call will be evaluated in October 2001, and will take up part of the provision for budget commitment in 2002, with projects starting in early 2002.

[13] Including management and administrative costs

The indicative timetable and scope for Calls for Proposals in 2001 are illustrated in the following tables.

Notes:

- The next update of the Workprogramme will be issued in January 2002. The preparation process, including consultations, will start in June 2001. Comments and suggestions from any organisation which may wish to express its views can be sent to the Commission .
- 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 2001

6.1.1 Sixth IST Call

Publication Date (indicative): 15 January, 2001	Indicative Budget: 400 Meuro

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals (indicative): 15 April 2001					
RTD	I.1.1, I.1.2, I.2.1	II.1.2, II.1.3, II.1.4, II.2.1, II.2.2, II.3.1, II.4.1, II.4.2	III.1.2, III.1.3, III.2.1, III.2.2, III.3.2, III.5.1	IV.1.2, IV.2.1, IV.2.2, IV.3.1, IV.5.2, IV.7.2	V.1.1, V.1.4, V.1.5, V.1.7, V.1.9, V.1.11, VI.2.1, VI.2.2, VII.1.2
TAKE-UP	I.1.3, I.3.2,		III.5.2	IV.2.4, IV.7.3	V.1.5, V.1.7, V.1.11
Support Activities(*)		II.2.1, II.2.2, II.4.2	III.1.2, III.1.3, III.2.2, III.5.3	IV.2.1, IV.2.2	V.1.5, V.1.7, V.1.11, VI.2.1, VI.2.2, VII.1.2
Continuous Submission Procedures until February 28, 2002					
RTD					VI.1.1, VIII.1.6
Support activities(*)					VIII.1.1, VIII.1.2, VIII.1.3, VIII.1.4, VIII.1.5, VIII.1.6, VIII.1.7, VIII.1.8, VIII.1.9

– (*) Support activities comprise thematic networks and concerted actions and accompanying measures

6.1.2 Seventh IST Call

Publication Date: June 2001	Indicative Budget : 450 Meuro

Scope of the Call (Action Lines)

	KA1	KA2	KA3	KA4	Others
Deadline for Proposals (indicative): October 2001					
RTD	I.3.1, I.5.1, I.5.2 I.5.3	II.1.1, II.1.4, II.1.6	III.1.1, III.3.1, III.4.1, III.5.1	IV.1.1, IV.2.3, IV.3.2, IV.4.1, IV.4.2, IV.5.1, IV.5.3, IV.6.1, IV.6.2, IV.7.1, IV.8.1, IV.8.2, IV.8.3	V.1.2, V.1.3, V.1.6, V.1.8, V.1.10, V.1.12, V.1.13, VI.2.3
TAKE-UP	I.4.1, I.5.4	II.1.5	III.1.1, III.5.2	IV.3.2, IV.3.3, IV.7.3, IV.8.1, IV.8.2, IV.8.4	V.1.6, V.1.10, V.1.12
Support activities(*)		II.1.1, II.1.5	III.1.1, III.4.1, III.5.3	IV.1.3, IV.2.3, IV.3.3, IV.8.1, IV.8.3 IV.8.2	V.1.3, V.1.13, VI.2.3
Continuous Submission Procedures until February 28, 2002					
RTD					VI.1.1, VIII.1.6
Support activities(*)					VIII.1.1, VIII.1.2, VIII.1.3, VIII.1.4, VIII.1.5, VIII.1.6, VIII.1.7, VIII.1.8, VIII.1.9

– (*) Support activities comprise thematic networks and concerted actions and accompanying measures

6.1.3 Intelligent Manufacturing Systems Initiative

Details of the call dates, budget and coverage are provided in paragraph 5.1"

7 GLOSSARY

3D	Three Dimensional
ACTS	Advanced Communications Technologies and Services (FP4 Programme)
AL	Action Line
Allowable costs	See **Eligible Costs**
"Ambient Intelligence"	A concept in IST that explores what should come beyond the current "keyboard and screen" interfaces to enable ALL citizens to access IST services wherever they are, whenever they want, and in the form that is most natural for them. It involves new technologies and applications both for the access to, and for the provision of applications and services. It calls for the development of multi-sensorial interfaces which are supported by computing and networking technologies present everywhere and embedded in everyday objects. It also requires new tools and business models for service development and provision and for content creation and delivery.
Assessments:	Type of **Take-up measure**. See definition in Annex 1.
ASICs	Applications Specific Integrated Components
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.
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 actions 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)	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.
Co-ordinator (Co-ordinating contractor)	Lead **contractor** in a Community action, delegated by the consortium for the role of co-ordination with the Commission.

