European Commission

**THE SIXTH FRAMEWORK PROGRAMME**

**The Sixth Framework Programme (FP6) covers Community activities in the field of research, technological development and demonstration (RTD) for the period 2002 to 2006**

## Work Programme for the Specific Programme for RTD: "Integrating and Strengthening the European Research Area"

### The Thematic Priority

# Information Society Technologies

Information Society Technologies

# Work Programme

## Second Update

## (IST WP 2005-06)

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# Introduction

The Information Society Technologies (IST) Work Programme sets out in greater detail the objectives and scientific and technological priorities of the IST priority thematic area of the FP6 Specific Programme for "integrating and strengthening the European Research Area" (SP1[1]). It defines the objectives and technical content of calls for proposals, the implementation plan and the criteria that will be used for evaluating proposals responding to these calls.

The priorities reflect input received from a series of consultation meetings, workshops and Web-based consultations[2], from the IST Advisory Group[3] (ISTAG), and from the IST Programme Committee. 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 Strategic Objectives have been defined in a changing environment for undertaking research in Information and Communication Technologies (ICT):

- ICT research is increasingly organised on an international scale, as firms seek to relocate their R&D activities in the face of accelerating competition in global markets.
- Innovation processes are more open, with wider and faster exchange of ideas, people and resources.
- Technology chains are increasingly complex, making it more difficult for any single player to establish industrial leadership in any ICT field.

At the same time, ICT are becoming more pervasive: we see their growing impact all around us, in the way we live, work, play and interact with each other. For the economy, ICT are central to boosting productivity and improving competitiveness of all businesses and industries. The ICT industry itself is one of Europe's largest economic sectors, and ICT innovations underpin progress of all other major science fields. In the public sector, ICT enable services to be delivered more efficiently, as well as new services that correspond to people's evolving needs. For society at large, ICT offer new solutions to meet societal demands. The impact of ICT on every facet of the society and economy is unique.

To fully exploit this uniqueness, three conditions need to be fulfilled. First, we have to stimulate research and development of ICT so as to master the technologies that will drive future innovation and growth. Second, we have to promote the widest and best possible use of ICT-based products and services[4]. Third, we have to create the right regulatory environment: one that ensures fair competition and eliminates obstacles to the adoption of ICT. The European Union's ICT policy is built on these three interlinked pillars. By addressing the three aspects through a coherent strategy, EU policy aims to enable Europe to take full advantage of ICT.

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[1] OJ L 294, 29.10.2002.
[2] See http://www.cordis.lu/ist/workprogramme/wp0506-consultation.htm
[3] See http://www.cordis.lu/ist/istag.htm
[4] See eEurope: http://europa.eu.int/information_society/eeurope/2005/index_en.htm

The process is ongoing. Over recent years, more than half of the productivity gains are explained by advances in ICT and their impact on organisations, business processes and markets.

We have only begun tapping into the opportunities opened by the development of ICT. Today different technology trends are converging and bringing a new generation of ICT applications and services.

Research is the key to unlocking this potential. An indigenous research capacity is essential in being able to assimilate technology and to exploit it to economic and social advantage. This is particularly true for ICT, where innovation moves at an ever faster pace and the frontiers of research are increasingly broad. Today, mastering ICT is essential to technological innovation in all fields.

# 1. Objectives, Structure and Overall Approach

## 1.1 IST in FP6: coverage and main targets

The European 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.

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"[5] places the user, the individual, at the centre of future developments for an inclusive knowledge-based society for all. Realising the vision requires a coherent 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[6] 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, applied and 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 relevant innovative platforms.

The research priorities to be addressed are specified in the specific programme for "integrating and strengthening the European Research Area" (SP1[7]):

(i) *Applied IST research addressing major societal and economic challenges*: The objective is to extend the scope and efficiency of IST-based solutions

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

[6] See Annex III of "Integrating and Strengthening the European Research Area" (SP1), OJ L 294, 29.10.2002.

[7] OJ L 294, 29.10.2002, p.1.

addressing major societal and economic challenges, and to make them accessible in the most trusted and natural way, anywhere and anytime to citizens, businesses and organisations.

(ii) *Communication, computing and software technologies*: The objectives are to consolidate and further develop European strengths in areas such as mobile communications, consumer electronics and embedded software and systems, and to improve the performance, reliability, cost-efficiency, functionality and adaptive capabilities of communications and computing technologies so as to meet the growing needs of applications.

(iii) *Components and microsystems*: The objectives are to reduce the cost, increase the performance and improve reconfigurability, scalability, adaptability and self-adjusting capabilities of micro-, nano- and opto-electronic components and systems-on-a-chip, and to improve the cost-efficiency, performance and functionality of subsystems and micro-systems and to increase the level of integration and miniaturisation allowing for improved interfacing with their surrounding and with networked services and systems.

(iv) *Knowledge and interface technologies:* The objective is to improve usability of IST applications and services and access to the knowledge they embody in order to encourage their wider adoption and faster deployment.

(v) *IST future and emerging technologies:* The objective is to 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.

### 1.2 Instruments in FP6

Integrated Projects (IPs) will be used as a priority means, when appropriate, to realise the IST priorities of FP6. Networks of Excellence (NoEs) will be used to structure research in specific IST domains. Other instruments will also be used: Specific Targeted Research Projects (STREPs), Coordination Actions (CAs) and Specific Support Actions (SSAs).

The use of IPs in particular will help integrate research activities, bringing together European and national actions in the context of creating the European Research Area. It will also help ensure the co-evolution of technologies and their integration in application contexts.

### 1.3 IST Work Programme 2005-06: continued focus on a limited set of Strategic Objectives

In order to ensure concentration of effort and critical mass, the IST Work Programme for 2005-06 continues to focus on a limited set of Strategic Objectives that are essential to realise the IST goals in FP6.

The Strategic Objectives have been specified to mobilise researchers across and beyond Europe and bring together the effort necessary to address the relevant challenges:

- To seize the opportunities presented by ICT to drive productivity, competitiveness and innovation in all sectors;
- To reinforce European excellence in key areas and strengthen the position of the ICT industry in Europe;
- To find new ways to handle the increasing complexity of ICT platforms, applications and services;
- To find new solutions to meet Europe's pressing economic and societal demands;
- To lay the foundations for future systems by leveraging the emerging linkages between ICT and other fields of science and technology.

### 1.4 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 success in IST. This will require different types of sustained effort 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 therefore be 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 therefore be considered systematically as part of a wider European approach to address these objectives.

The detailed description of the Strategic Objectives in the next chapter is organised in a way that highlights this approach. It identifies for each Strategic 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 work programme also provides indications on how the instruments will be used to achieve the objectives including higher integration and structuring of European research. The aim is to ensure the incremental build up of Europe-wide approaches to research in the key IST fields and to 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 therefore be 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" (SP2[8]).

### 1.5 An integrated approach: associating generic and applied research, spanning the value chain

The Strategic Objectives address technology components, their 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 Strategic 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 communities from the IST user and supply industries, 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.

There are several issues that are important to all parts of the work programme[9]. These include notably the needs of small and medium-sized enterprises (SMEs), the involvement of associated candidate countries and Associated States, and the international co-operation dimension.

*The needs of small and medium-sized enterprises (SMEs)*

> 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 and nurturing of new visions in IST and transforming them into business assets. A significant involvement of SMEs is expected, both as suppliers and as users of knowledge and technologies.

*The involvement of associated candidate countries and Associated States*

> Proposers based in Associated States take part in the IST research activities on the same footing and with the same rights and obligations as those based in EU Member States. In addition, this work programme underlines the importance of involving Associated Candidate Countries in the Community's research policy and in the European Research Area.

*The international co-operation dimension*

> International co-operation represents an important dimension of FP6. Collaboration with non-EU research teams is essential to enable European researchers to access knowledge, skills, technology and facilities available outside the EU, to strengthen Europe's participation in international R&D

[8] OJ L 294, 29.10.2002, p.44.

[9] These issues are addressed in the General Introduction to the SP1 work programme.

activities and accompanying measures, and to exploit R&D and policy complementarities so as to explore mutual benefits of the co-operation and increase access to market opportunities.

Participants from third countries and from international organisations may take part in all IST research activities. Funding is available for the participation of researchers, teams and institutions from developing countries, Mediterranean partner countries, Western Balkan countries, as well as Russia and the new independent states. Other third country participants can also be funded in those areas where the relevant part of this work programme makes reference to this possibility or if it is essential for carrying out the research activity.

Specific international co-operation activities include the Human Frontier Science Program[10] that results from intergovernmental agreements and relates to the IST priority. The Program, implemented by the International Human Frontier Science Program Organization, will continue to benefit from IST support and grants at a level foreseen to be 1.5 M€ per year in 2004, 2005 and 2006.

[10] See http://www.hfsp.org

# 2. Technical Content

This section sets out the IST Strategic Objectives (SO) and the actions under Future and Emerging Technologies (FET).

For each SO and for the FET Proactive Initiatives, the objectives and the focus are described, together with a specification of the instruments to be used, the indicative budget and its breakdown, and information about the call for proposals covering the SO.

## Strategic Objectives

**Strategic Objectives addressed in Call 4**

| |
|---|
| 2.4.1 Nanoelectronics |
| 2.4.2 Technologies and devices for micro/nano-scale integration |
| 2.4.3 Towards a global dependability and security framework |
| 2.4.4 Broadband for All |
| 2.4.5 Mobile and Wireless Systems and Platforms Beyond 3G |
| 2.4.6 Network Audio Visual Systems and Home Platforms |
| 2.4.7 Semantic-based Knowledge Systems |
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| 2.4.9 ICT Research for Innovative Government |
| 2.4.10 Technology-enhanced Learning |
| 2.4.11 Integrated biomedical information for better health |
| 2.4.12 eSafety – Co-operative Systems for Road Transport |
| 2.4.13 Strengthening the Integration of the ICT research effort in an Enlarged Europe |

### 2.4.1 Nanoelectronics

Objectives

Supporting the Technology Platform on nanoelectronics, the technical goals are to reduce the transistor size deep into the nano-scale, to radically transform the process technologies through integration of a large number of new materials, and to master the design technologies for achieving competitive systems-on-chip with increasing functionality, performance and complexity. This should be obtained without

compromising on reliability, energy consumption and costs of such systems. The aim is also to secure the necessary design skills and stimulate the use of technologies in areas where these are insufficiently used.

Focus

The SO covers research work on *process and device technologies* and on *design technologies* of nanoelectronics integrated circuits.

– For *process and device technologies*, the focus is on:

1. New materials integration and the related innovative processes to improve miniaturisation, performance, power and cost of next generations of non-conventional silicon-based devices (mid-term and long-term) for generic logics, memories, analogue, RF and high power platforms.

   These tasks are to be addressed by means of IPs and/or STREPs enabling strong collaboration and complementarity between academia and industry.

2. Equipment and materials R&D activities (short-term and mid-term) and *assessment actions* (innovation activities with specific evaluation criteria)[11] for the manufacturing of next generations of chips. Lithography has already been adequately covered in previous FP6 calls for proposals.

   These tasks are to be addressed by means of IPs with strong collaboration between users and suppliers, and significant involvement of SMEs.

*Design technologies* cover methods, tools and architectures for designing advanced nanoelectronic circuits within economical and technical constraints. The focus is on research for :

1. Mastering the design complexity and increasing the design productivity for system-on-chip (SoC) or system-in-package (SiP). This involves notably work on application platforms, Intellectual Property reuse, reconfigurable structures, system-on-chip architectures and design flows.
2. Mastering the technological shortcomings of nanoelectronics such as unreliable device behaviour, dispersion of circuit parameters, parasitic and interconnect effects, and leakage currents.
3. Addressing specific "high value" design competences that are essential for the strategic European application areas. These include for example analogue and mixed signal, high frequency and RF circuits, smart power and low power.

