EUROPEAN COMMISSION

Information Society Technologies

A thematic priority
for Research and Development under the Specific Programme
"Integrating and strengthening the European Research Area"
in the Community sixth Framework Programme

2003-2004 Workprogramme

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IST Workprogramme for 2003 and 2004

2.1 INTRODUCTION

This Workprogramme covers the activities of the IST thematic priority in the Specific Programme "Integrating and Strengthening the European Research Area" for two years, 2003 and 2004. It defines the priorities for the calls for proposals in these two years, the implementation plan and the criteria that will be used for evaluating proposals responding to these calls.

The priorities reflect the input received from the Programme Committee and the IST Advisory Group[1] (ISTAG), the response to the Expressions of Interest and from the preparatory activities launched in 2001 and 2002 including workshops and road-mapping exercises. **This has led to a strong focus of the Work programme on a limited set of Strategic Objectives that need to be addressed at a European level**.

The Workprogramme will be updated every year.

[1] The ISTAG report on the recommendations for the Workprogrammes in FP6, the reports on the analysis of Expressions of Interest as well as other reports on the preparation workshops and Commission internal Groups are available on the IST Web page www.cordis.lu/ist.

2.2 OBJECTIVES, STRUCTURE AND OVERALL APPROACH

2.2.1 IST in FP6: the overall vision

The IST thematic priority will contribute directly to realising European policies for the knowledge society as agreed at the Lisbon Council of 2000, the Stockholm Council of 2001, the Seville Council of 2002, and as reflected in the e-Europe Action Plan.

The strategy adopted in Lisbon 2000 is for an accelerated transition to a competitive and dynamic knowledge economy capable of sustainable growth, with more and better jobs and greater social cohesion. This requires a wider adoption, a broader availability and an extension of IST applications and services in all economic and public sectors and in the society as a whole. IST are the key underlying technologies for easier and efficient knowledge creation, sharing and exploitation.

The objectives of IST in FP6 are therefore to ensure European leadership in the generic and applied technologies at the heart of the knowledge economy. It aims to increase innovation and competitiveness in European businesses and industry and to contribute to greater benefits for all European citizens.

The focus of IST in FP6 is on the future generation of technologies in which computers and networks will be integrated into the everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces. This vision of "ambient intelligence"[2] places the user, the individual, at the centre of future developments for an inclusive knowledge-based society for all.

This research effort will therefore ***reinforce and complement the eEurope 2005[3] objectives*** *and look beyond them to the 2010 goals of the Union of bringing IST applications and services to everyone, every home, every school and to all businesses.*

eEurope2005 aims at a wider deployment of IST including to modernise further the public services including *e*government, *e*health and elearning and to create a dynamic business environment. It also aims at ensuring a higher security of the information infrastructure and a wider availability of broadband access.

*e*Europe will therefore contribute to the adoption of the research results as they emerge. It will also provide feedback about their acceptance and the problems related to their use. This close articulation between the research and policy initiatives is a key component of the Union strategy to achieve the Lisbon goals.

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[2] ISTAG report: Ambient Intelligence scenarios for 2010, www.cordis.lu/ist

[3] including eEurope+, see eEurope at: http://europa.eu.int/information_society/eeurope/index_en.htm

The Community support for IST in FP6 will help mobilise the industrial and research community around high-risk long term goals. It should facilitate the aggregation of public and private research effort on a European scale and enable the development of a European Research Area (ERA) in IST.

2.2.2 IST in FP6: Coverage and main targets

Realising the vision requires a massive and integrated research effort that addresses the major societal and economic challenges and ensures the co-evolution of technologies and their applications.

The FP6 instruments, such as Integrated Projects, will enable the integration of various research activities from knowledge generation and technology development to their application and transfer. They provide an opportunity to combine, as appropriate, the applied and the generic technology research. This will help pull the technology developments with applications and services addressing the socio-economic challenges and will help focus the applied research on the development of the relevant innovative technology platforms.

The main societal and economic challenges to be addressed are *:*

- solving *"trust and confidence"* problems so as to improve dependability of technologies, infrastructures and applications. These should ensure security, privacy and protect property and individual rights. Improving trust in the knowledge society is a key requirement for its development.

- Strengthening *social cohesion by providing* efficient, intelligent and easy to use systems for health, transport, inclusion, risk management, environment, learning and cultural heritage.

- Enabling *sustainable growth and improving competitiveness* both of large and small businesses as well as the efficiency and transparency of governments. This includes the development of mobile eCommerce and business and *e*work processes and will provide for more and better jobs.

- Supporting complex problem solving in science, society, industry and businesses. The aim is to harness the computing and knowledge management resources across Europe and bring them to the desktop of any researcher, engineer or other end user.

This requires progress in three main technology building blocks:

- Pushing the limits of miniaturisation and minimising the costs and power consumption of *microelectronic components and micro-systems.* This includes breaking new barriers with current CMOS technology below the 10 nano-meter. It also includes the exploration of alternative materials allowing further miniaturisation or organic flexible materials for displays, sensors and actuators so that they can be placed anywhere, even in the human body, and take any shape.

- Developing mobile, wireless, optical and broadband *communication infrastructures as well as software and computing technologies* that are reliable, pervasive, interoperable and can be adapted to accommodate new applications and services. Europe's strengths both in communication technologies and in embedded

software and systems provide a clear opportunity to lead and contribute to the development of the next generation of products and services. The development of open standards and open source software will be encouraged when appropriate to ensure interoperability of solutions and to further innovation.

- Developing *user friendly interfaces* which are intuitive, can interpret all our senses such as speech, vision and touch and that understand our gestures and various languages. This should be coupled with more powerful and flexible *knowledge technologies* that are semantic-based and context-aware. They should prepare for the next generation Web and make access to, and creation of digital content more effective and more creative.

IST today	***The IST in FP6 vision***
PC based ……	"Our surrounding" is the interface
"Writing and reading"……	…Use all senses, intuitive
"Word" based information search…….	Context-based knowledge handling
Low bandwidth, separate networks….	….Infinite bandwidth, convergence, ..
Mobile telephony (voice)……..	……Mobile/Wireless full multimedia
Micro scale……	Nano-scale
Silicon based……..	+ new materials
e-Services just emerging……..	Wide adoption (*e*Health, Learning,..)
< 10% of world population on-line…..	…World-wide adoption

2.2.3 Workprogramme 2003-2004: Focus on a limited set of Strategic Objectives

In order to ensure concentration of effort and critical mass, the Workprogramme for 2003-2004 is *focussed on a limited set of Strategic Objectives* that are essential to realise the IST in FP6 goals. They have been defined so as to mobilise researchers Europe-wide and bring together the effort necessary to address the relevant challenges.

The Strategic Objectives have been selected following an intensive consultation process that included SWOT[4] analyses exploring Europe's options at the economic, social and technology levels. They cover technology components, integrated systems and pull-through applications that have been carefully identified so as:

- *to reinforce European strengths in areas where it has established industrial and technology leadership:* This is the case for example in mobile and wireless communications, in microelectronics and microsystems, in embedded systems, in applied IST for health, transport and business support tools.

[4] Europe's SWOT analysis in IST are part of the reports of ISTAG, Expressions of Interest and other workshops. They are all present on www.cordis.lu/ist

- *to overcome weaknesses in areas which are critical for European competitiveness and for addressing societal challenges*: This is the case for the area of generic software and computing systems and in content development tools. The development of ambient intelligence provides an opportunity for Europe to reposition itself for the next generation of generic products and services building on a large user industry and service providers .
- *to exploit new opportunities and respond to emerging needs*: Examples include advanced interaction techniques, new sensors and Microsystems, context-aware knowledge handling and Grid based systems to solve complex problems in environment, health or engineering .
- *to ensure the co-evolution of technology and applications* so as technology advances are exploitable in innovative products and services. Particular attention will be paid to users' needs and to usability and accessibility of technologies and applications. The IST priority seeks to promote integrated approaches to address the vision. This is reflected in the definition and selection of the set of objectives as explained in the following paragraph.

In addition, IST in FP6 will support research to investigate and experiment with future visions and emerging technologies (FET) at the frontier of knowledge in the IST field. This will help new IST-related science and technology fields and communities to emerge, some of which will become strategic for economic and social development in the future and will feed into the mainstream IST activities in the future.

2.2.4 Focus on the fields that need to be addressed at a European level: realising the objectives of ERA in IST

Experience has shown that the development of common visions and consensus building is a key element of European successes in IST. This will require different types of sustained efforts and timescales according to the field. Links and articulation of Community contribution with member and associated states activities and EUREKA, including in particular the funding of complementary research, will be therefore sought in all activities.

For each of the objectives, the Community support will *focus only on the work that is essential to be done at European level and that requires a collaborative effort* involving the research actors across the Union and associated states. The Community effort will be therefore considered systematically as part of a wider European approach to address these objectives.

The detailed description of the objectives in the next chapter is organised in a way that highlights this approach. *It clearly identifies for each objective, the specific focus of the research that will be supported with Community funding* and the coordination mechanisms that need to be established with member and associated states and other private efforts in Europe.

The Workprogramme also provides indications on how the instruments will be used to attain the objectives including higher integration and structuring of European research. *The aim is to ensure the incremental build up of Europe-wide approaches for research in the key IST fields and help establish an IST European Research Area.*

In addition, the IST priority will support the further development of the research networking infrastructure as well as computing and knowledge Grids that play an essential role in the building of ERA. A specific effort will be therefore devoted to test beds on research networking and to Grid-based technologies. This will be done in collaboration with the Research Infrastructure part of the Specific Programme on Structuring the European Research Area.

2.2.5 An integrated approach associating generic and applied technology development

The objectives address technology components, the integration into systems and platforms as well as the development of innovative applications and services. They are therefore interlinked and should not be seen as separate isolated activities. A proposal addressing a specific objective, would cover all the research that is necessary to achieve its goals. *This could span across the value chain from technology components to applications and services.*

A key component of this integrated approach is the need to bring together different types of constituencies from the IST user and supply industry, from academic research labs and from large and small companies. IST in FP6 will therefore help establish solid frameworks for collaboration both within and across industrial and technology sectors.

2.2.6 Socio-economic dimensions in IST

Socio-economic dimensions including societal and user needs as well as the impact of research and technology on the development of the information and knowledge-based society should be addressed as an integral part of each project. They will be also addressed under the general accompanying actions when they cover socio-economic aspects of a generic nature that cut across different IST fields. This will help develop a better and more holistic understanding of the societal and economic drivers and implications of IST.

2.2.7 The participation of SMEs in IST in FP6

The participation of SMEs in the IST research activities is essential given their role in promoting innovation in this field. SMEs play a vital role in the development of new visions in IST and transforming them into business assets. This is illustrated by the level of participation of SMEs in the IST programme in FP5 with more than 70 % of contracts involving at least one SME, about 25% of total funding is taken by SMEs and about 27% of all participating contractors are SMEs.

The IST priority in FP6 will aim at a similar or higher level of participation of SMEs. This can only be achieved by ensuring a significant participation of SMEs in the new instruments and in particular in Integrated Projects. Projects in IST should therefore seek to build partnerships including SMEs and other organisations. This might require specific actions within the projects to ensure appropriate SMEs involvements.

2.2.8 Reinforcing Europe 's position in IST on the International scene

In most IST fields, collaboration between European and non EU research teams is essential to ensure exploitation of research results at a global scale and to build interoperable technology solutions. This is of unique value for the competitiveness of European industry and is a means to reach consensus on global critical issues such as security and dependability or the digital divide.

FP6 foresees international cooperation in all projects whenever needed including the support to non EU partners from the framework budget provided that they belong to the categories defined in the Specific Programme[5]. International cooperation will be therefore sought as appropriate in the different objectives and will be also supported in the general accompanying actions.

Examples of specific international co-operation activities include the Intelligent Manufacturing Systems initiative and the Human Frontier Science Programme, which both result from intergovernmental agreements and relate to the IST priority will continue to benefit from IST support and grants. Other activities will aim at creating synergies between IST activities and the relevant economic co-operation programmes undertaken to implement the European Union external policy, including @LIS, Asia IT&C, EUMEDIS, NeDAP, and future possible such initiatives in the Balkan region.

The level of participation of organisations established in the associated candidate countries will be carefully monitored. Whilst they are equal partners at the same level as the EU member states, their participation in IST will be expressly encouraged, in particular with a view to facilitate their integration in eEurope2005 and eEurope+, and including through special measures if deemed necessary.