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
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 not 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)
FPGAs	Field Programmable gate Arrays
Galileo	A constellation of 24 to 30 Medium Earth Orbit (MEO) Satellites supporting a Global Navigation service. This primary vocation will, in time, permit the developmemnt of various Value Added Services.
GIS	Geographic Information System
GMES:	Global Monitoring for Environment and Security - http://gmes.jrc.it/
GNSS	Global Navigation Satellite Systems
GPL	General Public Licence
GPRS	General Packet Radio Service
GSDI:	Global Spatial Data Infrastructure - http://www.gsdi.org
HFSP	Human Frontier Science Program (www.hfsp.org)
ICT	Information and communications technologies
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.
IP	Internet Protocol
IP	Intellectual Property (in the context of Micro- and Opto-electronics)
IPR	Intellectual Property Rights
IPv6	Internet Protocol version 6
ISO:	International Standard Organisation - http://www.iso.org
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)
JTC:	Join Technical Committee, an association between ISO and the IEC (Information Engineering Committee)
KA	Key Action (in FP5)
Marie Curie	Training fellowships supported by FP-5. Of these, IST itself only supports “Host” fellowships for young researchers.
MITI	Ministry of International Trade and Industry (www.miti.go.jp)
MPT	Ministry of Posts and Telecommunications (www.mpt.go.jp)
MOEMS	micro-opto-electro-mechanical
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)

OEM	Original Equipment Manufacturer
OGC:	Open GIS Consortium - http://www.opengis.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 C**all 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**.**
RDF	Resource Description Framework
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.
SOC	Systems on a- hip
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
Ubiquitous	Refers to "anywhere any time"
UMTS	Universal Mobile Telecommunications System
S-UMTS	Satellite-Universal Mobile Telecommunications System
VR	Virtual reality
WAP	Wireless Application Protocol
W3C	World-Wide Web Consortium
WDM	Wavelength Division Multiplexing
XML	Extensible mark-up language

8 INDEX OF ACTION LINES

9 ANNEX 1: TYPES OF ACTIONS ADDRESED IN WP2001 – CONTRACTUAL INSTRUMENTS

The IST Programme is implemented through the indirect RTD actions as provided for in Annexes II and IV to the 5th 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**[ii] – 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**[ii] – 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[ii, iii])
- **Combined R&D and Demonstration projects**[ii] – projects combining the above elements (financial participation: 35 to 50% of total eligible costs[ii, iii])
- **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[ii])
- **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 supports the following type of training fellowship: Industry Host fellowships.

(c) Thematic Networks

Thematic Nnetworks for bringing together e.g. manufacturers, users, universities, research centres around a given Science and Technology objective. These include co-ordination networks between Community funded projects. Support will cover a maximum 100% of the eligible costs necessary for setting up and maintaining such networks. The IST Programme supports the following types of Thematic Networks: IST project clusters, Networks of Excellence and Working Groups.

(d) Concerted actions

Actions co-ordinating RTD projects already in receipt of national 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).

(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 supports the following types of Accompanying Measures: Studies, Dissemination and Awareness actions, 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:

- *Assessment actions:* (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.
- *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).
- *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).
- *Access actions:* are designed to provide co-ordinated access to advanced, emerging technologies and services, knowledge and competence.

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 be found on the Programme Web site.

In addition to calls for proposals, calls for tenders are also expected to be published in Year 2001 on specific activities that the programme will support, including the organisation of the IST2001 conference. Details will be provided in the texts of these calls for tenders.

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[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 cumulating 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.