These tasks are to be addressed by means of IPs and STREPs both with involvement of users. Participation of SMEs is encouraged.

[11] *Assessment actions* are a specific type of innovation activities. They deal with the assessment of prototype equipment and materials in state-of-the-art manufacturing processes, shall be led by the user organisations carrying out the assessments, and may set aside a budget for adding further assessments that have not been identified at proposal stage. Such proposals should be clearly identified as an "assessment action" in the proposal sub-title. The IP's "S&T excellence" subcriterion of "clear progress beyond the current state-of-the-art" will be evaluated as "the extent of innovation in manufacturing processes".

In addition there is a need for complementary measures, in particular:

1. *Access services* supporting academic research on design as well as university education of qualified designers through access to industrial design tools and multi-project wafers. *Access services* are to be addressed by means of SSAs.
2. *Stimulation actions*[12] aim at increasing the interest of students and improving the quality of education in SoC design. This will be done through IPs that emphasize research carried out by, and training of, students in SoC design.

   It is expected that *stimulation actions* and in particular *access services* are to a significant extent financed through own resources or receipts from third parties.

3. *Use actions*[13] should promote the integration and use of micro- and nanoelectronics technologies (limited to FPGAs and reconfigurable structures) in products of SMEs, in application and/or geographical areas where these technologies are insufficiently used. They cover awareness actions, the development and evaluation of industrial test cases, and the dissemination of results for replication.

   IPs will be the instrument for *use actions*.

4. SSAs and CAs can be used to promote joint work with national programmes and Eureka, to support the work of the Technology Platform on Nanoelectronics, to define future research agendas, or to identify emerging topics and research groups world-wide.

With regard to *design technologies*, the SO focuses on chip design including SoC and SiP, and is complementary to the SO "Embedded Systems" which is focusing on system design.

Instruments: See above.

Indicative budget: IPs: 80%; STREPs, CAs, SSAs: 20%

Call information: IST Call 4

### 2.4.2 Technologies and devices for micro/nano-scale integration

Objectives

To push the limits of integrated mico/nano systems through research on a family of mixed technologies (combining for instance micro-nano-technology, ICT and biotechnology) and integration technologies for very high density or for integrating micro/nano devices in various materials and into large surfaces. Validation and

[12] *Stimulation actions* are a specific type of training activities. Such proposals should be clearly identified as "stimulation action" in the proposal sub-title. The IP's "S&T excellence" subcriterion of "clear progress beyond the current state-of-the-art" will be evaluated as "the extent of increase of knowledge and skills".

[13] *Use actions* are a specific type of innovation activities. Such proposals should be clearly identified as "use action" in the proposal sub-title. The "S&T excellence" subcriterion of "clear progress beyond the current state-of-the-art" will be evaluated as "the extent of product innovation by using the technology".

demonstration of maturing silicon-based and polymer-based technologies, manufacturing and design issues are also targeted.

Focus

1. *Heterogeneous technologies and devices for mixed-technology micro/nano systems* (e.g. microfluidic/ICT/micro-nano, bio/ICT/micro-nano, chemical/ICT/micro-nano combined). Activities include research at the boundary and integration between different scientific and engineering disciplines, e.g. the combination of silicon and non-silicon technologies and multi-functional integrated micro/nano systems combining information technology with nano-biology, nano-chemistry; combining micro-fluidics and nano-chemistry.

   These tasks are to be addressed through IPs and STREPS.

2. *Technology for very high density hybrid integration (towards e-grains, e-dust).* Research activities are to address a family of integration and interfacing technologies aiming at very high densities, unifying heterogeneous technologies including 3-dimensional vertical integration and very thin technologies. Integration of wireless communication interfaces, antennae, power provision and new functionalities into a very small volume/area is also envisaged.

   These tasks are to be addressed through IPs and STREPs.

3. *Integrating micro/nano devices in various materials and in or on large surfaces.* Research activities aim at integrating micro/nano components and devices in different materials. Activities include sensing, actuating, interfacing, processing and intelligent devices added to polymers, to textile, and to very large surfaces; very large area display technology and large area electronics. Research includes interfacing nano-to-nano; nano-to-micro-to-macro components; and connecting nano and micro devices to new materials (including connections to organic molecules, living cells).

   These tasks are to be addressed through IPs and STREPs.

4. *Manufacturing and design of mixed technology based micro/nano systems.* Focus of research activities is on flexible manufacturing; new processes, design and business or service concepts for combining different technologies requiring multi-competencies. In addition to research, *access services* supporting academic research, feasibility design, prototyping, training and education through access to advanced tools, multi project fabrication and design competency are called for.

   These tasks are to be addressed through IPs (training with specific evaluation criteria)[14].

[14] *Access services* and *stimulation actions* are specific types of training activities. Such proposals should be clearly identified as "access service" or "stimulation action" in the proposal sub-title. TheIP's "S&T excellence" sub-criterion of "clear progress beyond the current state-of-the-art" will be evaluated as "the extend of increase of knowledge and skills" for stimulation actions and will not be evaluated for access services. It is expected that a significant part of the costs are financed through receipts from third parties or through own resources.

5. *Validation and demonstration* of networked *micro/nano systems* and their use to address problems and opportunities in a holistic manner combining device, system, information management and application competencies. Application sectors emphasized are environment, the home, food and agriculture and healthcare.

   These tasks are to be addressed through IPs.

6. *Roadmaps, specific coordination and support activities* to prepare for a research agenda and to build the research community in order to define major trends and to address the ICT-bio-micro-nano-technology combined field, their technologies and their applications; emphasizing multidisciplinarity and addressing research and innovation at the boundaries of different sciences.

   These tasks are to be addressed through SSAs and CAs.

Instruments: See above.

Indicative budget: IPs: 60 %; STREPs, CAs, SSAs: 40%

Call information: IST Call 4

### 2.4.3 Towards a global dependability and security framework

Objectives

This Strategic Objective aims at building technical and scientific excellence, as well as European industrial strength in security, dependability and resilience of systems, services and infrastructures, whilst meeting European demands for privacy and trust. This will also seek to strengthen the interplay between research and policy development in line with the eEurope objectives both within the EU and world-wide, and contribute to standardisation activities in network and information security. It will give particular attention to involving all members of the enlarged Europe in a coherent EU security RTD strategy.

Focus

Security and dependability challenges will arise from complexity, ubiquity and autonomy of computing and communications as well as from the need for resilience, self-healing, mobility, dynamic content and volatile environments. In addition, the advent of new societal applications will lead to new policy challenges in areas like protection of citizens against cyber threats, privacy, identification and authentication for service access, interoperable content and digital rights management, for which strategic and solid research on security and trust is required.

This Strategic Objective will give priority to the following areas:

1. Development of integrated interdisciplinary frameworks and related technologies for the provision of resilience, dependability and security in complex interconnected and heterogeneous communication networks and information infrastructures that underpin our economy and society.

   Instruments: IPs, NoEs, STREPs, CAs

2. Development of novel modelling/simulation techniques and synthetic environments for critical infrastructure protection to understand ICT-related

interdependencies, for prevention and limitation of threats and vulnerabilities propagation and for recovery and continuity in critical scenarios.

Instruments: IPs, NoEs, STREPs, CAs

3. Development, testing and verification of technologies and architectures for secure and open trusted computing as well as interoperable management and trustworthy sharing of digital assets across different platforms and within dynamic (open and closed) communities.

   Instruments: IPs, STREPs

4. Multidisciplinary research on secure and interoperable biometrics and its applications including due consideration of the social and operational issues, in particular with respect to privacy and data protection.

   Instruments: IPs, STREPs

5. Development of security and privacy technologies and architectures for future wireless and mobile application and service provisioning scenarios leading to ambient intelligence.

   Instruments: STREPs

6. Development of European capabilities on security assurance and certification of complex networked systems and infrastructures leading to mutual recognition as well as support of network forensics to combat cyber-crime.

   Instruments: STREPs, SSAs

Integrated and comprehensive approaches involving all relevant stakeholders of the value chain are needed to address these issues at different levels and from different perspectives.

Where STREPs are invited these are particularly aimed at strengthening and complementing work performed in existing IPs and NoEs. Targeted international collaboration should be fostered in the areas of dependability, critical infrastructure protection and interdependencies.

Indicative budget: IPs, NoEs: 70%; STREPS, CAs and SSAs: 30%

Call information: IST Call 4

### 2.4.4 Broadband for All

Objectives

To develop the network technologies and architectures allowing a generalised and affordable availability of broadband access to European users, including those in less developed regions.

Outcome expected from this work is:

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, and notably for the enlarged Europe in line with the eEurope objectives.

A European consolidated approach regarding regulatory aspects, and for standardized solutions allowing the identification of best practice, and the introduction of low cost end user and access network equipment;

Focus

1. 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, and power line networks.

2. New concepts for network management, control and protocols, routing and traffic engineering for delivery of new added-value services, with Quality of Service, security and end-to-end network connectivity, including IPv6.

3. Service enabling technologies and platforms based on convergence of Telecom and Internet Infrastructure, creating a continuous and unified application and information space, with innovative capabilities of resilience, flexibility, network deployability and adaptability.

4. 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 generalized broadband access. Continuity with already launched initiatives is encouraged. SSAs could support the Strategic Objective and help prepare and define the context of future research priorities beyond the 6th Framework Programme.

Consortia are encouraged to secure support from other sources as well and to build on related national initiatives and the EUREKA Celtic initiative.

Instruments: IPs and NoEs will be the predominant instruments, complemented by STREPs. SSAs are expected to cover the strategic objective in its entirety.

Indicative budget: IPs, NoEs: 65%, STREPs and SSAs: 35%.

Call information: IST Call 4

### 2.4.5 Mobile and Wireless Systems Beyond 3G

Objectives

To realise the vision of "Optimally Connected Anywhere, Anytime". Preparatory work has characterized Systems beyond 3G as a 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.

Outcome expected from this work is:

A consolidated European approach to serving mobile users with appropriate enablers for applications and services. These 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) and also DVB-H in the context of broadcasting to mobile handheld devices, possibly complemented by a satellite overlay network (e.g. S-DMB).

A consolidated European approach to technology, systems and services, notably in the field of future standards (e.g. for access), in 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 optimising spectrum usage when moving beyond 3G.

Focus

1. A generalised access network, including novel air interfaces, based on a common, flexible and seamless all IP (Internet Protocol) infrastructure supporting scalability and mobility.
2. Advanced resource management techniques allowing optimum usage of the scarce spectrum resource enabling dynamic spectrum allocation and contributing to the reduction of electromagnetic radiation.
3. Global roaming for all access technologies, with horizontal and vertical hand-over and seamless services provision, with negotiation capabilities including mobility, security and Quality of Service based on end to end IPv6 architecture.
4. Inter-working between access technologies and with the core network at both service and control planes, including advanced service and composite network management.
5. Advanced architectures and technologies that enable reconfigurability at all layers (terminal, network and services).
6. Advanced wireless network technologies enabling robust connectivity in difficult environment and supporting their integration into ad-hoc, sensors and communication networks. Key challenges deal with scalability of network protocols to large number of nodes, design of simple, secure, efficient and power-conserving protocols for different network operations, advanced signal and antenna processing, adaptive waveforms and diversity techniques.
7. Enabling technologies for mobile service creation allowing rapid service deployment and testing independently of specific execution platforms based on open technologies guaranteeing interoperability via the development of a structured logical mobile platform architecture.

Research is expected to be placed in a system context, and should help provide full seamless and nomadic user access to new classes of feature rich applications, as well as person-to-person, device-to-device and device-to-person applications. Continuity with already launched initiatives is encouraged. International collaboration is essential, notably in the context of global standardisation.

These research objectives could be accompanied by SSAs aiming at supporting the work of a mobile and wireless Technology Platform.