2.2.9 Budget and planning for the four years

The estimated distribution of the budget commitments over the four years, as well as the deadlines for the calls are given in the table below. The present Workprogramme describes the content of the calls drawing on 2003 and 2004 budgets which will be around 1.725 Billion Euro.

Year	2003	2004	2005	2006
Indicative Commitment Budget	835,000	891,000	935,000	964,000
Calls per year	2 calls, covering 2003 and 2004 budgets	One call, drawing mainly on 2005 budget	To be defined	To be defined

[5] A budget of about 90 MEuro has been earmarked for participants from the following countries: Russia and Newly Independent states, Mediterranean Countries including the western Balkans and developing countries. Participants from other third-countries may also get funding in duly justified cases.

Two calls for proposals are foreseen to cover the 2003-2004 budget. Each of the calls will target a subset of the Strategic Objectives. In addition, one call with fixed deadline is foreseen for mid 2004 and will draw on the 2005 budget. The details of this call will be provided in the yearly update of the WP.

The detailed content of the calls for 2005 and 2006 will be defined in a way that ensures also concentration and focus. It should enable the coverage of the Specific Programme whilst taking into account the evolution of needs, markets and technologies.

2.2.10 Instruments

The new instruments, Integrated Projects (IPs) and Networks of Excellence (NoEs), will be used as a priority means to realise the FP6 objectives when deemed appropriate. The IST thematic priority will also use the other instruments including Specific Targeted Research Projects (STREPs), Coordination Actions (CAs) and Specific Support Actions (SSAs).

The use of the new instruments will help integrate and structure research activities, bringing together European and national actions in the context of creating the European Research Area. It will also help ensure, in IST, the co-evolution of technologies and their integration in application contexts. The flexibility and adaptability is also an important feature of the instruments.

It is expected that for each Strategic Objective, a limited number of Integrated Projects and Networks of Excellence are supported (on average two to three). Several Specific Targeted Research Projects and other actions are also foreseen in most objectives.

The budget of an integrated project can vary from several MEuro to several tens of millions. The budget of a Network of Excellence can go up to several MEuro per year.

The calls for proposals in the first two years will be open to all instruments **but it is expected that 2/3 of the budget will be devoted to Integrated Projects and Networks of Excellence.**

2.3 DETAILED DESCRIPTION OF THE WP CONTENT

The detailed descriptions of the Strategic Objectives is provided in the next paragraphs. The order of the presentation of these objectives follows the integration track from components to systems and applications. In addition to the Strategic Objectives, the Workrogramme 2003-2004 covers an activity on Future and Emerging Technologies (FET), an activity on Research Networking test-beds and an activity to support general accompanying actions.

2.3.1 Strategic Objectives covered in the first call

The table below shows the objectives that will be covered in the first call that will draw mostly on the 2003 budget and partly on 2004 budget. The second call will draw on the 2004 budget.

Strategic Objectives addressed in Call 1	
▪ *Pushing the limits of CMOS, preparing for post-CMOS* ▪ *Micro and nano-systems*	*Technology components*
▪ *Broadband for all* ▪ *Mobile and wireless systems beyond 3G* ▪ *Towards a global dependability and security framework* ▪ *Multimodal interfaces* ▪ *Semantic-based knowledge systems* ▪ *Networked audiovisual systems and home platforms* ▪ *Networked businesses and governments*	*Integrated systems*
▪ *eSafety of road and air transports* ▪ *e Health* ▪ *Technology-enhanced learning and access to cultural heritage*	*Sectoral applications*

A part of Future and Emerging Technologies (FET) will be covered in Call l. It is described in paragraph 2.3.4. The general accompanying actions will be open in Call 1 and are described in paragraph 2.3.5.

2.3.1.1 Pushing the limits of CMOS and preparing for post-CMOS

Objective: To develop, ahead of the ITRS international roadmap, semiconductor devices shrunk by an order of magnitude down to the 5 nm size, and alternative devices for the post-CMOS era. Research will also aim at enabling the design in-time and at cost, of reliable 1 billion gate systems-on-chip or systems-in-package, improving productivity by a factor of 10 by 2010. This will help prepare for the electronic components of 2010 and beyond.

For technologies, the focus is on

- integration of advanced and non-CMOS devices into the basic silicon technologies and new on-chip wiring to minimise signal propagation delays at nanoscale;
- driving the performance of silicon-based and of compound semiconductor devices to facilitate ultra high frequency and high power applications and to accelerate integration of micro and opto-electronics including related packaging technologies;
- pushing the limits of lithography including mask-less pattern transfer technologies, and mask making technologies ;
- acquisition of knowledge and control of emerging nanoelectronics technologies, with potential of high device performance and low cost of mass production for future applications, and provision of better environmental, safety and health conditions;

It is expected that work on the above topics would crystallise around Integrated Projects on e.g. "nano-CMOS", the "high frequency challenge" or "lithography". These may include equipment assessment actions. Networks of Excellence should help structure research in "new devices" and "advanced lithography". It might be necessary to complement major investments by industry in advanced research infrastructure, to achieve the ambitious research goals above.

For design methods and tools, the focus is on:

- providing novel approaches to design better and faster at system level. The major challenges are to maintain or improve system performance and reliability, to specify and verify at system level, to stimulate IP (Intellectual Property) reuse, to optimise power consumption, and to enhance flexibility and reconfigurability;
- devising methods to improve the use of large systems by including redundancy or to improve the testability, in particular with self-test circuits;
- addressing specific challenges in design with new methods and tools. These include mixed-signal design, low power design, RF circuits and packaging;
- supporting the industry in the change from board electronics to system-on-chip and complementing the design activities with education and training in modern design practice. Developing, demonstrating or standardising architectures and methods improving the design productivity is also needed.

It is expected that work on the above topics would crystallise around Integrated Projects on e.g. "system-level SoC design" or "reconfigurable systems". The Integrated Projects are expected to include complementary user involvement. Networks of excellence should help structure the European research effort in 'SoC design standardisation and training".

For both, technologies and design tools, topics complementing this overall strategy could come forward through the other instruments but should strictly be focused on promising alternative approaches.

Work should, where appropriate, precede and complement work implemented under EUREKA/MEDEA and in initiatives at member and associated state level. The work might also be complemented by major industrial investments thereby demonstrating value for money and that the proposed actions fit in an overall strategy. Activities should contribute to the intellectual property portfolio and to the knowledge that will enable Europe to compete internationally.

2.3.1.2 Micro and nano systems

Objective: To improve the cost-efficiency, performance and functionality of micro and nano-systems and to increase the level of integration and miniaturisation allowing for improved interfacing with their surrounding and with networked services and systems. This should foster their integration into a wide range of intelligent products and applications.

Focus is on:

- the technology and design of sensors, actuators, other devices, MST components, microsystems and the integration technology so as :
  - i) to *integrate* sensing, actuating, computing, processing devices including power optimisation *in* a wide range of *materials* (such as plastic, textile, paper, and concrete) in particular for flexible and/or portable applications.
  - ii) to allow systems to *miniaturise* to very small form factors (small sizes, low weight, less connections and low power consumption).
  - iii) to improve and to intensify the *interaction* between man, machine, ambient, and device, *integrating very different 'properties'*, sciences, environments and technologies.
  - iv) to *add functions* to applications and their interfaces, including multi-sensory concepts.
  - v) to *improve the performance* and *lower the cost* of micro and nanosystem-based products.
- vi) to increase the density and performance of system level packaging and interconnect of micro-electronic, optical, opto-electronic and photonic components, subsystems and micro-systems. The demonstrations and validation of the concepts should focus on visionary applications, be transferable to other application fields and should prove their industrialisation potential.
- vii) to explore the application potential of micro-nano technology and the integration of nano dimensions in macro and micro systems; to research the interconnect and integration technologies required to establish the nano to macro interface and to have 'nano' interacting with their ambient.
- viii) to demonstrate the feasibility and capabilities of large area systems integration covering the integration of sensing, actuating, processing in very large systems (including the related system approach) not restricted to one or the other material, environment, or purpose.

It is expected that work on topics i) to vi) will crystallise around Integrated Projects, stimulating multidisciplinary applied research driven by visionary applications and progressing emerging technologies. They should, when needed, cover also innovation and take-up activities, access to research infrastructures so as to facilitate cooperation and the involvement of SMEs. They may simultaneously address one or more of the different foci above and can be built incrementally starting from the first call.

Networks of Excellence, in particular for i), iii) and vi) are expected to complement the Integrated Projects for further structuring the ERA in these fields. Additional Specific Targeted Research projects and specific support actions will be restricted to explore highly promising alternative approaches to prepare new technological fields and will cover systems at the nano scale, in particular for areas (vii) and (viii)

Work should were appropriate, enhance, complement and be complemented by work implemented under priority 3, EUREKA/EURIMUS and other initiatives at member and associated state level and be positioned in an international context. Coordination mechanisms will be established.

2.3.1.3 Broadband for all

Objective: To develop the network technologies and architectures allowing a generalised availability of broadband access to European users, including those in less developed regions. This is a key enabler to the wider deployment of the information and knowledge-based society and economy.

Focus is on

- Low cost access network equipment, for a range of technologies optimised as a function of the operating environment, including optical fibre, fixed wireless access, interactive broadcasting, satellite access, xDSL and power line networks.
- New concepts for network management , control and protocols, to lower the operational costs, provide enhanced intelligence and functionality in the access network for delivery of new services, and end-to-end network connectivity.
- Multi-service capability, with a single access network physical infrastructure shared by multiple services allowing a reduction in capital and operational expenditures for installation and maintenance. It includes end to end IPv6 capabilities;
- Increased bandwidth capacity, in the access network as well as in the underlying optical core/metro network (including in particular optical burst and packet switching), commensurate with the expected evolution in user requirements and Internet-related services.

These research objectives are framed in a system context and are required to address the technological breakthroughs in support of the socio-economic evolution towards availability of low cost and generalised broadband access. This should therefore lead to:

- Optimized access technologies, as a function of the operating environment, at affordable price allowing for a generalized introduction of broadband services in Europe and in less developed regions;

- Technologies allowing the access portion of the next generation network to match the evolution of the core network, in terms of capacity, functionality and Quality of Service available to the end users.
- A European consolidated approach regarding regulatory aspects, and for standardized solutions allowing the identification of best practice, and introduction of low cost end user and access network equipment;

Consortia are encouraged to secure support from other sources as well and to build on related national initiatives. Widespread introduction of broadband access will require the involvement of industry, network operators and public authorities, through a wide range of public-private initiatives.

Satellite parts of the work should be clearly placed in the context of related ESA efforts. Activities on satellite communications is done in coordination with the activities in the thematic priority on “aeronautics and space”.

2.3.1.4 Mobile and Wireless Systems Beyond 3G

Objective: To realise the vision of "Optimally Connected Anywhere, Anytime". Early preparatory work has characterized Systems beyond 3G as an horizontal communication model, where different terrestrial access levels and technologies are combined to complement each other in an optimum way for different service requirements and radio environments. They may include the personal level (Personal/Body Area/Ad Hoc Network) the local/home level (W-LAN, UWB) the cellular level (GPRS, UMTS) the wider area level (DxB-T, BWA).

The resulting access landscape is complemented by a satellite overlay network, providing notably a global multicast layer (e.g. S-DMB). Reconfigurability is a key enabler to support such an heterogeneous and generalised wireless access.

Focus is on:

- A Generalised Access Network, including novel air interfaces, based on a common, flexible and seamless all IP (Internet Protocol) infrastructure supporting scalability and mobility.
- Advanced resource management techniques for the Generalised Access Network allowing optimum usage of the scarce spectrum resource enabling dynamic spectrum allocation and contributing to the reduction of electromagnetic radiation.
- Global roaming for all access technologies, with horizontal and vertical hand-over and seamless services provision, with negotiation capabilities including mobility, security and QoS based on end to end IPv6 service architecture.
- Inter-working between access technologies and with the core network at both, service and control planes, including advanced service and composite network management.
- Advanced architectures that enable reconfigurability at all layers (terminal, network and services)

Research is expected to be placed in a system context and to address the technological breakthrough in support of this conceptual evolution. It should open new social and economic opportunities by allowing full seamless and nomadic user

access to new classes of feature rich applications, and new classes of person to person, device to device and device to persons applications.

Outcome expected from this work is:

- A consolidated European approach to technology, systems and services, notably in the field of future standards (e.g. for access), in the international fora (WRC, ITU, 3GPP-IETF, ETSI, DVB…) where the issue of systems beyond 3G is addressed;
- A consolidated European approach regarding the spectrum requirements (terrestrial and satellites) in the evolution beyond 3G and a clear European understanding of the novel ways of optimizing spectrum usage when moving beyond 3G;
- A consolidated European approach to reconfigurability and to the associated new regulatory problem (notably in terms of security/privacy) entailed by this novel technology.

The satellite parts of the work should be placed in the context of related ESA efforts. Activities on satellite communications is done in coordination with the activities in the thematic priority on "aeronautics and space

2.3.1.5 Towards a global dependability and security framework

Objective: To strengthen security and enhance dependability of the information and communication systems and infrastructures and to ensure trust and confidence in the use of IST by addressing new security and dependability challenges. These are resulting from higher complexity, ubiquity of computing and communications, mobility, and increased dynamicity of content. Integrated and comprehensive approaches involving all relevant stakeholders of the value chain should address security and dependability at different levels and from different perspectives.

Focus is on:

- Development of integrated approaches, architectures and technologies for security and mobility, virtual identity management, privacy enhancing both at application level and at infrastructure level. Aspects of usability as well as socio-economic and regulatory issues would have to be taken into account.
- Development of integrated interdisciplinary approaches and ensuing technologies for the provision of dependable network and information systems that underpin our economy and our society.
- Development of modelling-, and simulation-based management decision support tools for critical infrastructure protection addressing ICT-related interdependencies of critical infrastructures and aiming at prevention of threats and reduction of vulnerabilities.
- Development, testing and verification of underlying and novel crypto technologies for a wide spectrum of applications. Development, testing and verification of technologies for protecting, securing and trustable distribution of digital assets. Due consideration should be given to implementation and

standardisation issues and to security policy development and consensus building among the relevant key players.

- Research, development, testing and certification on next generation secure smart devices (e.g. smart cards) and their components. This includes design, production and automated verification of smart devices.
- Multidisciplinary research on biometrics and its applications with due consideration also of the social and operational issues. Strengthening European competence on security certification leading to mutual recognition as well as network and computing forensic technologies to combat cyber-crime.

Work should link to member and associated state research initiatives and policies. Related to dependability and critical infrastructure protection, targeted international collaboration with complementary research communities and programmes should be fostered.

2.3.1.6 Multimodal interfaces

Objective: To develop natural and adaptive multimodal interfaces, that respond intelligently to speech and language, vision, gesture, haptics and other senses.

Focus is on:

- *Interaction between and among humans and the virtual and physical environment*, through intuitive multimodal interfaces that are autonomous and capable of learning and adapting to the user environment in dynamically changing contexts. They should recognise emotive user reaction and feature robust dialogue capability with unconstrained speech and language input.

- *Multilingual systems* facilitating translation for unrestricted domains, especially for spontaneous or ill-formed (speech) inputs, in task-oriented settings.

Work can span from basic research in areas such as machine learning and accurate vision and gesture tracking, to system level integration with proof of concept in challenging application domains, including wearable interfaces and smart clothes, intelligent rooms and interfaces for collaborative working tools, and cross-cultural communications.

IPs are expected to address the objectives within a holistic approach enabling, where justified, competition within and across projects. NoEs should aim at lowering barriers between hitherto split communities and disciplines and advance knowledge in the field. They should help establish and reinforce shared infrastructures, including for training and evaluation, annotation standards and appropriate usability metrics and benchmarks. STREPs are expected to bootstrap research in identifiable or emerging sub-domains and to prepare associated communities.

2.3.1.7 Semantic-based Knowledge Systems

Objective: To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

Focus is on:

- *Semantic-enabled systems and services* facilitating multimedia content mining on the Web and across distributed computing platforms. They should be self-organising, robust and scaleable and enable better mastery of complex information spaces through improved analysis, interpretation and visualisation of high-dimensional objects and content.

- *Knowledge-based adaptive systems,* combining semantically enriched content with "anytime-anywhere inferencing" in support of knowledge-intensive, time-critical tasks, especially for modelling and optimisation, automated diagnosis and decision-support.

Projects will cover all research aspects needed to achieve the above, including:

- *Foundational research:* new formal models, methods and languages for knowledge representation and reasoning under uncertainty, including learning models from data and multilingual and multimedia ontology infrastructure for the semantic Web.
- *Component-level research* addressing the functionality of knowledge systems: new generation of tools to support automatic acquisition, analysis, annotation, (re)organisation, browsing, filtering, processing and visualisation of multimedia content.
- *System-level integration* with proof of concept of knowledge technologies and components into novel semantic-based services and applications.

The activities should maximise cross-fertilization between several different areas, including knowledge technologies and engineering, database technology, agent technology, natural language processing, etc. Integrated Projects will aim at addressing, within an end-to-end approach, all stages of the research, covering foundational, component-level as well as system-level research. Component-level research may be the subject of focused STREPs. NoEs will provide a channel for fostering longer-term foundational research, developing shared ontologies and data infrastructures, including metrics for system training and evaluation, and promoting standards and open reference architectures.

2.3.1.8 Networked Audiovisual systems and home platforms

Objective: To develop end-to-end networked audio-visual systems and applications, and open trusted and interoperable multimedia user platforms and devices, notably for broadcasting and in-home platforms with full interactivity capacity.

Focus is on:

- Trusted free choice environments for more intuitive access and interaction with hybrid 3D multimedia signals and objects. Rich media objects representation, identification, location and description.

- Seamlessly co-operating IP (Internet Protocol) audiovisual (AV) networks, storage, new middleware protocols and architectures for real time and consistent multimedia routing, storing and distribution, load and balancing control mechanisms, P2P, datacasting and streaming of audio-visual rich media. Adaptive

Quality of Services for scalable audio-visual flows on heterogeneous networks, AV internetworking, network traffic engineering, interactive AV service management, and simulation.

- Home server portals, interoperability between home networking technologies and their integration with global networks, as a means for access to, and generation of combined applications and services. AV portals with storage, management and repackaging appliances, including extended home distribution. Advanced retrieval methods and business models to support access to streamed and stored audiovisual media from anywhere in the home and car environment from any device.

Research will strongly concentrate on enabling technology for error-resilient representation, slicing and handling of rich audio-visual signals. This concerns basic research, structuring and federating the best groups in Europe from the communication areas. It also concerns research in high potential, industry-driven domains such as next generation 3D-TV, electronic cinema, virtual & tele-presence and future mixed-reality-based mobile personal communication services. A strong requirement will be that these activities should be centred around a communication and storage infrastructure and should aim at exploiting the outstanding European potential developed over several Programmes in this area. Active contribution to world-wide standards setting, in particular open standards, will be a prerequisite.

2.3.1.9 Networked businesses and governments

Objective: To develop ICTs supporting organisational networking, process integration, and sharing of resources. This shall enable networked organisations, private and public, to build faster and more effective partnerships and alliances, to re-engineer and integrate their processes, to develop value added products and services, and to share efficiently knowledge and experiences.

Focus is on:

- *Management of dynamic collaborative networks* through the development of harmonisation frameworks, open platform specifications, models and ontologies. This includes multi-disciplinary research into complex adaptive and self-organising systems and modelling, representing, tracking and measuring distributed work and knowledge flows in business networks.
- *Technologies for interoperability* supporting open networks of intelligent, autonomous, self-adaptive, self-configurable, and scalable software components for networked organisations including SMEs. Novel reference architectures working in dynamic networks using ontologies, agent and Grid technologies, web-services, semantic web and peer-to-peer computing.
- *Open, secure, interoperable and re-configurable e-government* platforms, applications and multi-modal services. They should be based on European standards, support national, regional and local initiatives and deploy as much as possible open source software solutions for all aspects of inter- and intra-government operations including electronic democracy systems, interaction with citizens and businesses, governmental process re-engineering and knowledge management.

- *Managing knowledge to support innovation* and business strategies through sharing, brokering, trading and measuring of knowledge and intellectual capital. Research will also cover knowledge modelling from multiple perspectives/levels across the value chain as well as emergent innovation-friendly collaborative and working spaces that facilitate leveraging of tacit knowledge, creativity and resource productivity.
- *IST as driver for small business and government re-organisation* through local development processes including small business ecosystems and their interactions with local government. Mass deployment actions for one-stop e-government services for all, supported by benchmarking are addressed as well socio-economic research in the governance of networked organisations and e-government models and legal issues.

IPs shall follow a focused and multidisciplinary approach bringing together a critical mass of business and government organisations, academic research labs, standardisation organisations and technology transfer centres. NoEs shall be used to integrate visionary European and international research communities and build up new knowledge. STREPs should target and explore disruptive technologies and highly innovative organisational forms and models. STREPs could also be used to support innovative business and government pilots. Work will build on and complement the member and associated state activities in the field.
Work could also build on past international RTD activities involving US, Japanese and Latin American (e.g. Brazil, Mexico) participants in the area of networked collaborative organisations and will be complemented by demonstration and technology transfer activities for small businesses and governments towards the Mediterranean countries, Russia and the newly independent States (NIS), the Western Balkans, China and Latin America.

2.3.1.10 eSafety for Road and Air Transport

Objective: To develop, test and assess an integrated and global approach to intelligent road vehicles and aircraft which offers higher safety and value added services, where interactions between the person in control, the vehicle and the information infrastructure are addressed in an integrated way.

Focus is on:

- Research on advanced sensors and communication systems as well as highly dependable software and interfaces to integrate on-board safety systems that assist the driver in road vehicle control; advanced airborne collision avoidance systems for aircraft.
- For road transport, research in distributed intelligent agents, secure communications and advanced positioning and mapping technologies and their integration for supporting the provision of location based value added services.
- For road and air transport, work on vehicle and information infrastructure management systems with emphasis on safety and efficiency.

Proposals will describe how relevant results from non-EU programmes (e.g. PREDIT, Mobilitaet und Verkehr, EUREKA etc) will be combined to contribute to this task. National and regional test infrastructure should also be incorporated where appropriate.

Projects should aim at fostering partnership between advanced research laboratories from the road or air transport industry, telecommunication industry, infrastructure operators, equipment and service providers and users. Coordination will be maintained with other relevant FP6 thematic priorities , notably within thematic priorities 4 and 6. It is expected that the research domains will be covered mainly with Integrated Projects as well as a few STREPs.

2.3.1.11 eHealth

Objective: To develop an intelligent environment that enables ubiquitous management of citizens' health status and to assist health professionals in coping with some major challenges, risk management and the integration into clinical practice of advances in health knowledge.

Focus is on:

- Research and development on key technologies such as biosensors and secure communication and their integration into wearable or implantable systems that provide citizens and their health professionals with ubiquitous management of health status. The expected outcomes include intelligent and communicating clothing and/or implants that interact and communicate securely when appropriate with other health systems and points-of-care.

- Research on new reliable software tools supporting health professionals in taking promptly the best possible decision for prevention, diagnosis and treatment. Specific focus will be given to research into user-friendly, fast and reliable tools providing access to heterogeneous health information sources, and also to new methods for decision support and risk analysis. The use of GRID technology and open source is encouraged where appropriate.

- Networking of researchers in the areas of medical informatics, bioinformatics and neuroinformatics with the objectives of advancing health knowledge leading to a new generation of *e*Health systems assisting in the individualisation of disease prevention, diagnoses and treatment.

Coordination will be maintained with other relevant FP6 thematic priorities , notably with thematic priority 1.

Proposals will describe how the work complements and enhances the effort in non-EU programmes (e.g. national programmes, EUREKA,…) and international cooperation initiatives . International, national and regional test infrastructure should also be incorporated where appropriate.

Projects should aim at enhancing European industrial competitiveness by building partnerships between advanced R&D laboratories from relevant sectors related to health and healthcare e.g. medical devices, *e*Health, telecommunication, specialised software providers, infrastructure operators, equipment and service providers, and users. It is expected that the two first domains will be addressed by Integrated Projects and the third one by NoEs. Some STREPs are expected in all domains.

2.3.1.12 Technology-enhanced learning and access to cultural heritage

Objective: To develop advanced systems and services that help improve access to Europe's knowledge and educational resources (including cultural and scientific collections) and generate new forms of cultural and learning experiences.

Focus is on :

– Improving the efficiency and cost-effectiveness of learning, for individuals and organisations, independent of time, place and pace, through the development of *open* systems and services in support of *ubiquitous, experiential and contextualised learning* and *virtual collaborative learning communities.* Work combines advanced cognitive and knowledge-based approaches with new media, including virtual and augmented reality, virtual presence and simulation, takes account of technological, pedagogical as well as organisational aspects, and aims at demonstrating next-generation learning solutions in sizable field experiments.