Instruments: IPs and NoEs will be the predominant instruments, complemented by STREPs. SSAs are expected to cover the strategic objective in its entirety.

Indicative budget: IPs, NoEs: 65% ;STREPs, SSAs: 35%

Call information: IST Call 4

### 2.4.6 Network Audio Visual Systems and Home Platforms

Objectives

To advance "Audio Visual" systems and applications in converged and interoperable environments including notably broadcasting, communications, mobility and IP. At the economic level, the objective is to favour the emergence of horizontal competitive markets across the value chain, to lower market entry barriers, to enable viable business models and to open new markets. At the technological level, the aim is to ensure a guaranteed level of service across complex delivery environments as well as an optimised use of underlying delivery network bandwidth/QoS characteristics. Availability of high added value scalable multimedia contents and programmes and seamless device connectivity are strong requirements.

Focus

1. Audio Visual data handling including: i) personalisation, easy content navigation, copy protection and rights management, in end-to-end networked scenarios; ii) advanced coding exploiting underlying network characteristics, data aggregation and manipulation capability, adaptable/scalable format taking into account different delivery channels, selection of underlying network and instantaneous context variations, as well as different terminals ranging from home cinema, to small, portable terminals; iii) trans-coding of formats and applications.

   Instruments: IPs, NoEs, STREPs

2. Optimised audiovisual network architectures to deliver, store/cache and distribute content and provide connectivity across a range of heterogeneous, multi-domain fixed or mobile network platforms, with delivery of end-to-end QoS aware solutions. It covers interoperability of the various platforms, middleware architectures for optimised content adaptation and delivery, synchronisation of different delivery channels as well as control issues associated with service delivery in both intra and inter-domain operators' environments.

   The work covers in particular the home and extended-home (e.g. car, office…) network environment, notably through local ad-hoc networking of a range of consumer electronics devices and appliances with broadband wireless connectivity solutions such as UWB complemented with the higher layer protocols allowing for seamless connectivity and controls, the residential gateway, and the wider interoperability with Wide Area Network platforms.

   Instruments: IPs, NoEs

3. Audio visual data access and rendering, through low power and affordable terminals capable of processing and displaying scalable content, interacting with push/pull content, interfacing with different service and network providers as well as with other devices in a local home or personal network.

   Instruments: IPs, NoEs, STREPs

Related aspects includes:

4. A comprehensive, upward compatible, interoperable architecture for end to end content protection and rights management;

   Instruments: NoEs, STREPs

5. Evolution towards advanced applications, such as 3D-TV, on-line mobile gaming, electronic cinema, virtual/tele presence, future mixed reality services.

   Instruments: STREPs

The work must be placed in a system context, and visibly contribute to the development of international open standards. Participation of organisations from third countries is encouraged.

Instruments: See above.

Indicative budget: IPs, NoEs: 80%; STREPs, CAs, SSAs: 20%

Call information: IST Call 4

### 2.4.7 Semantic-based Knowledge Systems

Objectives

To develop semantic-based and context-aware systems to acquire, organise, share and use the knowledge embedded in web and multimedia content. Research will aim to maximise *automation* of the knowledge lifecycle and to achieve *semantic interoperability* between heterogeneous information resources and services, across content types and natural languages. To pioneer *intelligent content*, which will be self-describing, adaptive to context, and exhibit a seamless interaction with its surroundings and the user.

Focus

1. *Knowledge acquisition and modelling***,** capturing knowledge from raw information and multimedia content in webs and other distributed repositories to turn poorly structured information into machine-processable knowledge.

   *Foundational research* will address formal models and languages for representing static and dynamic knowledge, as well as interoperable ontologies for semantic webs, emphasizing data-driven approaches, maintainability and extensibility.

   *Component level* research will address methods and tools aimed at higher levels of information harvesting, including automated knowledge discovery, metadata extraction, annotation and summarisation, concept based and contextual retrieval of *all types of digital content*, paying due attention to cross-lingual aspects. Priority will be given to open architectures or alternative approaches ensuring seamless interworking between components.

   Instruments: IPs, NoEs, STREPs, SSAs

2. *Knowledge sharing and use*, combining semantically enriched information with context to provide 'actionable' meaning, applying inferencing and reasoning for decision support and collaborative use of trusted knowledge between organisations.

*Foundational research* will address the semantics of evolving processes and computational models for context of use.

*Component- and system-level research* will yield knowledge and integration technologies enabling semantic-based collaboration services and processes, leading to scaleable platforms to manage, search, share, personalise, present and exploit complex knowledge spaces that *cross the boundaries between organisations or communities*. The overall aim is to develop robust solutions which are portable across application domains.

Instruments: IPs, NoEs, STREPs, SSAs

3. *Exploring and bringing to maturity the intelligent content vision*, whereby multimedia objects integrate basic content with metadata and knowledge about users and contexts. These objects will learn to react to different stimuli and pro-actively interact with agents, devices and networks, and with each other. They will have the ability to seamlessly aggregate to create new content and services.

   *Foundational research* will focus on how such objects can be: *created*, including collaborative authoring and extraction of metadata as content is created; *managed* e.g. combined by means of automated workflows; *rendered* for different users and platforms; *exchanged and traded* with adequate efficiency and trust.

   *Component-level research* will provide proof-of-concept methods and tools for creating, aggregating and communicating such objects, within a *unifying framework* supporting different content types, across heterogeneous platforms and networks, in representative domains and use scenarios.

   *System-level work* should focus on cross-media, metadata based systems and processes aimed at realising content adaptable to particular users and formats.

   Instruments: IPs, NoEs, STREPs, SSAs

RTD work should address issues such as modelling of user information behaviours and how to hide complexity from the non-expert user. Projects should maximise cross-fertilisation between approaches and disciplines, promote open architectures and coherent stacks of standards, and help build shared infrastructures for research, evaluation and training. Ambitious test-beds will prove the successful integration of component technologies into robust, high performance and scalable systems in representative domains, which are readily transferable to other key sectors.

Instruments: IPs are expected to encompass all stages of the research, where appropriate cutting across the above research lines, and to address system-level integration in realistic scenarios. Foundational and component-level research and discrete solutions for particular domains may also be the subject of STREPs. NoEs should build communities focusing on longer-term, cross-disciplinary research related to knowledge representation, understanding of non-textual information, reasoning and new intelligent content paradigms.

Indicative budget: IPs, NoEs: 80%; STREPs, SSAs: 20%

Call information: IST Call 4

### 2.4.8 Cognitive Systems

Objectives

To develop artificial systems that can interpret data arising from real-world events and processes (mainly in the form of data-streams from sensors of all types) and in particular from visual and/or audio sources); acquire situated knowledge of their environment; act, make or suggest decisions and communicate with people on human terms, thereby supporting them in performing complex tasks.

Focus

Focus is on research into ways of endowing artificial systems with high-level cognitive capabilities, typically perception, understanding, learning, knowledge representation and deliberation, thus advancing enabling technologies for scene interpretation, natural language understanding, automated reasoning and problem-solving, robotics and automation, that are relevant for dealing with complex real-world systems. It aims at systems that develop their reasoning, planning and communication faculties through grounding in interactive and collaborative environments, which are part of, or connected to the real world.

These systems are expected to exhibit appropriate degrees of autonomy and also to learn through "social" interaction among themselves and/or with people; in a longer term perspective, research will explore models for cognitive traits such as affect, consciousness or theory of mind.

Work will build on ongoing research; it is expected to be highly interdisciplinary, drawing on appropriate fields that contribute to cognitive science and cognitive engineering: artificial intelligence, computer vision and robotics, as well as relevant branches of mathematics (e.g. dynamical systems), the bio-sciences (e.g. neuroscience) and the humanities (e.g. linguistics, philosophy). It should yield new approaches towards understanding and improving cognitive capabilities in artefacts and explore new methods of integrating these in complete artificial systems.

The investigation of viable methods living up to demanding application requirements for autonomous or semi-autonomous systems is also encouraged, preferably in industrial inspection and monitoring, complex systems control, medicine or the life sciences.

Instruments: IPs will be used to research the modelling and architecture of entire cognitive systems. They may also research systems-level integration of methods and tools, as well as the integration of different layers of the cognition process (e.g. combining low- and high-level cognitive functions). STREPs will primarily target specific research issues, cognitive functionalities or components which are best researched within small, flexible groupings. CAs are encouraged to promote collaboration across previously fragmented communities, with a view to forming future joint research networks. Alternatively to a CA, a well-balanced NoE combining a critical mass of interdisciplinary research would be welcome. All actions should promote pertinent aspects of community and skills building, where appropriate, with an outreach to and inclusion of industry and application service provision.

Indicative budget: IPs, NoEs: 65%; STREPs, CAs: 35%

Call information: IST Call 4

### 2.4.9 ICT Research for Innovative Government

Objectives

To modernise and innovate public administrations at all levels, to foster good governance, to empower citizens and industries with new service offers, and thus create new public value. To contribute to easing mobility of European citizens within the Internal Market, thus making European Citizenship a reality, and supporting them as active citizens through innovative government services and through participation in decision making processes.

Focus

1. Innovative ICTs for democratic involvement, in particular eParticipation. Research should address innovative tools and methods for fact-based policy development, agent technologies, intelligent formulation and enactment tools supporting the preparation of democratic decisions, scalable dialogue tools as well as new possibilities for interactivity in democratic processes.

   Instruments: NoEs, STREPs

2. Intelligent, inclusive and personalised eGovernment services. Research should distinctively focus on public service obligations of assuring privacy protection and public services that are provided for all. This addresses citizen-centric, intuitive and intelligent human interfaces that are capable to serve every citizen individually through seamless and personalised multi-device service delivery, and application of technologies for novel (e.g. context-aware) eGovernment services.

   Instruments: IPs, STREPs

3. Adaptive and proactive eGovernment support systems. Research should address intelligent modelling of administrative processes using emerging ontology and semantic web languages. It should include flexible technologies to support the legislative and policy development process such as intelligent tools to develop policy scenarios and to manage administrative processes and content. Research should respond to public service governance requirements such as process transparency, preservation of diversity and multi-level governance as well as multi-linguality.

   Instruments: IPs, STREPs

4. Secure pan-European eGovernment environments. Research should address architectures and secure environments, service dependability as well as interoperability challenges, in public administrations across Europe. Particular challenges are to cope with the high degree of heterogeneity, complexity and seeming persevearance of legacy systems in European public administrations. The new environments should be flexible as to allow for new forms of service provision (e.g. via public private partnerships). Research should also address technologies and implementation of pan-European secure and interoperable eGovernment electronic identity management and authentication systems, including smart card technologies.

   Instruments: IPs, STREPs

In addition to research work, a limited number of complementary measures are needed, in particular for:

- a roadmap project to prepare the research agenda for pro-active and innovative eGovernment services in the 2020 time frame, which should also bring together the key players of public administrations, industry and academia,

- a support measure to facilitate transfer of eGovernment R&D technologies and linking the research community with the " eEurope - eGovernment Good Practice Framework",

- a clustering activity involving national and European eGovernment projects to co-ordinate national and European activities on electronic identity for eGovernment services.

Instruments: SSAs, CAs

Proposals shall clearly address EU policy objectives, such as electronic procurement, electronic invoicing in public administrations, single-window customs, and European Citizenship and other major EU policies. Proposals should also take into account socio-economic, legal and organisational aspects, and Public Private Partnership concepts.

Where possible, proposals should aim at exploiting synergies with complementary activities in Europe (in particular IDA and eTen), national or regional programmes, and at issues of particular importance in the enlarged Europe.

International co-operation is encouraged, particularly in co-ordination with activities of international organisations such as the UN and the OECD, other countries such as the USA, and emerging economies such as China, Brazil, India.

Instruments: See above.