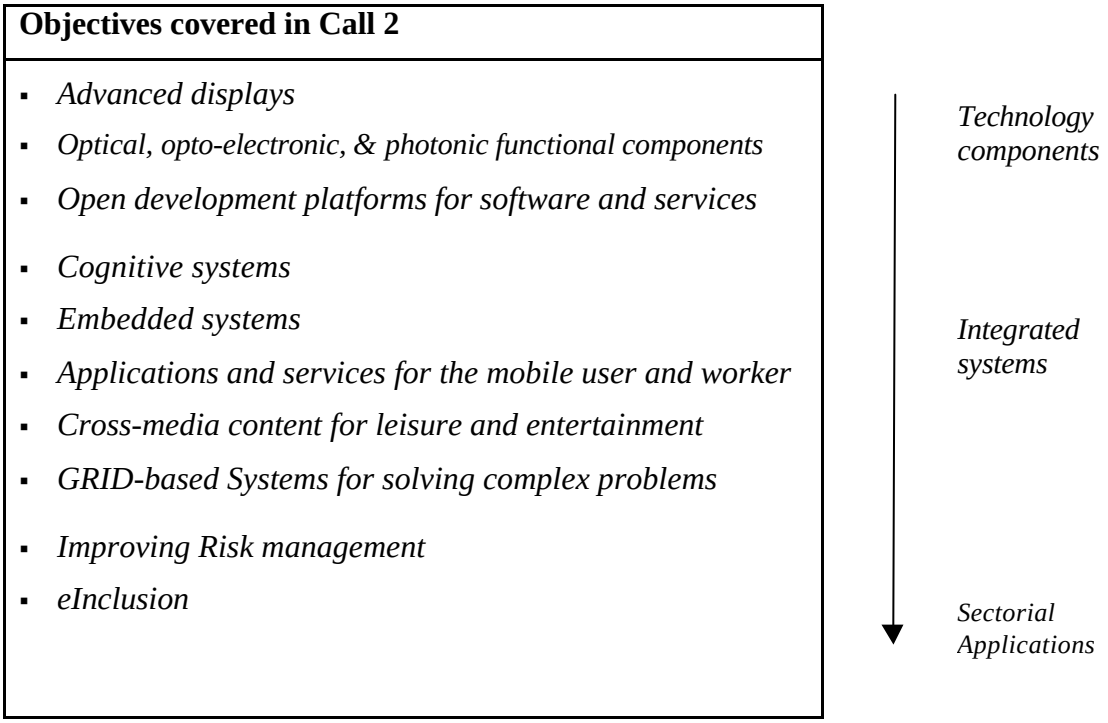
– Improving accessibility, visibility and recognition of the commercial value of Europe's cultural and scientific resources, by developing: advanced *digital libraries services,* providing high-bandwidth access to distributed and highly interactive repositories of European culture, history and science; *environments for intelligent heritage and tourism,* re-creating and visualising cultural and scientific objects and sites for enhancing user experience in cultural tourism; advanced tools, platforms and services in support of highly automated *digitisation* processes and workflows, digital *restoration and preservation* of film and video material, and digital memory management and exploitation.

It is expected that IPs will be the main vehicle for R&D and demonstration of *learning* systems and services, while NoEs will contribute to exploratory, longer-term research enhancing human learning and cognitive processes. All instruments, including STREPs, will help promoting best practice, take up and dissemination.

The *digital libraries* field is open for both NoEs and Integrated Projects, developing shared test-beds and resources and seeking to connect scientific and cultural actors. NoEs and STREPs will be the prevailing instruments for *intelligent heritage and tourism*. Work in *Preservation* aims at structuring new research communities round emerging agendas and platforms for research, through Integrated Projects and NoEs.

2.3.2 Objectives covered in the second call

The table below shows the objectives that will be covered in the second call.



Research Networking testbeds will be covered in Call2. They are described in paragraph 2.3.4 The general accompanying actions will be open in Call 2 and are described in paragraph 2.3.5.

2.3.2.1 Advanced displays

Objective: To develop, demonstrate and prepare for industrialisation emerging display technologies related to organic materials, lightweight near-to-the-eye information terminals and large size displays for the consumer like wall paper TV displays in order to improve their performance, cost efficiency, their integration in any system and their interfacing with the user.

Focus is on:

- i) mastering stable and light efficient organic display technologies, and advancing organic electronics. The aim is also to make their mass manufacturing compatible with printing techniques, to build on flexible technologies so as to demonstrate conformable displays (e.g. e-paper, wearable or woven displays) and to demonstrate these technologies for small hand-held and for affordable large size applications.

- ii) developing display solutions for small form factor high information content communicators (like for lightweight transparent eyeglasses with microdisplay / direct retina writing or micro-projectors) and achieving their integration and demonstration in complete systems.

- iii) Overcoming today's 3D multi-viewer dynamic visualisation complexity and limitations (volumetric, holographic)

It is expected that research activities on topics i) and ii) will crystallise around Integrated Projects; and are organised either vertically - combining materials, components, equipment, display RTD, integration and customisation for some applications - or are clustered around major technology strands with a view to spin out results in different innovative applications. Networks of Excellence in particular for i) are expected to complement the Integrated Project activities. Additional Specific Targeted Research Projects and Specific Support Actions will be restricted to highly exploratory and promising alternative approaches to prepare new technological fields and to cover research objective iii).

Work should where appropriate build upon existing networks and activities in the member and associated states and be positioned in an international context. Coordination mechanisms are expected to be established.

2.3.2.2 Optical, opto-electronic, and photonic functional components

Objective: To develop advanced materials, micro- and nano-scale photonic structures and devices, solid-state sources and to realise optoelectronic integrated circuits (OEIC). In the last 20 years, optics and photonics have become increasingly pervasive in a wide range of industrial applications. It has now become the heart of a new industry, building on microelectronics with which it will be increasingly linked.

Projects are expected to address research challenges for 2010 and beyond in one or more of the following application contexts: "telecommunication and infotainment" (components for "low-cost high-bandwidth" and "Terabyte storage"), "health care and life science" (minimally invasive photonic diagnostics and therapies, biophotonic devices),and "Environment and Security" (photonic sensors and imagers)

Focus is on:

- advanced materials, microoptics and micro-nano-photonic structures: passive and active photonic materials and heterostructures, and their integration with microelectronic main stream processes. This includes compound semiconductors, organic and polymers and glass;
- advanced devices, hybrid or monolithic, and integrated photonic circuits implementing functional requirements of telecommunication (e.g, electro-optic and all-optical processing), of medical (e.g, biophotonics and imaging) and of environment applications (e.g, sensors).
- advanced solid-state light sources to increase compactness, tunability and brightness. Work will also include ultra-short pulse, microcavities and source array technologies.

It is expected that work on the above topics would crystallise around integrated projects on "sources", "photonic devices", and "opto-electronic integrated circuits". Networks of excellence should help structure in "micro-nano scale structures and devices" and "polymer/organic components and fibers". Topics complementing this overall strategy could come forward through the other instruments but should strictly

be focused on promising alternative approaches. Proposals for Coordination Actions to support the development of roadmaps in the field are encouraged.

2.3.2.3 Open development Platforms for software and services

Objective: To build open development and run-time environments for software and services providing the next generation of methodologies, interoperable middleware and tools to support developers - through all phases of the software life-cycle, from requirements analysis until deployment and maintenance - in the production of networked and distributed software systems and services, embedded software and value-added user services. This will enable the development of future software engineering methods and tools.

Focus is on:

– High level methods and concepts (esp. at requirements and architectural level) for system design, development and integration, addressing non-functional aspects, complexity, autonomy and composability.

– Open and modular development environments, enabling flexibility and extensibility with new or sector-specific tools (e.g. intelligent distributed decision support), supporting different adaptable development processes and methodologies and ensuring consistency and traceability across the development lifecycle.

– Light/agile methodologies and adaptive workflow providing a dynamic and adaptive environment, suitable for co-operative and distributed development.

– Open platforms, middleware and languages supporting standards for interoperability, composability and integration. (incl. e.g. P2P, GRID, autonomy, agents, dynamic adaptability and evolvability, context awareness, customer profiles). Open source middleware layers can facilitate rapid and broad adoption.

Priority will be given to projects in which strong industrial users join forces with software and service suppliers in building common platforms with support of academic research partners.

In addition, related foundational research, to be implemented by Specific Targeted Research Projects and Coordination Actions, should focus on fundamental design concepts, systematisation of domain specifications, concurrency, distribution and timing, formal and quantitative analysis and testing tools, and future database and information system concepts.

Work should where appropriate, enhance and complement work implemented under EUREKA/ITEA and in software initiatives at member and associated state level. The IST programme will seek active co-operation with ITEA in software intensive systems.

2.3.2.4 Cognitive Systems

Objective: To construct physically instantiated or embodied systems that can perceive, understand (the semantics of information conveyed through their perceptual

input) and interact with their environment, and evolve in order to achieve human-like performance in activities requiring context-(situation and task) specific knowledge.

Focus is on:

- *methodologies and construction of robust and adaptive cognitive systems* integrating perception, reasoning, representation and learning, that are capable of interpretation, physical interaction and communication in real-world environments for the purpose of performing goal-directed tasks. Research will aim at realising complete systems with real-time performance and/or bounded rationality, have well developed memory capacities (*e.g.* short term, long term, iconic, associative) with efficient representation, and that acquire representations as needed to realise performance goals. The emphasis is on closing the loop in realistic test cases.

A main target of this research is interdisciplinarity, *i.e.*, to carefully consider the integration of different disciplines including computer vision, natural language understanding, robotics, artificial intelligence, mathematics and cognitive neuroscience and its impact on overall system design. Integrated Projects are expected to leverage these communities to integrate methods and insights towards the objective of realising entire systems and to promote community building. NoEs will provide a channel for fostering foundational research, for developing and maintaining common resources, specifically, of open systems and training environments to study learning and evolving systems.

2.3.2.5 Embedded systems

Objective: To develop the next generation of technologies and tools for modelling, design, implementation and operation of hardware/software systems embedded in intelligent devices. An end-to-end systems vision should allow to build cost-efficient systems with optimal performance, high confidence, reduced time to market and faster deployment.

Focus is on:

- Middleware and platforms for building *Networked Embedded Systems* that aim to hide the complexity of underlying computing, communications, sensing and control while, at the same time, providing efficient and effective distribution of resources at low cost. Emphasis will be on middleware for small wireless devices, e.g. mobile phones or PDAs, that makes design, programming, verification and maintenance of systems including such devices easier. It will also be on scalable and self-organising platforms that offer services for ad-hoc networking of very small devices and for mastering complexity through perception techniques for object and event recognition and advanced computing and control.
- Concepts, methods and tools for *system design*, development of warrantable software components and implementation of systems, with emphasis on correct handling of complex *Real-Time* constraints. Work includes unification of computational models and composition methods, holistic design addressing event and time constraints, interface technologies in hard- and software addressing real-world and legacy issues, techniques and integrated validation tools to ensure ultra-stable, dependable embedded systems.
- *Advanced Controls* for Real-Time systems with emphasis on hybrid systems theories including non-linear processes with both constraints and switching

modes. Advanced controls for Networked Embedded Systems with emphasis on networked autonomous and fault adaptive control and management, as well as on reasoning, behaviour, global performance and robustness.

It is expected that work on Networked Embedded Systems and on system design would crystallise around Integrated Projects which would also address the relevant parts of work on Advanced Controls. These Integrated Projects are expected to create critical mass by covering: basic and foundational research (e.g. methods, models, languages), component-based research (e.g. new generation of tools) and systems integration. Projects must stimulate innovation in business and industrial systems by incorporating leading-edge users with visionary application problems and also users with mid-term issues and SMEs to ensure a wider take-up. An incremental approach starting with a group of core partners is recommended.

Networks of Excellence are expected to complement the Integrated Projects, in particular for Advanced Controls where activities with a longer term horizon are needed for further structuring the ERA in this field. Specific Targeted Research Projects and Specific Support Actions are encouraged to explore emerging technologies or alternative approaches so as to pave the way for additional new technological advances in the field.

Work should, where appropriate, strengthen and complement research implemented under EUREKA and in national initiatives. Work could also build on established international RTD activities involving the United States, Korea and Japan, and may evolve to include other countries

2.3.2.6 Applications and Services for the Mobile User and worker

Objective: To foster the emergence of rich landscape of innovative applications and services for the mobile user and worker and to support the use and development of new work methods and collaborative work environments. These should be based on interoperable mobile, wireless technologies and the convergence of fixed and mobile communication infrastructures. Such applications and services will enable new business models, new ways of working, improved customer relations and government services in any context.

The target applications and services will be capable of being seamlessly accessed and provided anywhere, anytime and in any context.

Focus is on:

- The integration of technologies into a wide range of innovative mobile and multimodal applications and services including workplace designs that enhance creativity and productivity:
  - Intelligent, adaptive and self-configuring services that deploy wearable interfaces and enable automatic context-sensitivity, user profiling and personalisation in a trusted and secure environment as well as multi-lingual and multi-cultural presentation, and multiple modes of interaction;
  - Novel workplace designs and methods of work organisation that enable collaboration of multi-location and mobile workers and can increase participation in, and access to work in remote and rural areas.

– Addressing the major hurdles for the deployment of applications and services for the mobile user so as to ensure:
  - Opennesand interoperability of service development and provision environments, including location-based services compatible with existing and emerging satellite infrastructures (e.g. Galileo),
  - Interoperability of services and roaming across heterogeneous networks, and service environments including e.g. working, billing, payment, ticketing and accounting services, as well as seamless access to corporate and government resources.

Projects shall cover research, development, testing and uptake activities with emphasis on multi-service large scale systems in several sectoral settings and in work environments. Where relevant socio-economic, regulatory and policy issues, including for health and safety, and the analysis of economic drivers, including creativity and intangible value creation, should also be addressed.

Projects shall also aim at integrated and multidisciplinary approaches, and foster partnerships between industrial and academic actors such as application and technology developers, equipment vendors and systems integrators, content and service providers, operators, human-computer interfaces and usability experts, architects, office designers and end users.

Work will link to member and associated states initiatives in the field and will build on common RTD activities with Japan, the Unites States and other third countries including the Intelligent Manufacturing Systems (IMS) initiative.

2.3.2.7 Cross-media content for leisure and entertainment

Objective: To improve the full digital content chain, covering creation, acquisition, management and production, through effective multimedia technologies enabling multi-channel, cross-platform access to media, entertainment and leisure content in the form of film, music, games, news and alike. It will accelerate take up in B2B, B2C and C2C, currently hampered by insufficient productivity, convergence and high cost.

Focus is on:

– Developing technologies supporting the creation of *new, compelling forms of content* for interactive, creative or artistic consumption. Research should aim at advancing imaging technologies and audio-visual representation, multi-dimensional immersive environments and experience portals, as well as virtual, augmented and mixed reality technologies featuring higher levels of quality and accuracy. Device adaptivity and contextualisation, personalisation and (emotive) feedback, and ability to capture real-time, multimodal and multisensorial input will be embedded as needed.

– Developing integrated *content programming environments* allowing to retrieve content from different sources, types and locations, and to store, compress and categorise it, with a view to realising programming appropriate to a particular audience and delivery channel, including interactive TV, e-cinema, radio, online games and music.

Integrated Projects will address the full RTD spectrum outlined above, also covering workflow issues, versioning and re-purposing, user needs and acceptance, business models, DRM, security and privacy. Networks of Excellence are expected to explore radically new forms of content and associated experience models. All instruments should aim to mobilise relevant media value chain players, in particular content creators and aggregators, and broadcasters and publishers.

2.3.2.8 GRID-based Systems for solving complex problems

Objectives:

– To expand the potential of the Grid and peer-to-peer approaches to solving complex problems which can not be solved with current technologies in application fields such as, but not limited to, industrial design, engineering and manufacturing, health, genomics and drug design, environment, critical infrastructures, energy, business and finance, and new media.

– To overcome present architectural and design limitations hampering the use and wider deployment of computing and knowledge Grids and to enrich its capabilities by including new functionalities required for complex problem solving. This should help the larger uptake of Grid type architectures and extend the concept from computation Grids to knowledge Grids, eventually leading to a "semantic Grid".

Focus is on:

– *Architecture, design and development of the next generation Grid* beyond extensions of existing technologies, leading to open standards, and including security built-in at all levels, programming environments, resource management; economic and business models for new services, customisable middleware, interoperability with existing Grid and Webservices. An integrated and comprehensive approach including stake holders from all relevant levels is required.

– *Enabling application technologies* for the solution of complex problems in domains requiring a Grid-based approach, including next generation tools and environments for modelling, simulation, datamining, visualisation, process control, remote operation; and collaborative working in dynamic virtual organisations. To exploit synergies and avoid duplication, communities in different application domains having similar requirements shall join forces and share common layers.

Coordination and Specific Support Actions will be used to co-ordinate relevant research activities in the member and associated states so as to help build critical mass, avoid duplication of efforts and strengthen European leadership in developing the next generation Grid technologies**.**. A multi-disciplinary approach across the relevant levels of the value chain is required. For the first focus it is a priority to foster international collaboration with complementary research communities and programmes.

2.3.2.9 Improving Risk management

Objective: To develop open platforms, integrated systems and components for improved risk management, civil security applications (including threats from anti-personnel landmines) and environmental management. To foster the emergence of a European info-structure and service platforms which will facilitate the use of interoperable components and sub-systems. The work should contribute to the implementation of the GMES action plan, notably to the development of the part related to risk management.

Focus is on:

– Research on key IST technologies, notably: robust and/or low cost smart sensors with communication and location capabilities, advanced modelling and simulation, decision support and visualisation tools, GRID technology to form part of an integrated system for the prevention and the management of emergencies. When appropriate, applications should seamlessly integrate data from earth observation.

– Research on new concepts and IST technologies to enhance Civil Security in the prevention and the management of industrial and terrorist threats and to improve crisis management. Work will also include technologies for humanitarian aid and humanitarian de-mining for which the focus is on methods for the reliable detection of safe areas, and multi-purpose sensors for risks including mine and explosive detection.

– Research to help the development of a European info-structure and associated services for environmental and crisis management. In particular, actions to improve co-ordination towards the harmonisation and standardisation of ontologies and sophisticated metadata architectures taking into account the requirements developed under the INSPIRE[6] initiative.

Coordination will be ensured with other relevant FP6 thematic priorities , notably with thematic priorities 4 and 6.

In the first focus area, Integrated projects shall help develop, principally, common open platforms for software and services supporting a distributed information and decision systems for risk and crisis management. The main expected result is a common risk management architecture capable of supporting a wide range of applications covering the whole risk cycle: risk assessment and planning, mitigation, preparedness, response and recovery. Such generic architectures are to support any type of risk (environmental, industrial or terrorist) and crisis in a common approach. In the second focus area, a special emphasis will be put on the co-ordination of humanitarian de-mining research at a European level. In addition to some research projects (IPs or STREPs), Networks of Excellence and/or co-ordination actions will help structure research in the field of humanitarian de-mining.

In the third focus, the emphasis is on access to shared data. STREPs and NoEs should address both technical and non technical issues. Proposals will describe how

[6] *The INfrastructure for SPatial InfoRmation in Europe initiative.* http://inspire.jrc.it/

objectives, project work, results and funding from international, national and regional programmes will contribute to the EU funded programmes.

2.3.2.10 eInclusion

Objectives:

- To promote eInclusion as a core horizontal building block in the establishment of the Information Society to ensure equal access and participation for all in Europe.
- To develop intelligent systems that empower persons with disabilities and ageing citizens to play a full role in society and to increase their autonomy.

Research activities will also be conducted in two others priorities: 'Citizens and Governance in a Knowledge Society' and 'Support to EU policies'.

As far as the IST priority is concerned, focus is on:

- Research on advanced interfaces, low cost sensors and possibly robotics to be integrated in assistive devices, and information modeling and web semantics to improve web usability for digitally disadvantaged persons.
- Development and demonstration of intelligent housing for persons with special needs to be addressed in an integrated approach.
- Networking of research teams, in the domain of *assistive technologies* to strengthen the research effort on the quality of life of users with physical, sensory or cognitive impairments as well as in the domain of *design-for-all* for mainstream products and services exploring, for example, cognitive demands and new multimodal platforms.

Socio-economic, regulatory and policy dimensions, especially covering *e*Inclusion in a broad sense to ensure availability of information society services for all at a reasonable cost, will be also addressed.

Proposals will describe how objectives, project work, results and funding from international, national and regional programmes and international co-operation initiatives will contribute to the EU funded programmes.

Projects should aim at fostering partnership between advanced research laboratories in the key IST domains from the industry, system integrators, service providers and relevant users.

It is expected that the two first domains will be covered by STREPs and Integrated Projects and that the third domain will be covered by Networks of Excellence.

2.3.3 Joint call with Thematic Priority 3

A joint call is foreseen with Priority 3 that will address a strategic objective of the IST priority on "Products and service engineering 2010" that is described below. It will address jointly a research area in Priority 3 that is described in paragraph 3.4.3.1 of the Priority 3 workprogramme where focus will be given to the *creation of "knowledge communities" in production technologies.* The joint call will use a two stage procedure.

2.3.3.1 Products and Services engineering 2010

Objective: To strengthen further Europe's competitive position by developing collaborative technologies and methodologies for extended service and product development approaches, including associated services and distributed global manufacturing organisation. Community funding should help integrate, in a global context, fragmented European and international (e.g. IMS) RTD efforts in product and process design, and to focus on new holistic product/service concepts.

Focus is on:

- Technologies, engineering methodologies, novel tools, methods and work environments that facilitate collaboration, creativity, resource use efficiency through holistic approaches to products and associated services. Work will consider all product value creation stages, from conception, design, configuration, to production, delivery maintenance, and disposal, as well as work organisation and the work environment
- New and emerging information technologies for the development, manufacturing and integration of miniaturised devices (e.g. smart tags, sensors) and related software into end-products
- Technologies and methodologies for the optimisation of value creation processes in manufacturing, facilitating seamless knowledge and information flow between suppliers and users as well as novel approaches to customisation, fulfilment, logistics, maintenance
- Demonstrating the feasibility and applicability of holistic product design, development and distribution tools and methods in a rich variety of sectoral settings (e.g. automotive, aerospace, construction, industrial textiles, furniture, agriculture and food, transport and delivery, maritime, electronics).
- Global standardisation initiatives in the area of inter-enterprise business processes management and integration (e.g. planning, scheduling and co-ordination), heterogeneous virtual business and manufacturing networks (e.g. for assuring process transparency and traceability of produced parts), shop floor automation as well as knowledge management and security.

Work will build on and help aggregate member and associated states' efforts[7]. In addition, collaboration with the Eureka Factory initiative is encouraged. This

[7] e.g. initiatives such as the e-Manufacturing initiative in the UK, SPIN Software product industry and Presto-Future Products in Finland and the IT 2006 initiative in Germany

description supports the Priority 2 part of activities to be called in common with Priority 3[8] and the Intelligent Manufacturing Systems (IMS) initiative. The Strategic objective will be open to Integrated Projects, Networks of Excellence, Coordination Actions and Specific Support Actions.

2.3.4 Future and Emerging Technologies (FET)

FET complements the other objectives of IST with research from a more visionary and exploratory perspective. Specifically, FET's purpose is to help new IST-related science and technology fields to emerge and mature, some of which will become strategic for economic and social development in the future. The research typically supported by FET is of a long-term nature and involves high risks that are compensated by the promise of major advances and large potential impact. It aims at opening up new possibilities and setting trends for future research programmes, making FET a 'nursery' of novel research ideas and the IST's pathfinder activity.

FET uses two complementary approaches: one pro-active, the other receptive and open:

- The pro-active scheme has a strategic character, setting the agenda for a limited number of specific areas that hold particular promise for the future.
- The open scheme employs the inverse approach – it is open, at any time, to the broadest possible spectrum of ideas as they come directly 'from the roots'.

Information on FET is provided at the web site *www.cordis.lu/ist/fethome.htm*.

2.3.4.1 FET Open

This scheme is open to the widest possible spectrum of research opportunities that relate to information society technologies as these arise bottom-up. It supports: research on new ideas involving high risk; embryonic research and proof-of-concept; and high quality long term research of a foundational nature. Such research is implemented through Specific Targeted Research Projects (STREPs).

FET-Open also supports the shaping, consolidation, or emergence of research communities and the coordination of national research programmes or activities in any IST-relevant area of advanced and longer term research. Such activities are implemented through coordination actions (CA) and specific support measures (SSA).

Proposal submission and evaluation modalities

It is expected that the call for proposals for FET-Open will be open throughout the 6th framework programme (continuous submission).

- Proposals for STREPs have to be submitted in two stages: first a *short* proposal with a technical description of maximum 5 pages is submitted, at any time,

[8] Strategic Area 1: Supporting the Transformation of the European Industry

describing the key objectives and motivation for the proposed work. Short proposals are evaluated anonymously as they come in with the help of remote evaluators. The proposers are informed of the results of the evaluation normally within 6 weeks of the proposal's reception. If the short proposal is successful, they are invited to submit a *full* proposal by a specified cut-off date. Proposers of successful short proposals will be given at least 2 months for preparing full proposals.