Indicative budget: IPs, NoEs: 50%; STREPs, SSAs: 50%

Call information: IST Call 4

### 2.4.10 Technology-enhanced Learning

Objectives

The objectives, contributing to the overall goal of enhancing learning through technologies, are:

- To explore interactions between the learning of the individual and that of the organisation in order to improve how current or emerging ICT can mutually enhance the learning processes for the individual and for the organisation;

- To contribute to new understandings of the learning processes by exploring links between human learning, cognition and technologies.

The first is mid-term, reflecting the challenges posed by ubiquity of access and delivery in mixed formal and informal learning settings. The second is longer term and aims to build on and advance the inter-relationship between cognition and learning processes and exploit links to other disciplines.

Focus

1. Research exploiting the synergies between learning and knowledge management systems in complex educational contexts as well as new ways of conceptualising and integrating individual and group activities within consistent pedagogical scenarios. It should take account of the specific needs of public sector organisations and universities, in addition to industry, and the proposed solutions should have a potential for widespread adoption. By focusing on individuals and organisations, it complements existing projects covering individual learning in schools.
2. Research exploring the links between learning and cognition, with the aim of increasing understanding of human cognitive and learning processes. It implies work on developing conceptual models for technology-enhanced learning processes, and on cognition and learning. Research should be focused on specific learner situations (ages/groups of learners or specific subjects) but should demonstrate how approaches can be adapted to other contexts. Looking to the longer term, it should advance the basic understanding of specific issues pertaining to the interplay between the various dimensions of learning on the one hand and technology on the other hand (e.g. physiological, psychological and cognitive aspects).

Instruments: It is expected that moderately scaled IPs will be the main vehicle exploring the synergies between learning and knowledge management. In focused areas, these may be supplemented by STREPs. STREPs will be the instrument for work on learning systems which further explore the relationship between cognition and technology-enhanced learning processes. There is scope for focused NoEs aiming at integrating cross-disciplinary research on the interplay between learning and cognition.

Indicative budget: IPs and NoEs: 75%; STREPs: 25%.

Call information: IST Call 4

### 2.4.11 Integrated biomedical information for better health

Objective

Research and development on innovative ICT systems and services that process, integrate and use all relevant biomedical data for improving health knowledge and processes related to prevention, diagnosis, treatment, and personalisation of health care.

Focus

Research and development should focus on the following areas

1. Methods and systems for biomedical data and information processing, modelling, visualisation and integration deploying methods such as data mining and grid technologies. Biomedical data and information to be considered do not only

include clinical data relating to tissues, organs or personal health-related information but also data and information on the levels of molecules and cells, such as those acquired from genomics and proteomics research.

Instruments: IPs, STREPs

2. Innovative systems and services for illness prevention, diagnosis and treatment based on integrated biomedical data and information on several levels (molecular, cellular, tissue, organ and person levels). Resulting applications should exploit advances in cognitive modelling, grid and mobile technologies, wearable and imaging technologies and should lead to new approaches in illness prevention, early diagnosis, enhancement of patient safety (e.g. prevention of adverse drug events), and support personalisation of healthcare and lifestyle management. The proposed systems and services should demonstrate measurable benefits, respect all aspects of confidentiality and privacy and be user friendly.

   Instruments: IPs, STREPs

IPs should address both areas of focus. Special emphasis should be given to data and system integration and interoperability aspects, such as seamless data collection and integration from electronic health records, health monitoring systems, and biobanks that preferably do not require additional data entry. Impact on specific diseases (e.g. cancer, cardiac, chronic and rare diseases) or research topics (e.g. new diagnostics and treatments based on molecular imaging, patient safety, modelling and simulation of cell or organ functions) should be clearly demonstrated.

STREPs are expected to focus on the research and development of innovative systems and services based on integrated biomedical data with a clearly specified problem and target user group such as methods for detection and visualisation of genetic expressions and metabolic functions or new approaches to intelligent systems for prevention based on novel methods integrating biomedical data on different levels.

In addition, Specific Support Actions and Coordination Actions are called for with the following focus:

- Roadmaps for research and developments in ICT for health leading to recommendations for actions and to preparatory actions at European level. Proposed roadmaps should take into account not only technological but also financial, legal and research community aspects. The intermediate milestones should constitute results that are applicable and of benefit to health research and clinical practice. International developments and dissemination at the appropriate levels should be included. The following R&D roadmaps are called for:

  a) interoperability of eHealth systems, in particular those proposed in the eHealth Communication (COM(2004)356)[15]. Special emphasis should be given to semantic interoperability, classifications, terminologies and their limitations as well as realistic approach and applicability in clinical setting. The use of Open Source model should be considered.

[15] Communication on eHealth - making healthcare better for European citizens: An action plan for a European eHealth Area http://www.europa.eu.int/information_society/qualif/health/index_en.htm

b) *in silico* model of a human being (virtual human). The roadmap should merge a top down approach starting from the models of body parts and organs with a bottom up approach that models molecular interactions, pathways and cells taking into account existing research activities..

c) beneficial uptake of HealthGrid technologies and applications for health research and health care services. The roadmap should focus on technological aspects and address specific needs for technology developments and implementation challenges.

- Co-ordination and underpinning of the follow up to the Action Plan of the eHealth Communication COM(2004)356[1] including setting up an expert group of Member States representatives related to the relevant national authority that supports the coordination and development of national roadmaps for the uptake of eHealth technologies.

Instruments: see above

Indicative budget: IPs: 60% ; STREPs, SSAs, CAs: 40%

Call information: IST Call 4

### 2.4.12 eSafety – Co-operative Systems for Road Transport

Objectives

To develop and demonstrate co-operative systems for road transport that will make transport more efficient and effective, safer and more environmentally friendly. Co-operative Systems (as opposed to autonomous or stand-alone systems), in which the vehicles communicate with each other and the infrastructure have the potential to greatly increase the quality and reliability of information available about the vehicles, their location and the road environment, enabling improved and new services for the road users.

Such systems will enhance the support available to drivers and other road users and will provide for:

Greater transport efficiency by making better use of the capacity of the available infrastructure and by managing varying demands;

Increased safety by improving the quality and reliability of information used by advanced driver assistance systems and allowing the implementation of advanced safety applications.

Focus

1. Research on advanced communications concepts, open interoperable and scalable system architectures that allow easy upgrading, advanced sensor infrastructure, dependable software, robust positioning technologies and their integration into intelligent co-operative systems that support a range of core functions in the areas of road and vehicle safety as well as traffic management and control.

   Instruments: IPs, NoEs, STREPs

2. In support of the eSafety initiative[16], and as a prerequisite for diagnosis and evaluation of the most promising active safety technologies:

   - Research in consistent accident causation analysis to gain a detailed knowledge about the real backgrounds of European traffic accidents using existing data sources

     Instruments: STREPs

   - Research to assess the potential impact and socio-economic cost/benefit, up to 2020, of stand-alone and co-operative intelligent vehicle safety systems in Europe

     Instruments: STREPs

   - Actions which will sustain the work of the eSafety Forum[17]

     Instruments: SSAs

   - support for international co-operation, training of professionals and users, and dissemination; and improve participation by SMEs

     Instruments: SSAs

The proposals shall indicate how vehicles equipped with such systems will be used across Europe and internationally and how the proposed activities relate to initiatives launched in some Member States and world-wide, especially activities in the USA, Japan and emerging economies. Consortia have to ensure the involvement of all stakeholders, such as road operators, road authorities, service providers, automotive industry, original equipments suppliers, systems integrators, and communications providers. Societal, organisational and institutional matters that are linked to the new generation of Co-operative Systems have also to be addressed.

Instruments: See above.

Indicative budget: IPs, NoEs: 60%; STREPs, SSAs: 40%

Call information: IST Call 4

### 2.4.13 Strengthening the Integration of the ICT research effort in an Enlarged Europe

Objectives

To develop and validate innovative and efficient ICT-based systems and services in key application areas for the societal and economical development of the enlarged Europe, with a view to strengthening the integration of the IST European Research Area.

Focus

[16] Commission Communication COM (2003) 542 final of 15 September 2003 « Information and Communications Technologies for Safe and Intelligent Vehicles »,

[17] http://europa.eu.int/information_society/programmes/esafety/index_en.htm

1. eLearning

   Research and development on ICT-based systems for teaching and learning building on existing open platforms and tools and exploiting the collaborative use of learning objects and resources (including of cultural and scientific content). Work should integrate validation, supported by sound research methodologies, in realistic pedagogical scenarios in universities or schools, and address the critical success factors for subsequent larger-scale deployment initiatives.

2. eHealth

   Research and development on advanced ICT-based eHealth systems and services focusing on integrated health information systems, intelligent environment for health professionals and online health services for patients and citizens. Proposed applications should exploit advances in networking and mobile communications and ensure interoperability with existing networks. Moreover, eHealth applications should build on best practices established throughout Europe and ensure all aspects of confidentiality and privacy. Examples of proposed applications include regional health information networks, decision support for health professionals, mobile applications for health monitoring, home care monitoring and support to autonomy of patients.

3. eGovernment

   Research and development on ICT-based systems to improve the delivery of key public services and to enable good governance (efficiency, inclusiveness, democracy, openness and accountability) in areas with strong potential for European collaboration. Work should integrate several back-office administrative systems at local, regional, national and European level and build on secure and interoperable infrastructures for eGovernment. In addition it should address relevant critical success factors for subsequent larger scale deployment.

   Example application areas are electronic public procurement, citizens services such as job search or social security. The proposed work should build on best European practice and is expected to link to the eGovernment good practice framework under eEurope 2005.

4. eBusiness

   Research and development addressing: e-collaboration enabling a particular cluster of SMEs to operate as a single business entity in the production of applications and solutions adapted to local business needs; B2B and B2C e-commerce allowing quicker response times and more dynamic business models at a lower cost; connection of CRM applications to back-office applications of both Enterprise Resource Planning (ERP) and supply chain. The regulatory, social, cultural and economic obstacles to e-business take-up within the enlarged Europe should be given special attention as well as the interoperability of proposed enterprise applications.

Proposals should make a convincing contribution to strenghten integration within the enlarged Europe in the field selected . In addition , proposals are expected to provide a strong contribution to the relevant eEurope objectives[18] in the selected fields.

Integration is characterized by the level of collaboration between relevant organisations within the enlarged Europe and in terms of bringing an appropriate European dimension into the proposed solutions within the selected application fields.

Instruments: STREPs

Indicative budget: STREPs: 100%

Call information: IST Call 4

**Strategic Objectives addressed in Call 5**

| |
|---|
| 2.5.1 Photonic components |
| 2.5.2 Micro/nano based sub-systems |
| 2.5.3 Embedded Systems |
| 2.5.4 Advanced Grid Technologies, Systems and Services |
| 2.5.5 Open Platforms for software and services |
| 2.5.6 Research networking testbeds |
| 2.5.7 Multimodal Interfaces |
| 2.5.8 ICT for Networked Businesses |
| 2.5.9 Collaborative Working Environments |
| 2.5.10 Access to and preservation of cultural and scientific resources |
| 2.5.11 eInclusion |
| 2.5.12 ICT for Environmental Risk Management |

[18] See http://europa.eu.int/information_society/eeurope/2005/index_en.htm

### 2.5.1 Photonic components

Objectives

To develop advanced materials, solid-state sources and micro- and nano-scale photonic devices, and to integrate photonic functions in micro/nanoelectronics components ('Photonic system on a chip').

Projects are expected to address research challenges for mid-term to long-term industrial exploitation in one or more of the following application contexts:

"Information technologies for health care and life science": bio-photonic functional components and sub-assemblies;

"Communications": components for low-cost or high-performance;

"Environment and security": photonic sensors and imaging components.

Focus

1. Manufacturing technologies and device concepts, addressing the requirements of above cited application areas;
2. Hybrid and monolithic photonic integration technologies offering greater device functionality, and reduced cost, size or power consumption;
3. 'Photonic systems on a chip' for applications in communications (e.g. signal processing or wavelength manipulation) and healthcare (e.g. bio-photonics sensors);
4. Advanced components for optical networks, and low-cost components for broadband wireless/wired access;
5. Advanced solid-state sources to increase compactness, brightness, tunability and spectral purity, and advanced solid-state lighting for ICT applications.

These tasks are to be addressed through IPs, STREPs and SSAs.

Instruments: IPs will be considered if they address "bio-photonic functional components and sub-assemblies", "low-cost communications components" or "advanced source technologies for multiple applications", and if they are application-driven and focused on medium-term exploitation.

STREPs will address medium- to long-term research objectives. CAs and SSAs will address roadmaps, coordination and dissemination activities of photonics.

The involvement of SMEs and of new member states and associated candidate countries is encouraged.

Indicative budget: IPs: 65 %; STREPs, CAs, SSAs: 35%

Call information: IST Call 5

### 2.5.2 Micro/nano based sub-systems

Objectives

To validate integrated micro/nano systems technology for new products and services in key application fields such as miniaturised autonomous robotic systems, mass storage systems and visualisation systems. Micro/nano-based integrated medical systems are also targeted to explore the many opportunities offered by combining bio, nano and information related technologies.

Focus

1. *Integrated systems and tools for point-of-care diagnosis, monitoring, and drug delivery.* Activities should follow a multi-disciplinary approach combining device, systems and application RTD. Bio-compatibility, attached or implanted devices, integration of different sensors into diagnostic/therapeutic tools that interface between the cell/chips and the outside world; new bio/microsystems for proteomics, DNA screening, drug screening and delivery and early diagnostics are examples of activities that may be addressed.

   These tasks are to be addressed through IPs and STREPs.

2. *Autonomous and miniaturised (micro-) robotic systems.* RTD on "smart" pills, miniature instruments including minimal invasive surgery, and autonomous mobile miniaturised (micro-) vehicles including 'flying' robots is envisaged. This includes developments for active locomotion, vision, power supply and energy storage capability and new assembling and packaging approaches. Emphasis should be put on design aspects and on power supply management, including energy scavenging, rechargeable miniaturised batteries, micro-fuel cells and to explore different approaches for robust, small dimensional new energy sources.

   These tasks are to be addressed through IPs and STREPs.

3. *Innovative mass storage systems.* RTD includes research on new devices, emerging technology, and integrated systems for very high density mass storage capacity in a very small size and with high performance building upon progress in micro-nano-devices, in mechanics, optics, electronics and/or magnetic know how.

   These tasks are to be addressed through IPs and STREPs.

4. *Novel 3D visualisation systems; very large area displays and highly-integrated display solutions.* RTD developments should aim at improving overall quality and performance of existing 3D display systems (e.g. resolution, colour fidelity, multi-viewer support); integrating sensors in displays to enhance usability and user experience and to allow a high level of user interactivity; new disruptive display technologies for highly-integrated display solutions or very large area displays.

   These tasks are to be addressed through IPs and STREPs.

5. Validation and demonstration of micro/nano systems-enabled tools and subsystems, with emphasis on transfering results between application fields and to explore their use to address major socio-economic needs combining the device, tool and subsystem development with the application RTD.

   These tasks are to be addressed through IPs.

6. *Roadmaps, specific coordination and support activities* to prepare for a research agenda and to build the research community in order to define major trends and to address the ICT-bio-micro-nano-technology combined field, their technologies and their applications; emphasizing multi-disciplinarity and addressing research and innovation at the boundaries of different sciences.

These tasks are to be addressed through SSAs and CAs.

Instruments: See above.

Indicative budget: IPs: 70%; STREPs, CAs, SSAs: 30%

Call information: IST Call 5

### 2.5.3 Embedded Systems

Objective

To develop the next generation of technologies, methods 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 ambient intelligence systems with optimal performance, high confidence, reduced time to market and faster deployment.

Focus

1. Concepts, methods and tools for *System Design* that master system's complexity by allowing cost-efficient mapping of applications and product variants onto an embedded platform; while respecting constraints in terms of resources (time, energy, memory, etc.), safety, security, and quality of service.

   - Model-based system design, validation and testing. The aim is to achieve interoperability at the semantic level of the models and tools.

   - Design methods, programming models and compilation tools for reconfigurable architectures. The aim is to master the heterogeneity and facilitate the use of these architectures.

   Key issues include: developing more effective language representations; component-based and modular design that allows scalability and interoperability of heterogeneous components, including the mixing of different communication and timing models; verification of functional correctness through formal methods.

   This research complements the Strategic Objective "Nanoelectronics"; the latter focuses on chip design including SoC and SiP, whereas here the focus is on system design, from the application down to the embedded platform architecture.

2. Middleware and platforms for building secure, swarming and fault-tolerant *Networked Embedded Systems* where diverse heterogeneous physical objects co-operate to achieve a given goal. While the developed technology must be generic (e.g. regarding computational and programming models, architectures, semantics, new APIs, operating systems, secure kernels etc.), it should be driven by an entire class of ambitious future applications, covering not only information handling but also perception and control (e.g. smart homes, civil security, air and highway traffic management).

   - Middleware for wireless objects, from mobile devices to cars, which aim to hide the complexity of the underlying infrastructure while providing open interfaces to third parties for application development.

- Scalable and self-organising platforms that offer services for ad-hoc networking of very small objects and for mastering the complexity through perception techniques for object and event recognition.

Key issues include: new computing paradigms which are network-centric and not necessarily device-specific; data networking which goes beyond traditional node-centric approaches; dynamic resource discovery and management; advanced control which makes the system reactive to the physical world and semantics which would allow object definition and querying for data and resources without any need for unique identifiers.

Actions targeting *SME embedded tool developers and vendors* are encouraged, in order to achieve better interoperability of complementary tools or to increase integration of the tool chain, either as part of IPs or through STREPs and CAs.

An important challenge is the *availability of skills*: properly trained designer and system architect teams that are able to think at the global system level, including the interaction with the physical environment, while making the connection to the embedded platform design. It is expected that IPs will specifically address this need; additional CAs are also welcome.

Work should, where appropriate, *complement R&D under EUREKA and in national initiatives*. In particular, links to ITEA and MEDEA+ projects should be described in sufficient detail as to assess synergies and inter-dependencies in terms of timing and funding.

Work could also build on *international cooperation* activities involving the United States, Korea, Japan or other countries. SSAs and CAs should address the preparation of future joint research agendas on topics that would require a world-wide effort due to their challenging and longer term nature.

Instruments: It is expected that work would crystallise around IPs that assemble a critical mass of resources to address ambitious strategic objectives. The research agenda of IPs should integrate basic and foundational research (e.g. computational models, architectures, semantics, and programming models), component-based research (e.g. new APIs, operating systems, secure kernels) and systems engineering and integration. The participation of technology brokers (e.g. associations of SMEs or technology transfer centres) is welcome.

*STREPs* are encouraged to explore emerging technologies or alternative approaches, opening new prospects in the field.

*SSAs and CAs* can be used to promote joint work with national programmes and Eureka, to support the work of the Technology Platform in Embedded Systems, to define future research agendas, or to identify emerging topics and research groups world-wide.

Indicative budget: IPs: 60%; STREPs, SSAs, CAs: 40%

Call information: IST Call 5

### 2.5.4 Advanced Grid Technologies, Systems and Services

*Objectives*:

- To advance the current generation of Grids towards the knowledge Grid and complete virtualisation of Grid resources. To foster uptake and use in business and society.
- To reduce the complexity of Grid-based systems, empowering individuals and organisations to create, provide access to and use a variety of services, anywhere, anytime, in a transparent and cost-effective way, realising the vision of a knowledge-based and ubiquitous utility.

*Focus is on*:

1. *Grid Foundations: Architecture, design and development of technologies and systems for building the invisible Grid.* Scale-independent, adaptive and dependable Grid architectures enabling the management of large networked distributed resources; evolutionary behaviours including inter alia agent-mediated approaches and peer-to-peer technologies; self-organising fault-tolerant autonomous systems leading towards complete virtualisation of resources; new models, languages and environments for programming the Grid at all levels of abstraction; semantic and agent technologies for resource brokering and management; development environments for dynamic composition and orchestration of ubiquitous Grid services.

   Instruments: IPs, STREPs

2. *Grid-enabled applications and services for business and society: Research, development, validation and take-up of generic environments and tools.* Grid-based environments for dynamic service creation and provision supporting distributed collaborations spanning multiple administrative domains, addressing issues such as business models and Grid economics, intelligent tools and interfaces supporting ubiquitous Grid access, persistence, management of trust and value provenance and related policies. Grid-enabled decision support services including knowledge discovery, predictive and descriptive modelling, novel simulation techniques, stochastic search and optimisation.

   Instruments: IPs, STREPs

3. *Network-centric Grid operating systems: Research and development on new or enhanced fabrics for future distributed systems and services.* Two routes shall be pursued: research and conceptualisation on new fabrics replacing existing operating systems; and alternatively, development, testing and validation of an enhanced fabric based on existing operating systems. This work is expected to underpin and support Grid foundations to simplify management and programmability, to support mobility, and to enhance security and performance.

   Instruments: IPs, STREPs

4. Co-ordination of relevant research activities in Member and Associated States in the Framework of ERA building on existing initiatives and linking to Grid

industrial actors; preparing the future research agenda and building research community; creating EU-wide stakeholder initiatives supporting early and wide adoption of Grid technologies; assessing the societal and economic impact of on-going initiatives and non-technical barriers for deployment; fostering international collaboration with complementary research communities and programmes outside Europe.

Instruments: CAs, SSAs

For each focus, a few IPs are expected to address a multidisciplinary and comprehensive approach including stakeholders from all relevant levels of the value chain, complemented by a few STREPs addressing longer term research issues and conceptionalisation. For the second focus, user-driven IPs shall address common requirements across different disciplines and applications in industry, business and society and shall include a technology take-up phase with special emphasis on SMEs as technology providers, service providers or end-users.

Exploitation of results should be promoted through the use of open source models or open standards. Participation according to their particular strengths is encouraged for SMEs and for organisations from the enlarged EU and the acceding States as well as from the target countries for international co-operation.

Instruments: see above

Indicative budget: IPs: 70% ; STREPs, CAs, SSAs: 30%

Call information: IST Call 5

### 2.5.5 Open Platforms for software and services

Objectives

To support the competitive position of European software industry (notably SMEs) in more globalised and service-oriented markets. This requires advanced capabilities in the engineering and management of software systems, services and applications and is to be addressed by creating and extending open and interoperable platforms, methodologies, middleware, standards and tools. The results will enable the design and management of complex software systems and, particularly, the simple and low-cost creation of new types of service and applications, including those for the mobile user.

Focus

1. Research on the engineering, management and provision of services and software, incorporating ambient intelligence-based features such as dynamic composability and adaptability, context awareness, autonomy, semantic interoperability.

   Instruments: IPs, STREPs

2. Principles, methodologies and tools for design, management and simulation of complex software systems, viewing the user as part of the system.

   Instruments: IPs, STREPs

3. Research into technologies specifically supporting the development, deployment and evolution of open source software. The use of open source models for improving software engineering tools should be investigated.

   Instruments: IPs, STREPs

4. Foundational and applied research to enable the creation of software systems with properties such as self-adaptability, flexibility, robustness, dependability and evolvability. Emphasis should be on high level methods and concepts (especially at requirements and architectural level) for system design, development and integration, light/agile methodologies, collaborative and distributed development.

   Instruments: NoEs, STREPs

5. Support actions studying the evolution of the software industry into service-based organisations and identifying strategies, and technological roadmaps: These actions should help reduce fragmentation of research effort and build a critical mass of support for consensual action and agenda-setting.