- Proposals for CAs and SSAs are submitted in one stage, i.e. full proposals are submitted directly, at any time.

There are two to three cut-off dates per year for the submission of *full* proposals – either STREPs or CAs and SSAs: Proposals that have been received by a given cut-off date are evaluated at a session that is normally organised within a month of that cut-off date.

In order to preserve continuity between FP5 and FP6, assessment projects contracted under FP5 that have been successful, but that did not have the opportunity to submit a follow-up full proposal within FP5, will be invited to submit directly a full proposal to FET-Open in FP6.

The evaluation of full proposals is carried out through a combination of remote evaluation and panels of experts that convene in Brussels to consolidate the referees' individual assessments of full proposals and recommend a proposal ranking

2.3.4.2 Proactive Initiatives

Proactive initiatives aim at focusing resources on visionary and challenging long-term goals that are timely and have strong potential for future impact. These long-term goals are not necessarily to be reached during the lifetime of projects but provide a common strategic perspective for all research work within the initiative and a focal point around which critical mass can be built and synergies developed. Calls for proposals for proactive initiatives may be preceded by invitations to submit 'expressions of interest'.

Instruments to be used

Each proactive initiative will typically consist of one or more integrated projects and, in some cases, a Network of Excellence (NoE). In the context of a proactive initiative, NoEs would have a specific role: they would bring together the broader community active in the research domain of the initiative in order to provide a framework of coordination for research and training activities at the European level, and allow the progressive and lasting integration of these activities around pre-specified themes. This may include the establishment of "distributed" centres of excellence, shared fabrication or experimental facilities, testbeds etc.

NoEs in the proactive initiatives will help elaborate and maintain a research roadmap for the area, in cooperation with the integrated projects, and they will also ensure a broad dissemination of research results emanating from the proactive initiative, stimulate industrial and commercial interest, and enhance the public visibility of the research. In addition to the above activities, the Joint Programme of Activity (JPA) of

a NoE may provide support to research that is within the subject area of the initiative and is of an exploratory nature, or tests the credibility of new research ideas and concepts, complementing the work carried out within the integrated projects.

Proactive initiatives to be called in 2003

(i) Beyond robotics

Incorporation of information technology into physical mobile artefacts ("robots") poses a wide range of interdisciplinary research challenges and has the potential to lead to a large variety of new applications. Proposals should address one or more of the following *long term* objectives:

- The development of cognitive robots whose "purpose in life" would be to serve humans as assistants or "companions". Such robots would be able to learn new skills and tasks in an active open-ended way and to grow in constant interaction and co-operation with humans.

- Hybrid bionic systems that would augment human capabilities such as perception of the environment, motion, interaction with other humans etc. This would involve smooth integration of sophisticated robotic and information systems with human perception-action systems using bi-directional interfaces (invasive or non-invasive) with the human nervous system.

- The development of autonomous microrobot groups ('robot ecologies'), consisting of many heterogeneous members exhibiting collective behaviour and intelligence. The robots would be able to self-organise, adapt, co-operate and evolve in order to attain a global objective.

Proposals should have ambitious objectives at the level of a complete system and aim at breakthroughs that go well beyond the state of the art. Research should seek new approaches and address and integrate topics such as multisensory perception, learning, scalability, integration, task and environment adaptation, interaction with humans, and rigorous evaluation. Existing state-of-the-art solutions for robotic sub-systems may be adopted where appropriate. The work would partly build on the ongoing FET neuroinformatics (NI) and life-like perception systems (LPS) initiatives with augmented scope for integration and systems research.

(ii) Complex systems research

The extreme scale and dynamism of information systems poses fundamental challenges to their design and control. Conventional engineering methods will soon hit a complexity barrier due to the exponential growth of interconnections among a rapidly increasing number of system components. New conceptual frameworks for designing and building complex systems are necessary.

The *objective* is therefore to create a new generation of *scale-free, autonomously evolving* IT systems building on design and control paradigms derived from complex system analysis. Such systems — large scale networks, societies of simulated or embodied agents, electronic circuits, information repositories, etc. — must incorporate adaptive and stable self-regulatory mechanisms that guide their growth

and lead to autonomous self-organisation. They must be able to operate on multiple spatial and temporal scales and continue operating reliably in dynamic environments.

To address the above objective ŧ will be essential to study real-world systems — living organisms, eco- and social systems, or even the man-made internet — and understand how these scale-up and organise the information flow between their parts. In addition, beyond studying real-world systems as computational systems in order to develop tools to "engineer emergent order", ultimately only a general conceptual framework for complex systems would enable a leap from ad-hoc solutions to a scientifically-rooted paradigm shift. Essential for this are concepts from statistical physics, evolutionary and developmental biology, immunology, neuroscience, game theory, etc.

Possible *research goals / challenges* include:

– Monitor, visualise and simulate the dynamics of large, rapidly evolving networks in real-time. Characterise and classify their structural properties and develop *local* algorithms taking advantage of these properties. Enhance their capacity of self-monitoring and self-management.

– Extract meaning from huge, unstructured, dynamically evolving sets of data. Guide societies of heterogeneous agents — simulated or embodied — to develop shared knowledge systems or languages.

– Create scale-free computational structures composed of self-assembling building blocks that are capable to develop - through spontaneous differentiation - organised structures and greater capabilities. Identify new languages for 'programming' such structures via local rules.

(iii) The Disappearing Computer

The designs of future ambient systems - that is, IT systems intimately integrated with everyday environments and supporting people in their activities - are likely to be quite different to those of current computer systems. Instead they will have to be based on radically new architectures comprising an unbounded set of "building blocks" – where these blocks may be embedded in everyday objects, be it stand-alone objects or software entities.

The key aim of this research is to develop such *open* architectures and supporting frameworks (tools, languages, ontologies etc.) that could become *universally applicable.* The building blocks would be heterogeneous entities with different functionalities (e.g. processors, controllers, protocol modules, agents, tags, human interaction modules, sensors etc, embedded in everyday objects or "stand-alone"). The architectures should allow their arbitrary combination to produce an unbounded range of configurations giving rise to functionalities that can be neither pre-programmed nor foreseeable.

In order to meaningfully bridge the distance between low-level architectures and high level ambient systems interacting with people, the research effort should span the entire spectrum ranging from low level architectural design through to development of representative scenarios of use. The scenarios should provide realistic contexts of

use and interaction, inspired by observations of people and their activities. They need to be diverse enough to ensure that the architectures could indeed become universally applicable.

Work on the development of architectures should be done in conjunction with building research prototypes where the architecture is evaluated against the scenarios applied in a diversity of real-world settings.

Optional pre-proposal checks

Pre-proposal checks is a service provided by FET to consortia intending to submit a proposal to a Proactive Initiative call. Their purpose is to provide feedback on the eligibility of the proposal, the suitability of the proposed work with respect to the scope of the call, and on the suitability of the instrument used.

Planning for proactive initiative calls in 2004 and beyond

The following tentative areas are expected to build on successful work launched in the 5th framework programme. The list is not exclusive nor is it certain that all the areas listed below will be called:

- *Quantum information processing and communication*: This initiative explores novel computing and communication systems that exploit the properties of quantum mechanical operations. The main focus would be on scalable solid-state and atom-based approaches to quantum processors.

- *Molecular computing*: This would be the follow-up to the Nanotechnology Information Devices (NID) initiative and would focus on molecular and biomolecular approaches to information processing systems, including devices, computational architectures and bottom-up nanofabrication.

- *Global computing*: This would build on successful work under the Global Computing initiative that started in 2001. The central challenge would be to establish solid foundational principles for the analysis and design of systems composed of extremely large numbers of autonomous, mobile and interacting computational entities, so that the global system is dependable, secure, robust and efficient.

- *Life-like perception and cognition systems* would build on successful work undertaken in the "neuroinformatics for living artefacts" and "life-like perception systems" initiatives that were launched in 2000 and 2001. The scope would cover both subsystems as well as complete autonomous artefacts that are inspired by the sophistication of perception-decision-action architectures adopted by living organisms.

2.3.5 Research networking test-beds

This work is complementary to and in support of the activities carried out in the area of Research Infrastructures on high-capacity and high-speed communications network for all researchers in Europe (GÉANT) and specific high performance Grids.

Objectives: To integrate and validate, in the context of user-driven large scale test-beds, the state-of-the-art technology that is essential for preparing the future upgrades in the infrastructure deployed across Europe. This should help support all research fields and identify the opportunities that such technology offers together with its limitations. The work is essential for fostering the early deployment in Europe of Next Generation Information and Communications Networks based upon all-optical technologies and new Internet protocols and for incorporating the most up-to-date middleware.

Focus is on:

- integrating, testing, validating and demonstrating new networking technologies - including disruptive technologies - and services (e.g. IP (Internet Protocol) over photonics, GMPLS, new routing and protocol schemes, access technologies, photonic networks, lambda and terabit networking, global networking, distributed architectures, storage, configuration, security, billing and charging mechanisms, QoS, autonomous administration) in real-world settings and production environments.
- developing roadmaps and strategic guidance for infrastructure development in Europe, promoting specialised training and education on related advanced topics, promoting centres of excellence (e.g. GRIDs technology centres) and technology and know-how transfer, thus contributing towards strengthening and enhancing the European initiatives on Research Infrastructures.
- fostering interoperability of solutions across different scientific and industrial disciplines in an effort to achieve broader-scale up-take of new state-of-the-art infrastructure technology and promoting the creation of standards and a continued effort to strengthen contributions to open-source objectives.

The RTD, taking place in the context of large scale experimentation in real settings, is expected to promote interoperability across heterogeneous technology domains, facilitate interoperability of solutions across different scientific and industrial communities, support the creation of standards, promote economies of scale during the validation phase and achieve broader-scale up-take of technology across numerous user communities. Involvement of demanding user communities is crucial.

Work should, where appropriate, enhance, complement and exploit synergies with the relevant national and international initiatives.

2.3.6 General Accompanying Actions

The general accompanying actions run in parallel with the Strategic Objectives, and are employed to prepare (before), support (during) and facilitate the rapid adoption and transfer (after) of technologies and research results. They include activities such

as support to International Cooperation, socio-economic studies including statistical indicators, dissemination and awareness, standardisation and foresights.

The general accompanying actions will be implemented exclusively with Specific Support Actions and Coordination Actions that cut across the Strategic Objectives of the Workprogramme and will be open for each call with fixed deadline. A particular aim of the Specific Support Actions will be to stimulate, encourage and facilitate the participation of SMEs, small research teams, newly developed and remote research centres, as well as those organisations from the candidate countries in the RTD activities of the IST priority. The implementation of these actions will rely on the specific information and assistance structures, including the network of national contact points, established by the member states and the associated countries at local, regional and national level and will aim at ensuring a smooth transition from the Fifth to the Sixth Framework Programme.

In addition, continued support will be given 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 seven 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.

2.4 IMPLEMENTATION PLAN

2.4.1 Calls in 2003 and 2004

Two calls for proposals with fixed deadlines are foreseen for 2003 and 2004. These are open for all instruments but about **2/3 of the budget is expected to be devoted to the new instruments,** Integrated Projects and Networks of Excellence.

In addition, one Call for continuous submission is foreseen for the FET open scheme. Details on the implementation of this call are given in the paragraph 2.3.4.1 , in the FET section.

The indicative timetable of the fixed deadline calls for proposals based on the WP2003-2004 is as follows:

Fixed deadline:

- Call 1 - publication 17/12 2002, closing 24/4 2003 – would have an indicative budget of around 1070 MEuro. The call follows a one stage procedure
- Call 2 – publication 17/6 2003, closing 15/10 2003 – would have an indicative budget of around 525 MEuro. The call follows a one stage procedure
- A joint call on *"manufacturing, products and services engineering in 2010* is foreseen with thematic Priority 3. The call will follow a two stage procedure. The publication will be on 17/12 2002, the deadline for the first stage (short proposals) is 24/4/2003 and the deadline for the second stage (full proposals) is 16/9 2002. The call would have an indicative budget of 25 MEuro.
- A third call is also foreseen for 2004 with a more limited budget than the two first calls. The details of this call will be part of the first update of the Workprogramme. Examples of the areas that it will cover include the FET proactive initiatives described in paragraph 2.3.4.