   Instruments: SSAs, CAs

Support for interoperability should be promoted through the use, extension and creation of open standards. Support for the widest possible use of results may be promoted through the use, extension and creation of open source software where appropriate.

Priority will be given to projects in which strong industrial users join forces with software and service suppliers in building common platforms and applications with support of academic research partners. These projects should include clear demonstration of the industrial usability of results through take-up activities. Foundational research should, in particular, pave the way for applied research in later framework programmes.

Work should, where appropriate, enhance and complement ERA activities. Within the software sector, dynamic SMEs play a vital role in bringing the benefits of the Information Society to fruition. International cooperation, especially in the field of free and open source software, is welcome.

Instruments: See above

Indicative budget: IPs, NoEs: 70%; STREPs, CAs, SSAs: 30%

Call information: IST Call 5

### 2.5.6 Research networking testbeds

Objectives

To integrate and validate, in the context of user-driven large scale testbeds, the state-of-the-art technology that is essential for preparing future upgrades of the infrastructure deployed across Europe. 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.

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 to specific high performance Grids.

Focus

1. Integrating, testing, validating and demonstrating new fixed and wireless networking technologies - including disruptive technologies - and services (e.g. IP over photonics, GMPLS, new routing and signalling protocol schemes, access technologies, photonic networks, lambda and terabit networking, distributed architectures, storage, configuration, security, billing and charging mechanisms, dynamic QoS and resource allocation, autonomous management) in real-world settings and production environments.

   Instruments: IPs, NoEs, STREPs

2. Provisioning of open test infrastructures for third party researchers (including test and validation methods, conformance testing, fault detection, usage and usability trials, IPR management, etc.) including demonstrator environments, resulting in research synergies and facilitating their exploitation.

   Instruments: IPs, NoEs, STREPs

3. 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.

   Instruments: IPs, NoEs, STREPs

4. 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.

   Instruments: SSAs, CAs

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. Active involvement of all Members of the enlarged Europe is sought .

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

Instruments: See above.

Indicative budget: IPs, NoEs: 65%; STREPs, SSAs, CAs: 35%

Call information: IST Call 5

### 2.5.7 Multimodal Interfaces

Objectives

To develop natural and easy to use interfaces that communicate intelligently via several modalities or with multilingual capabilities.

Focus

1. *Natural interaction between humans and the physical or virtual environment*, through multimodal interfaces that are autonomous and capable of learning and adapting to user intentions and behaviour, in dynamically changing environments. They should feature unconstrained, robust and ergonomic interaction, recognise user reactions and respond to them intelligently and naturally. Such interfaces should include mechanisms for selecting cognitively sound combinations of interface modalities according to the user's preferences and context.

   This presupposes a systematic approach to experimentation in both the fusion of information related to different modalities and their channelling to multiple modalities, with due consideration of synchronisation problems. Special attention should be given to integrated and multidisciplinary interface systems design in order to ensure the coherence of the proposed solutions, as well as sensitivity to context and adaptivity.

   Instruments: IPs, STREPs

2. *Multilingual communication systems* for unrestricted domains, including real-time understanding of spontaneous spoken and gesture input in specific task-oriented settings. Research should address novel learning paradigms, e.g. utilizing statistical methods and/or exploiting contextual information, human and linguistic knowledge in a more effective way than currently done. Portability of new languages taking advantage of methods and techniques developed for languages already covered is a further challenge to be addressed, e.g. in the context of new EU languages.

   Instruments: IPs, STREPs

Work on user modelling, system design, visual recognition and tracking, language understanding and spoken language translation is envisaged. Proof of concept is expected in application domains characterised by multiple user scenarios, including interfaces for home and nomadic environments, as well as interfaces for creativity and entertainment. The use of the Experience and Application Research (EAR[19]) approach is encouraged for an early involvement of users.

Instruments: IPs are expected to address system-level objectives in natural interaction and multilingual communication. They may be supplemented by STREPs in focussed areas such as language understanding and spoken language translation.

Indicative budget: IPs: 60%; STREPs: 40%.

Call information: IST Call 5

### 2.5.8 ICT for Networked Businesses

Objectives

[19] See the ISTAG working group report "Involving users in the development of Ambient Intelligence" on http://www.cordis.lu/ist/istag

- To develop software solutions adaptable to the needs of local/regional SMEs, supporting organisational networking and process integration as well as improving adaptability and responsiveness to rapidly changing market demands and customer requirements.
- To develop distributed and collaborative ambient intelligence-based network-oriented systems for efficient, effective and secure product and service creation and delivery. The aim is to explore how ambient intelligence technologies and the vision of duality of existence, in the real world and in cyberspace, can result in innovative products, services and business environments.

Focus

1. *Digital business ecosystems for SMEs*. Research in this area will aim at providing an open-source environment enabling small- and medium-sized organisations to co-operate in production of software services, components and applications that are suited to local/regional business needs across the enlarged European Union. The work covers the design, development and take-up of flexible and adaptable software applications which are interoperable with proprietary systems, to support the spontaneous composition, sharing, distribution, adaptation and evolution of business solutions and knowledge. Special emphasis will be laid on open-source, distributed, collaborative, self-adaptive and easy-to-use environments for small organisations.

   Instruments: STREPs, NoEs

2. *Extended products and services*. Research in this area will investigate what recent progress in ambient intelligence technologies (e.g., agent based systems, knowledge management, smart wireless tagging, and ubiquitous computing) can mean for new products, services and the business environment. The work can cover decentralised architectures of intelligent communicating objects or processes allowing new approaches to collaboration, planning, scheduling, material management, auctioning, tendering, invoicing, workflow management, knowledge management or other business processes. Underlying issues such as interoperability, flexible, secure and robust infrastructures, information and knowledge sharing, modelling and simulation, and organisational change should be given due consideration.

   Instruments: IPs, STREPs

3. *Horizontal actions*. This work will address the new legal challenges raised by the fostered networked and collaborative paradigms – especially in the areas of IPR/open source, autonomous software components and the extended products and services concept, which draw an increased public awareness – and the need for advanced tools for the measurement and assessment of the potential benefits of collaborative networks.

   Instruments: SSAs, CAs

Priority will be given to domain-specific RTD projects contemplating a time to market above 5 years. Complementarity and consistency with ongoing activities from IST Calls 1 and 2 will be given special attention. International co-operation with third countries will continue to be promoted, in particular with the U.S. (through the research opportunity jointly developed by the EU IST priority and the U.S.

Information Technology Research Programme), India (as a follow-up of EuroIndia 2004), China, and Latin America.

Instruments: see above

Indicative budget: IPs, NoEs: 55%; STREPs, CAs, SSAs: 45%

Call information: IST Call 5

### 2.5.9 Collaborative Working Environments

Objective: To develop next generation collaborative working environments, thereby increasing creativity and boosting innovation and productivity. These environments should provide collaboration services to make possible the development of worker-centric, flexible, scalable and adaptable tools and applications. This will enable seamless and natural collaboration amongst a diversity of agents (humans, machines, etc) within distributed, knowledge-rich and virtualized working environments. Professional virtual communities and nomadic personal access to knowledge should be supported.

Focus on:

Three layered tasks following a systems approach:

1. *Design and development of innovative concepts, methods and core services for distributed collaboration at work.* Core collaboration services will enhance available platforms to provide: synchronisation and persistence of distributed workspaces; discovery and allocation of group resources; group identification, traceability and security; management and interfacing between physical materials and digital representations; and environment awareness, with a special emphasis on mobility. Next generation collaborative working environments should deliver a high quality of experience to co-workers based on flexible management of services and should be customizable to different communities, making use of the bundling of different (mobile) devices.

   Instruments: IPs, CAs and STREPs.

2. *Research on tools for collaborative work in rich virtualised environments.* These tools will offer sophisticated services to ensure seamless, stable, dependable and scalable applications for collaborative work. Focus is on support of augmented group presence, visualisation, group management, sharing support, seamless interaction, service composition, and semantic modelling of complex groups of workers.

   Instruments: IPs, CAs and STREPs.

3. Development of innovative validating applications for collaborative work in content-rich, mobile and fixed collaborative environments. Applications are expected in "ICT rich" domains, such as collaborative design and engineering, in particular rapid prototyping and simulation, virtual manufacturing, media/content production, e-Professionals and knowledge and information workers in remote and rural settings. These applications will benefit from cross-domain fertilisation and, where appropriate, leverage on experience from collaborative games.

Instruments: IPs

Other tasks:

- To promote joint research activities with national programmes, to define future research agendas or to identify emerging topics and research groups world-wide.

  Instruments: SSAs, CAs

- *Collaboration with international research and standardisation activities*. Research may also build on international RTD activities, involving in particular the United States, Canada, Korea and Japan Activities should also be linked to international standardisation initiatives, including W3C and IETF when appropriate, with the potential to achieve internationally agreed reference architecture for collaborative work.

  Instruments: SSAs, CAs.

Work should, when appropriate, strengthen and complement research carried out under ESA, EUREKA and national initiatives. In particular, links to Eureka ITEA projects related to Nomadic and Cyber-Enterprise domain applications should be described to assess synergies and inter-dependencies in terms of timing and funding.

Actions targeting SMEs developing collaborative tools and application are encouraged in order to achieve better interoperability of complementary services and tools.

It is expected that work on innovative concepts, methods, core collaboration services, and tools for collaboration would crystallize around Integrated Projects which will also validate those results on testbeds and large demonstrators. These Integrated Projects are expected to create a critical mass and to follow a *system approach*. The use of the Experience and Application Research (EAR[20]) approach is encouraged for an early involvement of users and to create links to the structures, business processes and workplace practices of the organizations.

Coordination Actions are expected to promote and support the networking and coordination of research and innovation activities needed for European leadership in ICT-enabled Collaborative Working Environments.

Specific Targeted Research Projects are encouraged to explore emerging alternatives to pave the way for additional technological advances in the field.

Instruments: see above

Indicative budget: IPs: 75%; STREPs, CAs, SSAs: 25%.

Call information: IST Call 5.

### 2.5.10 Access to and preservation of cultural and scientific resources

Objectives

[20] See the ISTAG working group report "Involving users in the development of Ambient Intelligence" on http://www.cordis.lu/ist/istag

The overall aim is to develop systems and tools which will support the accessibility and use over time of digital cultural and scientific resources. This requires work to:

Support the emerging complexity of digital cultural and scientific objects and repositories, through enriched conceptual representations and access methods.

Explore how to preserve the availability of digital resources over time, through novel concepts, techniques and tools ..

Focus

1. Research into the conceptualisation and representation of digital cultural and scientific objects, of multiple forms and origin, to exploit the potential of these resources for developing new forms of interactive or creative experiences. This requires methods, systems and tools to support indexing, retrieving, aggregating and creatively exploiting primarily non-textual objects and their integration into sustainable digital library services.

   Work should apply leading-edge technologies (especially in knowledge technologies, VR, visualisation). Applications should clearly integrate heterogeneous resources, and address specific user communities and stakeholders

2. Research into methods and systems for guaranteeing the long-term preservation of digital objects. Work in this area is open to both short term experiment and longer term research. Research is needed to develop test-beds and systems that will support the availability and accessibility of multi-sourced and multi-formatted resources. Longer-term research is needed to address the preservation of complex, dynamic and very high volume digital objects, including those with high levels of interactivity.

Instruments: STREPs will be the main mechanism for the longer-term research on the access and use of cultural content. Partnerships will involve the cultural heritage research community, technology research and developers, including high-tech SMEs, and cultural institutions. In the digital preservation research, IPs are the preferred instrument for the test-beds of multi-sourced resources. The structuring and building of the research interests in digital preservation including a better understanding of digital longevity issues over extended timescales is likely to be best addressed through CAs.

Indicative budget: IPs: 40%; STREPs, CAs: 60%.

Call information: IST Call 5

### 2.5.11 eInclusion

Objectives

- To mainstream accessibility in consumers' goods and services, including public services through applied research and development of advance technologies. This will help ensure equal access, independent living and participation for all in the Information Society.

- To develop next generation assistive systems that empower persons with (in particular cognitive -) disabilities and aging citizens to play a full role in society, to increase their autonomy and to realize their potential.

Focus

Research and development actions focus on:

1. Experience and Application Research[21] leading to large scale demonstrators to mainstream accessibility in particular in the areas of smart environment, next generation mobiles, Digital TV and future related services. Work would benefit by using existing infrastructures of key industrial actors in the field and involving users in the RTD process. Demonstration scenarios could focus on living environments for older persons, educational environment for children or work environments for people with disabilities.

   Instruments: IPs

2. Development of innovative solutions for persons with *cognitive disabilities*. Basic Research would be appropriate in this area to address some of the fundamental challenges posed by the demographic changes. Applications could aim for example to support the ageing population, or to provide support to children in developing their potential and learning new skills.

   Instruments: STREPs

Furthermore in order to contribute to ERA in the field of eInclusion, support and co-ordination actions focus on:

- Federating the fragmented assistive technology industry (mainly SMEs), and achieving an understanding of market requirements and cost benefit issues.

  Instruments: CAs

- In the area of design-for-all and assistive technology, research aiming at structuring the co-operation among centres for accessibility resource and support.

  Instruments: CAs

- Development and constitution of adequate technology platforms to meet the challenges posed by the ageing population. The work should be addressed by the relevant mainstream industries in synergy with the assistive technology industry and with participation of user communities.

  Instruments: SSAs

Activities in this area should adequately reflect the multi-disciplinarity of the field and make use of Design-for-all methods and tools. In all areas user involvement should be maximized paying attention to capacity building. The work described above, could either aim at a mix of basic long-term research, for example in the area of cognition, coupled with more short-term applied research with high exploitation potential, for example in the area of smart homes for older persons, or a combination of both. Activities should address the socio-economic, regulatory and policy

[21] See the ISTAG working group report "Involving users in the development of Ambient Intelligence" on http://www.cordis.lu/ist/istag

dimensions, to ensure availability of information society services for all at a reasonable cost.

Instruments: See above.

Indicative budget: IPs: 50%; STREPs, CAs, SSAs: 50%

Call information: IST Call 5

### 2.5.12 ICT for Environmental Risk Management

Objectives

This SO covers ICT aspects of services for GMES (Global Monitoring for the Environment and Security)[22] end-users and those aspects that are relevant to the monitoring, the preparation and the response phases of environmental risk/crisis management co-ordinated at European level.

Work undertaken under this SO does *not* include work on security applications (military or homeland security) or on modelling of natural hazards and data/information security.

Focus

The work will focus on risks leading to emergencies and/or environmental crises from natural hazards or industrial accidents.

1. In-situ (environmental) monitoring systems, in particular based on *self-organising, self-healing, ad-hoc networking* of sensors using state-of-the-art and/or emerging technology. Terrestrial and aircraft-based sensor networks (possibly complemented by work on Medium and High Altitude Platforms) for both (a) sensor platforms in general and (b) communications backhaul during crisis/emergency operations. GMES related work should focus on the provision of ICT-based services (GMES initial services) to the public and specialist services, based on clear end-user requirements.

   Instruments: IPs, STREPs

2. Crisis management (including emergency telecommunications and alert systems) making use of standard open architectures to support different types of risk management and building on existing initiatives. The needs of local personnel in the front line including training, as well as the strong multi-national dimension to enhance international response to large crises must be considered. Emergency telecoms will focus on further development of UWB systems for communication and localisation, including spectrum allocation and interference issues.

   Instruments: IPs, STREPs

3. Preparation of the deployment of GMES service infrastructure, and extension of risk and crisis management architectures, throughout the enlarged Europe, with special attention given to public safety communications.

   Instruments: CAs, SSAs

[22] http://www.gmes.info/

Research and development impacting on systems architecture standards and large-scale demonstrations such as GMES initial services are better implemented through IPs

Instruments: see above

Indicative budget: IPs: 60%; STREPs, CAs, SSAs: 40%

Call information: IST Call 5

## 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/fet/home.htm.

### 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).

In 2005, the scheme is open for STREP proposals by invitation only. Indeed, successful *short* STREP proposals submitted by the deadline of 31/12/04 under the call published on 17/12/02 who have not had the opportunity to submit a *full* STREP proposal by 31/12/04 will be invited to submit a *full* STREP proposal by the closure date of the call. The FET Open scheme will not be continued thereafter.

*Proposal submission and evaluation modalities*

Proposals for STREPs under FET Open are submitted in two stages: first a *short* proposal with a technical description of maximum 5 pages is submitted describing the key objectives and motivation for the proposed work. If the short proposal is successful, the proposers are invited to submit a *full* proposal by the closure date. 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

**FET 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/or STREPs as well as, 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 co-ordination 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, test beds etc. NoEs in the proactive initiatives will help elaborate and maintain a research roadmap for the area, in co-operation 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.

*International co-operation*

Proactive initiatives will build on international activities in basic and long term research in the relevant fields involving in particular the United States, Canada, Japan, Australia, China, S. Korea, India and Russia. They may also evolve to include other countries where there is complementarity of basic research interests and balanced benefits.

*Proactive initiatives to be called in 2005 – 06*

**FET Proactive Initiatives – Call 4**

| |
|---|
| 2.3.4 (viii) Advanced Computing Architectures |
| 2.3.4 (ix)Presence and Interaction in Mixed Reality Environments |
| 2.3.4 (x) Situated and Autonomic Communications |

## 2.3.4.(viii) Advanced Computing Architectures

Objectives

New computing architectural developments together with a new generation of compiling and operating systems are required for general purpose, programmable or reconfigurable systems addressing projected computing, storage, and communication needs of future applications in a 10+ years timeframe.

The *aim* of this programme is to develop novel advanced computing architectures, methods, tools and intellectual property that will:

- Substantially increase the performance of computing engines (processors and scalable systems made of multiple processors) well beyond projected performance of Moore's law (e.g., by two orders of magnitude), while reducing their power consumption.
- Provide leading compiler and operating system technology that will deliver high performance and efficient code optimisation, just-in-time compilation, and that will be portable across a wide range of systems.
- Constitute building blocks to be combined with each other and programmed easily and efficiently, even in heterogeneous processing platforms.

Focus

The following long-term research themes should be addressed:

- Processor architectures: low power, low-cost or high-performance processors, application-oriented processors (embedded computing, multimedia, networking, wireless, etc), including programmability and reconfigurability.
- Scalable multiple processor system architectures: cluster, SMP, chip-MP, tiled architectures, storage and interconnection architectures, high-performance embedded computing architectures.
- Retargetable optimisation, compilation for multi-core systems, automated compiler generation, architecture and operating system cross-optimisation, architecture-aware compilation, and optimisation of high-level language for embedded systems.
- System architecture tools for heterogeneous parallel design of highly complex computing architectures.
- Highly flexible operating systems that will provide a unified programming model for computing systems at different scales, as well as across different heterogeneous subsystems.

The proposed programme is expected to mobilise key research stakeholders. Participation from industry is required in order to address research directions that

have the potential of providing the required application breakthroughs (ranging from tiny embedded or wireless systems to large internetworked server-based systems) in a 10+ years horizon.

Instruments

The programme will be implemented through Integrated Projects (IPs) and a Network of Excellence (NoEs). IPs should have a clear set of measurable and ambitious targets and be motivated by projected industrial requirements covering a broad range of application scenarios. They should define their target systems and application-linked benchmarks to assess their performances. They should be focused around a coherent set of research themes among those listed above. The NoE would aim at grouping the best competencies available in Europe and could include in its joint research activities, support to the IPs for the development of agreed sets of performance testing and evaluation benchmarks.

Indicative budget: IPs, NoEs: 100%

Call Information: IST Call 4

### 2.3.4 (ix) Presence and Interaction in Mixed Reality Environments

Objective

The *objective* of the initiative is to create novel systems that match human cognitive and affective capacities and re-create the different experiences of presence and interaction in mixed reality environments. Research should focus on the following:

- Understanding different forms of presence, encompassing aspects of perception, cognition, interaction, emotions and affect. Techniques for measuring presence need to be developed taking into account insights from physio- neuro- cognitive and social sciences. The ethical aspects and the investigation of possible long-term consequences of using presence technologies need to be investigated.
- Designing and developing essential building blocks that capture the salient aspects of presence and interaction based on the understanding of human presence. These blocks should exploit relevant cutting edge software and hardware technologies (e.g. real time display and high fidelity rendering, 3D representation and compression, real-time tracking and capture, light control, haptic interfaces, 3D audio, wearable and sensor technology, etc.).
- Developing novel systems, able to generate or support different levels and types of presence and interaction in a multitude of situations. The research focus should be on open system architectures for integrating the above building blocks, with open APIs and source authoring tools for programming presence and for designing novel interaction paradigms.

Focus

All the above research issues should be combined together to support the realisation of a number of challenging scenarios, as for example:

- *Persistent hybrid communities*: constructing large scale virtual/mixed communities that respond in real-time and exhibit effects of memory and

behavioural persistence while evolving according to their intrinsic social dynamics.

- *Presence for conflict resolution*, allowing people to immersively experience situations of conflict or co-operation. By fostering communication and mutual understanding between different parties these presence environments should ultimately be *empathy-enducing*.
- *Mobile mixed reality presence environments*: moving freely and interacting in real/augmented populated surroundings through natural and/or augmented mediated tools.
- *Personalised learning and training* environments, stimulating a combination of imaginary and physical actions and emotions through appropriate sets of embedded non-verbal and multisensory cues for skill acquisition and learning.

Instruments

This initiative will be implemented exclusively through Integrated Projects that are highly interdisciplinary. It is expected to attract contributions from neuroscience, computer science and engineering, design, cognitive developmental psychology, human computer interaction, AI, media effects and interaction design, etc., as appropriate.

Indicative budget: IPs: 100 %

Call information: IST Call 4

### 2.3.4.(x) Situated and Autonomic Communications

Objectives

The goal of this initiative is to promote research in the area of new paradigms for communication/networking systems that can be characterised as situated (i.e. reacting locally on environment and context changes), autonomously controlled, self-organising, radically distributed, technology independent and scale-free. Consequently, communication/networking should become task- and knowledge-driven and fully scalable.

The main objectives are:

To define a self-organising communication network concept and technology that can be situated in multiple and dynamic contexts, ranging from sensor networks to virtual networks of humans. This concept will require the definition of decentralised optimisation strategies and might benefit from cross-layer or non-layered approaches.

To study how strategic needs of social or commercial nature impact on future communication paradigms, and how networks and applications can support society and economy, enabling a service oriented, requirement and trust driven development of communication networks. This should allow developing networking technologies (hardware/software combinations) that can evolve and create maximal synergy with the other types of non-technological networks that constitute their context.

Focus

Key requirements to be ensured by future communications paradigms are:

– security and trustworthiness of this distributed communication system by embedding security and trust rules in network functionality at modelling and design phases;

– overall stability and resilience of the network as it evolves within its design envelope;

– positive interactions of new communication paradigms on human and social aspects, in relation to ambient intelligence and future sensorized societies.

Instruments

This initiative will be implemented through integrated projects (IPs) and networks of excellence (NoEs). IPs are expected to address both objectives in an integrated way. NoEs in this area are expected to promote and federate European basic research in networking. They should aim at a new "network information theory" characterising the limits of new context-related, autonomic and self-organising communication paradigms, in relation to trust requirements and exploiting knowledge from other disciplines such as game theory, random graphs, chaos control, etc.