The first two calls will draw on the 2003 and 2004 budgets. The third call will draw on the 2005 budget except for FET proactive initiatives that will draw both on 2004 and 2005 budgets[9].

Continuous submission:

- Only for the FET open scheme: Call published on December 17, 2003 and ending in December 2004 with an indicative budget of 60 MEuro. The call follows a two stage procedure.

2.4.2 Budget allocation per Strategic Objective

For each fixed deadline call, 80% of the budget is pre-distributed on the Strategic Objectives to provide an indication of the effort that will be devoted to each of these objectives. The remaining 20% are not pre-allocated to a specific objective. They will

[9] 35 MEuro of the 2004 budget are pre-allocated for FET proactive in Call 3

be allocated after the call based on the quality of proposals and the relevance of the suggested work. This will enable, in particular, to support also proposals that cut across the objectives addressed in the call.

Only proposals addressing the Objectives open in a specific call will be supported with the exception of General Accompanying actions that cut across the Strategic Objectives of the IST Workprogramme.

The table below presents the calls, the Strategic Objectives that are open in each call, the type of instruments that can be used and the pre-allocated budget per objective.

Strategic Objectives, FET and RN	**Call 1 ~1070 M€**	**Call 2 ~525 M€**	**Continuous ~60 M€**	**Indicative Pre-allocated Budget[10]**
Pushing the limits of CMOS, preparing for post-CMOS	All instruments[11]			75
Micro and nano systems	All instruments			85
Broadband for all	All instruments			60
Mobile and wireless systems beyond 3G	All instruments			90
Towards a global dependability and security framework	All instruments			55
Multimodal Interfaces	All instruments			65
Semantic-based knowledge systems	All instruments			55
Networked audio-visual systems and home platforms	All instruments			60
Networked businesses and governments	All instruments			75
E Safety of road and air transport	All instruments			65
eHealth	All instruments			70
Technology-enhanced learning and access to cultural heritage	All instruments			65
Advanced displays		All instruments		25
Optical, opto-electronic, photonic functional components		All instruments		45
Embedded systems		All instruments		50
Open development platforms for software and services		All instruments		55
Cognitive systems		All instruments		25
Applications and Services for the Mobile User and worker		All instruments		60
Cross-media content for leisure and entertainment		All instruments		55
GRID-based Systems for solving complex problems		All instruments		45
Improving Risk management		All instruments		30
eInclusion		All instruments		30
FET proactive	IPs, NoEs			40
FET open			STREPs, CAs, SSAs	60[12]
Research Networking test-beds		All instruments		25
General accompanying actions	SSAs+CAs	SSAs+CAs		16

Joint call with priority 3

Objective: Products and Services engineering 2010[13]	**Instruments:** IPs, NoEs, CAs, SSAs	**Indicative budget**: 25 M€

Support to conferences, seminars, workshops or exhibitions are part of a continuous call for grants. Application forms for these grants will be found on the IST Web site. In addition to calls for proposals, calls for tenders are also expected to be published in Years 2003-2004 on specific activities that the IST priority will support, including the organisation of the IST conference. Details will be provided in the texts of these calls for tenders.

[10] The amounts correspond to the 80% of the budget which is pre-allocated

[11] All instruments are IPs, NoEs, STREPs, CAs and SSAs

[12] This corresponds to 100% of the indicative budget of FET Open for 2003-2004

[13] The Priority 3 area that will complement this objective in the joint call is 3.4.3.1 where focus will be given to the *creation of "knowledge communities" in production technologies.*

2.5 EVALUATION AND SELECTION CRITERIA

A number of evaluation criteria are common to all the programmes of the Sixth Framework Programme and are set out in the European Parliament and the Council Regulations on the Rules for Participation (Article 10).

The work programme defines, in accordance with the type of instruments deployed or the objectives of the RTD activity, how the criteria set out in the rules for participation will be applied. It determines any particular interpretations of the criteria to be used for evaluation and any weights and thresholds to be applied to the criteria.

As each instrument has its own distinct character and its own distinct role to play in implementing the programmes, each instrument has its own distinct set of evaluation criteria, organised into blocks. Annex B of the Workprogramme provides the basic set of evaluation criteria for all instruments.

The IST priority will use this basic set with for evaluating proposals but with the modifications described below.

Proposals in IST for all instruments should have adequate industrial participation including large companies and SMEs.

1. **For Integrated Projects, the criterion on Quality of the consortium will be as follows:**

   Quality of the consortium

   The extent to which:

   - the participants collectively constitute a **consortium of high quality.**
   - the participants are **well-suited and committed to the tasks** assigned to them.
   - there is **good complementarity** between participants.
   - **there is an adequate industrial involvement** to ensure exploitation of results[14].
   - the opportunity for a real involvement of SMEs has been adequately addressed.

2. **The selection criteria and weights and thresholds for the FET open scheme are different from the basic set and** are presented in details in paragraph 2.6 below.

[14] This does not apply for FET proposals

2.6 EVALUATION CRITERIA FOR FET OPEN

1- Specific Targeted Research Projects

Relevance to the objectives of the programme

- Is the proposed project **within the scope** of IST in general and FET Open in particular? Does it concern research on new ideas involving high risk, embryonic research and proof-of-concept, or long term research of a foundational nature?

Scientific and technological excellence

- Are the objectives **challenging** and **clearly defined?**
- Do they represent **clear progress well beyond the current state-of-the-art?** Is the research **highly innovative?**
- For *short* proposals : is the proposed S&T approach **plausible?**
- For *full* proposals : is the proposed S&T approach **well thought out?** Could it enable the project to achieve its objectives?

(Note : only a short outline of the approach should be provided in short proposals).

Potential impact

If successful:

- Will the project have a **large scientific or technological impact**? Can this research **open new prospects** for IST? And/or,
- will it have, in the longer term, a **large economic impact** or contribute to solving **societal problems**?
- Are the potential long term benefits sufficiently large to justify the level of risk of the project?
- Will the impact be best achieved if the project is carried out at **European level**?

Quality of the consortium

For *full* proposals **only**:

- Is all necessary **expertise** available in the consortium? Are the participants **well-suited to the tasks** assigned to them? Are they **committed** to the project?
- Do the participants collectively constitute a **consortium of high quality?** Is there **good complementarity** between participants?

Quality of the management

For *full* proposals **only**:

- Is the **project management** demonstrably of high quality? Is there a clearly laid out plan of work?
- Is there a satisfactory plan for the **management of knowledge** (e.g. dissemination, use, intellectual property, etc) and for promoting innovation, where relevant?

Resources

– For *short* proposals: Do the resources requested seem **reasonable** for achieving the project objectives?

For *full* proposals only:

– Are the foreseen **resources** (personnel, equipment, financial…) **necessary and sufficient** for success?

– Are the **resources convincingly integrated** to form a coherent project?

Is the overall financial plan for the project adequate?

2- Coordination Actions

Relevance to the objectives of the programme

– The extent to which the proposed project **supports the scientific, technical, socio-economic and policy objectives** of the work programme in the areas open for the particular call.

Quality of the co-ordination

The extent to which:

– the research activities/programmes to be co-ordinated are at the forefront of **the current state-of-the-art**.

– the proposed activities are sufficiently well designed to bring about the co-ordination envisaged.

Potential impact

The extent to which:

– the impact of the proposed work can best be achieved if carried out at European level.

– the Community support would have a real structuring and/or strategic impact on the area concerned and the scale, ambition and outcome of the research activities/programmes to be co-ordinated.

– exploitation and/or dissemination plans are adequate to ensure **optimal use of the project results,** where possible beyond the participants in the proposed action.

Quality of the consortium

The extent to which:

– the participants collectively constitute a **consortium of high quality** that can pursue the objectives of the proposed action **effectively.**

– the participants are **well-suited to the tasks** assigned to them and committed to the proposed action.

– the project combines the **complementary expertise** of the participants to generate added value with respect to the individual participants' programmes.

Quality of the management

The extent to which:

- the **project management** is demonstrably of high quality.
- there is a clearly laid out plan of work
- there is a satisfactory plan for the **management of knowledge** (e.g. dissemination, intellectual property, etc.) and for promoting innovation where relevant.

Mobilisation of resources

The extent to which:

- the proposed action is cost-effective, providing for the **resources** (personnel, equipment, financial…*)* that are necessary and sufficient for success.
- the **resources** are **convincingly integrated** to form a coherent project.
- the overall **financial plan** for the project **is adequate**.

3- Specific Support Actions

Relevance to the objectives of the programme

- The extent to which the proposed project **supports the scientific, technical, socio-economic and policy objectives** of the work programme in the areas open for the particular call.

Quality of the support action

The extent to which:

- the support action proposed represent **a high quality work;**
- the proposed activities are sufficiently well designed to support the programme objectives.

Potential impact

The extent to which:

- the impact of the proposed work can best be achieved if carried out at European level.
- the impact will be significant in scientific, technological, socio-economic or policy terms.
- exploitation and/or dissemination plans are adequate to ensure **optimal use of the project results,** also beyond the participants in the support action.

Quality of the consortium

For multipartner proposals:

The extent to which:

- the participants collectively constitute a **consortium of high quality** that can pursue the objectives of the proposed action **effectively.**

– the participants are **well-suited to the tasks** assigned to them and committed to the proposed action.

– the project combines the **complementary expertise** of the participants to generate added value with respect to the individual participants' programmes.

For single partner proposals:

– The extent to which:the participant has the necessary quality, skills, expertise and proven track record to carry out the action.

Quality of the management

The extent to which:

– the **project management** is demonstrably of high quality.

– there is a satisfactory plan for the **management of knowledge** (e.g. dissemination, use, intellectual property, etc.) and for promoting innovation where relevant.

Mobilisation of resources

The extent to which:

– the proposed action is cost-effective, providing for the **resources** (personnel, equipment, financial…*)* that are necessary and sufficient for success.

– the **resources** are **convincingly integrated** to form a coherent project, if relevant.

– the overall **financial plan** for the project **is adequate**.

2.7 CALL FICHES

A- Call 1

1) Specific Programme: Integrating and Strengthening the European Research Area

2) Activity: Thematic priority area: Information Society Technologies

3) Call title: Call 1 of the IST priority

4) Call identifier: [15]

5) Date of publication[16]: 17.12.2002

6)Closure dates [17]: 24.4.2003 at 17.00 (Brussels local time)

7) Total indicative budget: 1070 MEuro

8) Distribution of budget per area: 80% of the budget of this call is pre-distributed on the different areas covered including each of the the Strategic Objectives, FET, Research Networking test beds and general accompanying actions. This provides an indication of the effort that will be devoted to each of these areas. The remaining 20% are not pre-allocated to a specific area. They will be allocated after the call based on the quality of proposals and the relevance of the suggested work. The table in point10 shows the distribution of the pre-allocated budgets per area.

9) Distribution per instrument : The overall indicative budget distribution between instruments is: 2/3 of the budget for the new instruments (NoEs and IPs) and 1/3 for the traditional instruments

10) Areas addressed in the Call

The table below indicates the areas open and the distribution of the pre-allocated budget on these areas:

[15] The call identifier shall be given in the published version of this call.

[16] The director-general responsible for the call may publish it up to one month prior or after the envisaged date of publication.

[17] Where the envisaged date of publication is anticipated or delayed (see footnote 19), closure date(s) will be adjusted accordingly in the published call for proposals.

	Instruments	Indicative Pre-allocated Budget[18] MEuro
1-Strategic Objectives		
2.3.1.1 Pushing the limits of CMOS, preparing for post-CMOS	*All*[19]	75
2.3.1.2 Micro and nano systems	*All*	85
2.3.1.3 Broadband for all	*All*	60
2.3.1.4 Mobile and wireless systems beyond 3G	*All*	90
2.3.1.5 Towards a global dependability and security framework	*All*	55
2.3.1.6 Multimodal Interfaces	*All*	65
2.3.1.7 Semantic-based knowledge systems	*All*	55
2.3.1.8 Networked audio-visual systems and home platforms	*All*	60
2.3.1.9 Networked businesses and governments	*All*	75
2.3.1.10 eSafety of road and air transport	*All*	65
2.3.1.11 eHealth	*All*	70
2.3.1.12 Technology-enhanced learning and access to cultural heritage	*All*	65
2- Future and emerging Technologies		
– *2. 3.4.2 P roactive initiatives:*[20] *(i) Beyond robotics* *(ii) Complex systems research* *(iii)The Disappearing Computer*	*IPs and NoEs*	*40*
3- General Accompanying		
2.3.6 General Accompanying actions	*SSAs & CAs*	*8*

11) Minimum number of participants[21]:

Instrument	Minimum number
IPs, NoEs, STREPs and CAs	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC
Specific support actions	1 legal entity

12) Restriction to participation: None.

13) Consortium agreement: Participants in RTD actions resulting from this call are required to conclude a consortium agreement.

[18] The amounts correspond to the 80% of the budget which is pre-allocated.
[19] "All instruments" correspond to IPs, NoEs, STREPs, CAs and SSAs
[20] *Pre-proposals to FET Proactive may be submitted by e-mail or fax at any time up to 28*/2/ 2003
[21] MS = Member States of the EU ; AS (incl. ACC) = Associated States ; ACC : Associated candidate countries.

14) Evaluation procedure :

- the evaluation shall follow a one stage procedure
- proposals will not be evaluated anonymously

15) Evaluation criteria:

- See the section on evaluation criteria in paragraph 2.5 of this Work Programme and the weights and thresholds below

16) Indicative evaluation and selection delays:

- evaluation results: 2 months after the relevant closure date

B- Call 2

1) Specific Programme: Integrating and Strengthening the European Research Area

2) Activity: Thematic priority area: Information Society Technologies

3) Call title: Call 2 of the IST Priority

4) Call identifier: [22]

5) Date of publication[23]: 17.06.2003

6)Closure dates [24]: 15.10.2003 at 17.00 (Brussels local time)

7) Total indicative budget: 525 MEuro

8) Distribution of budget per area: 80% of the budget of this call is pre-distributed on the different areas covered including each of the the Strategic Objectives, FET, Research Networking test beds and general accompanying actions. This provides an indication of the effort that will be devoted to each of these areas. The remaining 20% are not pre-allocated to a specific area. They will be allocated after the call based on the quality of proposals and the relevance of the suggested work. The table in point10 shows the distribution of the pre-allocated budgets per area.

9) Distribution per instrument : The overall indicative budget distribution between instruments is: 2/3 of the budget for the new instruments (NoEs and IPs) and 1/3 for the traditional instruments

10) Areas addressed in the Call

The table below indicates the areas open and the distribution of the pre-allocated budget on these areas:

[22] The call identifier shall be given in the published version of this call.

[23] The director-general responsible for the call may publish it up to one month prior or after the envisaged date of publication.

[24] Where the envisaged date of publication is anticipated or delayed (see footnote 19), closure date(s) will be adjusted accordingly in the published call for proposals.

	Instruments	Indicative Pre-allocated Budget[25] MEuro
1- Strategic Objectives		
2 3.2.1 Advanced displays	*All*[26]	25
2.3.2.2 Optical, opto-electronic, photonic functional components	*All*	45
2 3.2.3 Embedded systems	*All*	50
2 3.2.4 Open development platforms for software and services	*All*	55
2 3.2.5 Cognitive systems	*All*	25
2 3.2.6 Applications and Services for the Mobile User and worker	*All*	60
2 3.2.7 Cross-media content for leisure and entertainment	*All*	55
2 3.2.8 GRID-based Systems and solving complex problems	*All*	45
2 3.2.9 Improving Risk management	*All*	30
2 3.2.10 eInclusion	*All*	30
2- Research Networking		
2 3.5 Research Networking test beds	*ALL*	*25*
3- General accompanying actions		
2 3.6 General Accompanying actions	*SSA; CAS*	*8*

11) Minimum number of participants[27]:

Instrument	**Minimum number**
IPs, NoEs, STREPs, CAs	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC
Specific support actions	1 legal entity

12) Restriction to participation: None.

13) Consortium agreement: Participants in RTD actions resulting from this call are required to conclude a consortium agreement.

14) Evaluation procedure:

- the evaluation shall follow a one stage procedure
- proposals will not be evaluated anonymously

[25] The amounts correspond to the 80% of the budget which is pre-allocated.

[26] "All instruments" correspond to IPs, NoEs, STREPs, CAs and SSAs

[27] MS = Member States of the EU ; AS (incl. ACC) = Associated States ; ACC : Associated candidate countries.

15) Evaluation criteria:

- See the section on evaluation criteria in paragraph 2.5 of thisWorkprogramme and the weights and thresholds below

16) Indicative evaluation and selection delays:

- evaluation results: 2 months after the relevant closure date

C- Continuous submission call

1. **Specific Programme**: "Integrating and strengthening the European Research Area"

2. **Activity**: Priority thematic area of research "Information Society technologies".

3. **Call title**: Future and Emerging Technologies – Open domain (Continuous submission).

4. **Call reference number/identifier:**[28]

5. **Date of publication**[29]**:** 17 December 2002.

6. **Date from which proposals are receivable**[30]: 10 February 2003

7. **Closing date**[31]: 31 December 2004-

8. **Total indicative budget:** EUR 60 million

9. **Areas called and Instruments**:

Area	**Instruments**
2.3.4.1 FET Open	STREPs, CAs, SSAs

10. Minimum number of participants[32]**:**

Instrument	**Minimum number**
STREPs and CAs	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC
Specific support actions	1 legal entity

11. Restriction on participation: none.

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[28] The call identifier shall be given in the published version of this call.

[29] The director-general responsible for the publication of this call may publish it up to one month prior or after its envisaged publication date.

[30] When the envisaged publication date is changed (see footnote 1), other dates may be adjusted accordingly

[31] It is expected that a subsequent call will further extend this date to the last year of the framework programme

[32] MS = Member States of the EU ; AS (incl. ACC) = Associated States ; ACC : Associated candidate countries.

12. Consortia agreements: It is not mandatory that participants in RTD actions resulting from this call conclude a consortium agreement although such agreements strongly recommended.

13. Evaluation procedure:

- Proposals for STREPs have to be submitted in two stages: first a *short* proposal of maximum 5 pages is submitted describing the key objectives and motivation for the proposed work.

- *Short* proposals are evaluated anonymously as they come in with the help of remote evaluators.

- If the short proposal is successful, the proposers are invited to submit a *full* proposal by a specified cut-off date. Proposers of successful *short* proposals will be given at least 2 months for preparing full proposals. The evaluation of *full* proposals is not anonymous and is carried out through a combination of remote evaluation and panels of experts that convene in Brussels.

- In order to preserve continuity between framework programmes, assessment projects contracted under FP5 that have been successful, but that did not have the opportunity to submit a follow-up *full* proposal within FP5, will be invited to submit directly a *full* proposal for a STREP to FET-Open in FP6.

- Proposals for CAs and SSAs are submitted in one stage and will not be evaluated anonymously.

- Cut-off dates for the submission of the *full* proposals for STREPs (second stage) and proposals for CAs and SSAs: 13 May and 16 September 2003; 13 January, 11 May and 14 September 2004.

14. Evaluation criteria: See the criteria for FET open in the section on evaluation criteria in paragraph 2.6 of this Workprogramme and the weights and thresholds below.

15. Indicative evaluation and selection delays:

- Evaluation results for *short* proposals: 6 weeks from a proposal's reception;
- Evaluation results for *full* proposals: 2 months from the cut-off date;

Weights and thresholds for FET Open

Specific Targeted Research Projects

SHORT PROPOSALS

Criteria	Relevance to the objectives of the programme	Potential Impact	S&T excellence	Quality of the consortium	Quality of the management	Mobilisation of ressources	Overall
Weight	30	30	30	0	0	10	
Threshold	3	3	3	-	-	2	**3.5**

FULL PROPOSALS

Weight	0	30	40	10	10	10	
Threshold	3	3	4	3	-	2	**3.5**

Coordination Actions

Criteria	Relevance to the objectives of the programme	Quality of the coordination	Potentiel impact	Quality of the consortium	Quality of the management	Mobilisation of ressources	overall
Weight	10	20	30	20	10	10	
Threshold	3	3	4	3	3	2	**3.5**

Specific Support Actions

Criteria	Support to the objectives of the Programme	S&T excellence	Potential impact	Quality of the management	Mobilisation of ressources	Overall
Weight	10	20	40	20	10	
Threshold	3	3	4	3	3	3.5

D- Joint Call with Priority 3

1) Specific Programme: Integrating and Strengthening the European Research Area

2) Activity: Priority Thematic Area of research "Information Society Technologies" and "Nanotechnology, … processes and devices"

3) Call title: Joint call between priority 2 and priority 3 on: *"manufacturing, products and services engineering in 2010"*

4) Call identifier: [33]

5) Date of publication[34]: 17.12.2002

6)Closure dates [35]: For the new Instruments, at 17.00 (Brussels local time)
April 24, 2003 (1st stage); September 16, 03 (2nd stage)

For the other instruments (CA, SSA), at 17.00 (Brussels local time)
April 24, and September 16, 2003 (single stage)

7) Total indicative budget: 25 M€ (of which 20 M€ for the new instruments) are allocated from priority 2; 35 M€ (of which 25 M€ for the new instruments) for priority 3

8) Areas called and instruments:

- For Priority 2, see section 2.3.3.1. Focus will be given to ***"products and services engineering".***
- For Priority 3, see section 3.4.3.1. Focus will be given to the ***creation of "knowledge communities" in production technologies.***
- Instruments targeted are **IPs; NoEs; CAs; SSAs**.

11) Minimum number of participants[36]:

Instrument	**Minimum number**
IPs, NoEs and CAs	3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC
Specific support actions	1 legal entity

[33] The call identifier shall be given in the published version of this call.

[34] The director-general responsible for the call may publish it up to one month prior or after the envisaged date of publication.

[35] Where the envisaged date of publication is anticipated or delayed (see footnote 19), closure date(s) will be adjusted accordingly in the published call for proposals.

[36] MS = Member States of the EU ; AS (incl. ACC) = Associated States ; ACC : Associated candidate countries.

12) Restriction to participation: None.

13) Consortium agreement: Participants in actions involving new instruments are required to conclude a consortium agreement. Participants in the actions involving other instruments will not be required, but strongly advised, to conclude a consortium agreement before the signature of a possible contract..

14) Evaluation procedure *:*

- The evaluation for the new instruments will follow a two-stage procedure; whereas the evaluation for the other instruments will follow a single stage procedure.
- proposals will not be evaluated anonymously

15) Evaluation criteria:

- **Evaluation criteria:** see standard criteria (in annex B of this workprogramme). A particular attention will be given to international co-operation (see section 2.3.6.3 for information corresponding to the IMS multilateral agreement).

16) Indicative evaluation and selection delays:

- evaluation results: 2 months after the relevant closure date

Glossary

3D	Three Dimensional
3G	Third Generation mobile and wireless communications
"Ambient Intelligence"	A concept in IST that presents 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.
CAs	Coordination actions
Call for Proposals	As published in the Official Journal. Opens parts of the workprogramme for proposals, indicating what types of actions (RTD projects, Accompanying actions etc.) are required. A provisional timetable for such Calls is included in the workprogramme
CMOS	Complementary metal-oxide semiconductor
COST	Coopération européenne dans le domaine de la recherche scientifique et technique
DVB	Digital Video Broadcasting
EC	European Commission (europa.eu.int)
ESA	European Space Agency (www.estec.esa.nl)
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 is conducted through the application of Evaluation Criteria identified in the WorkProgramme.
FET	Future and Emerging Technologies
FP	Framework Programme (EU – Sixth FP is FP6, etc.. – www.cordis.lu)
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.
GMES:	Global Monitoring for Environment and Security - http://gmes.jrc.it/
GPRS	General Packet Radio Service
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/)
IP	Internet Protocol
IP	Intellectual Property (in the context of Micro- and Opto-electronics)
IPR	Intellectual Property Rights
IPs	Integrated Projects

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)
MOEMS	micro-opto-electro-mechanical
New Instruments	Correspond to Integrated Projects (IPs) and Networks of Excellence (NoEs) both of which are new instruments in FP6
NoEs	Networks of Excellence
NSF	National Science Foundation (http://212.208.8.14/nsf.htm)
OECD	Organisation for Economic Co-operation and Development (www.oecd.org)
OMG	Object Management Group (www.omg.org)
QoS…..	Quality of Service
RF	Radio Frequency
RTD (R&D)	Research and Technology Development.
SOC	Systems on a- Chip
SSA	Specific Support Actions
STREPs	Specific Targeted Research Projects
S-UMTS	Satellite-Universal Mobile Telecommunications System
Traditional instruments	These are the Specific Targeted Research Projects (STREPs), the Coordination Actions (CAs) and the Specific Support Actions (SSAs)
UMTS	Universal Mobile Telecommunications System
VR	Virtual reality
W3C	World-Wide Web Consortium
WAP	Wireless Application Protocol
WDM	Wavelength Division Multiplexing
XML	Extensible mark-up language