Indicative budget: IPs, NoEs: 100%

Call information: IST Call 4

### 2.3.4.(xi) Simulating Emergent Properties in Complex Systems

Objectives

The objective is to develop scalable computational modelling and inference tools and scalable simulation techniques for complex systems with a high number of highly interconnected elements and in particular to:

- Infer system models – the dynamic laws governing the components and their interactions - from high volume, possible incomplete or uncertain data.
- Develop models of emergence of aggregate behaviour that will permit the formulation of design strategies for systems with a specified aggregate behaviour.

Focus

One or more of the following research issues encountered across many applications in science and engineering should be addressed:

- *Multi-scale simulations*: Develop methods for the effective computation of systems acting/described on different levels of aggregation. Underlying issues include:
    - Model embedding: How to link simulations on different scales?
    - Formal languages to model systems in a modular and compositional way.
    - Hierarchical structures from aggregation: emergence of higher level behaviour.
- *Simulation in presence of uncertainty*: Develop computational tools that take into account the fact that the models themselves as well as the parameters that they use may be uncertain.

- *Reconstruction of system models from incomplete sets of data.* Validate data by combining them with simulation results and complementary data.
- *Integrated modelling and simulation environments*: Matching large amounts of data against models - to tune and validate them – imposes integration of simulation modules and high-throughput sources of experimental data.

Projects should lead to breakthroughs in one of the following application areas: critical information infrastructures, bioinformatics, or systems engineering.

Instruments

The initiative will be implemented through 'Specific Targeted Research Projects' (STREPs) comprising multidisciplinary teams with the necessary expertise in modelling and in application areas.

Indicative budget: STREPs: 100%

Call information: IST Call 5

*Planning of future proactive initiatives*

The following tentative areas are expected to build on successful work launched in the 6th Framework Programme. The list is not exclusive nor is it certain that all the areas listed below will be called:

- Atom-scale technologies
- Creative ambient systems
- Towards self-aware intelligent machines.

# 3. Implementation Plan

## 3.1 Calls for Proposals

The IST Work Programme was adopted on 9 December 2002[23] and four calls for proposals were published in 2002:

- Call 1, closed on 24.04.2003
- Call 2, closed on 15.10.2003
- First Joint Call between thematic priorities 2 and 3, closed on 16.09.2003

[23] C(2002)4789, see Information Society Technologies on htt, p://www.cordis.lu/fp6/sp1_wp.htm.

- Continuous submission call "Future and Emerging Technologies (FET) - Open domain", closing on 31.12.2004

A first update was adopted on June 10, 2004[24] and three calls for proposals were published in 2004:

- IST Call 3, closed on 22.09.2004
- A second Joint Call between thematic priorities 2 and 3, closed on 14.10.2004
- The call for Future and Emerging Technologies (FET) - Proactive initiatives, closed on 22.09.2004

See http://www.cordis.lu/ist/projects/projects.htm for information about on-going FP6 projects resulting from these calls.

**This second update sets out the detailed priorities of another three calls for proposals:**

- IST Call 4, closing on 23 March 2005
- IST Call 5, closing on 21 September 2005
- Continuous submission call "Future and Emerging Technologies (FET) - Open domain", with a final closure date of 10 May 2005 (only *full* STREP proposals following successful *short* proposals submitted before 31 December 2004).

### 3.2 Indicative budget allocation per Strategic Objective

For each fixed deadline call, 90% of the budget is pre-allocated on the Strategic Objectives to provide an indication of the effort that will be devoted to each of these objectives. The remaining 10% are not pre-allocated to a specific objective. They will be allocated after the call based on the quality of proposals.

Only proposals addressing the Strategic Objectives open in a specific call will be supported.

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

[24] See Information Society Technologies on http://www.cordis.lu/fp6/sp1_wp.htm.

| Strategic Objectives 2005-06 | Instruments | Ratio New[25]/ Traditional[26] Instruments (%) | Indicative budget |
|---|---|---|---|
| **Call 4** | | | |
| 2.4.1 Nanoelectronics | IPs, STREPs, CAs, SSAs | 80/20 | |
| 2.4.2 Technologies and devices for micro/nano-scale integration | IPs, STREPs, CAs, SSAs | 60/40 | |
| 2.4.3 Towards a global dependability and security framework | IPs, NoEs, STREPs, CAs, SSAs | 70/30 | |
| 2.4.4 Broadband for All | IPs, NoEs, STREPs, SSAs | 65/35 | |
| 2.4.5 Mobile and Wireless Systems and Platforms Beyond 3G | IPs, NoEs, STREPs, SSAs | 65/35 | |
| 2.4.6 Network Audio Visual Systems and Home Platforms | IPs, NoEs, STREPs, CAs, SSAs | 80/20 | |
| 2.4.7 Semantic-based Knowledge Systems | IPs, NoEs, STREPs, SSAs | 80/20 | |
| 2.4.8 Cognitive Systems | IPs, NoEs, STREPs, CAs | 65/35 | |
| 2.4.9 ICT Research for Innovative Government | IPs, NoEs, STREPs, SSAs | 50/50 | |
| 2.4.10 Technology-enhanced Learning | IPs, NoEs, STREPs | 75/25 | |
| 2.4.11 Integrated biomedical information for better health | IPs, STREPs, SSAs, CAs | 60/40 | |
| 2.4.12 eSafety – Co-operative Systems for Road Transport | IPs, NoEs, STREPs, SSAs | 60/40 | |
| 2.4.13 Strengthening the Integration of the ICT research effort in an Enlarged Europe | STREPs | 0/100 | |
| **FET Proactive Initiatives** | | | |
| 2.3.4 (viii) Advanced Computing Architectures | IPs, NoEs | 100/0 | |

[25] New Instruments: IPs and NoEs.

[26] Traditional instruments: STREPs, SSAs and CAs

| | | | |
|---|---|---|---|
| 2.3.4 (ix)Presence and Interaction in Mixed Reality Environments | IPs | 100/0 | |
| 2.3.4 (x) Situated and Autonomic Communications | IPs, NoEs | 100/0 | |
| **Call 5** | **Instruments** | | |
| 2.5.1 Photonic components | IPs, STREPs, CAs, SSAs | 65/35 | |
| 2.5.2 Micro/nano based sub-systems | IPs, STREPs, CAs, SSAs | 70/30 | |
| 2.5.3 Embedded Systems | IPs, STREPs, SSAs, CAs | 60/40 | |
| 2.5.4 Advanced Grid Technologies, Systems and Services | IPs, STREPs, SSAs, CAs | 70/30 | |
| 2.5.5 Open Platforms for software and services | IPs, NoEs, STREPs, SSAs, CAs | 70/30 | |
| 2.5.6 Research networking testbeds | IPs, NoEs, STREPs, SSAs, CAs | 65/35 | |
| 2.5.7 Multimodal Interfaces | IPs, STREPs | 60/40 | |
| 2.5.8 ICT for Networked Businesses | IPs, NoEs, STREPs, Cas, SSAs | 55/45 | |
| 2.5.9 Collaborative Working Environments | IPs, STREPs, SSAs, CAs | 75/25 | |
| 2.5.10 Access to and preservation of cultural and scientific resources | IPs, STREPs, CAs | 40/60 | |
| 2.5.11 eInclusion | IPs, STREPs, CAs, SSAs | 50/50 | |
| 2.5.12 ICT for Environmental Risk Management | IPs, STREPs, CAs, SSAs | 60/40 | |
| FET Proactive Initiative | | | |
| 2.3.4 (xi) Simulating Emergent Properties in Complex Systems | STREPs | 0/100 | |

In addition to calls for proposals, calls for tenders are also expected to be published 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. Furthermore, the IST priority will support independent experts assisting in IST proposals evaluations and project reviews for an amount estimated at 15 M Euro per year in 2005 and 2006.

# 4. 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.

## 4.1 Integrated Projects

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

**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[27].
- the opportunity for a real involvement of SMEs has been adequately addressed.

[27] This does not apply for FET proposals

### 4.2 Nanoelectronics and Technologies and devices for micro/nano-scale integration

For ***"assessment actions"*** under **Nanoelectronics**, to be addressed by Integrated Projects, the criterion on "S&T excellence" will be as follows:

***S&T excellence***

The extent to which:

- the project has clearly defined objectives.
- The objectives represent **innovation in manufacturing processes**.
- the proposed S&T approach is likely to enable the project to achieve its objectives in research and innovation.

*For* ***'Stimulation actions'*** under **Nanoelectronics** and **Devices for Micro/Nano Scale Integration** to be addressed by Integrated Projects, the criterion for "S&T excellence" will be as follows:

***S&T excellence***

The extent to which:

- the project has clearly defined objectives.
- The objectives represent **increase of knowledge and skills**
- the proposed S&T approach is likely to enable the project to achieve its objectives in research and innovation.

*For* ***'Use actions'*** under **Nanoelectronics** and **Devices for Micro/Nano Scale Integration** to be addressed by Integrated Projects, the criterion for "S&T excellence" will be as follows:

***S&T excellence***

The extent to which:

- the project has clearly defined objectives.
- The objectives represent **product innovation by using the technology**
- the proposed S&T approach is likely to enable the project to achieve its objectives in research and innovation.

### 4.3 FET Open

**The selection criteria and weights and thresholds for the FET open scheme are different from the basic set.**

***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.

– the applicant(s) represent(s) a high level of competence in terms of professional qualifications and/or experience.

***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 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**.

## 5. Call Information

## IST Call 4

**1) Specific programme** : Integrating and Strengthening the European Research Area

**2) Thematic priority/domain**: Information Society Technologies (IST)

**3) Call title**: IST Call 4

**4) Call identifier**[28]: FP6-2004-IST-4

**5) Date of publication**[29]: November 2004

**6) Closure date(s)**[30]: 23 March at 17.00 (Brussels local time)

**7) Total indicative budget**:

**8) Areas and instruments**

Proposals are invited to address the following objectives:

| **Strategic Objectives 2005-06** | **Instruments** | **Ratio New[31]/ Traditional[32] Instruments (%)** | **Indicative Budget** |
|---|---|---|---|
| 2.4.1 Nanoelectronics | IPs, STREPs, CAs, SSAs | 80/20 | |
| 2.4.2 Technologies and devices for micro/nano-scale integration | IPs, STREPs, CAs, SSAs | 60/40 | |
| 2.4.3 Towards a global dependability and security framework | IPs, NoEs, STREPs, CAs, SSAs | 70/30 | |

[28] The call identifier shall be given in the published version of this call.
[29] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[30] Where the envisaged date of publication is anticipated or delayed (see footnote above), closure date(s) will be adjusted accordingly in the published call for proposals.
[31] New Instruments: IPs and NoEs.

[32] Traditional instruments: STREPs, SSAs and CAs

| | | | |
|---|---|---|---|
| 2.4.4 Broadband for All | IPs, NoEs, STREPs, SSAs | 65/35 | |
| 2.4.5 Mobile and Wireless Systems and Platforms Beyond 3G | IPs, NoEs, STREPs, SSAs | 65/35 | |
| 2.4.6 Network Audio Visual Systems and Home Platforms | IPs, NoEs, STREPs, CAs, SSAs | 80/20 | |
| 2.4.7 Semantic-based Knowledge Systems | IPs, NoEs, STREPs, SSAs | 80/20 | |
| 2.4.8 Cognitive Systems | IPs, NoEs, STREPs, CAs | 65/35 | |
| 2.4.9 ICT Research for Innovative Government | IPs, NoEs, STREPs, SSAs | 50/50 | |
| 2.4.10 Technology-enhanced Learning | IPs, NoEs, STREPs | 75/25 | |
| 2.4.11 Integrated biomedical information for better health | IPs, STREPs, SSAs, CAs | 60/40 | |
| 2.4.12 eSafety – Co-operative Systems for Road Transport | IPs, NoEs, STREPs, SSAs | 60/40 | |
| 2.4.13 Strengthening the Integration of the ICT research effort in an Enlarged Europe | STREPs | 0/100 | |
| **FET Proactive Initiatives** | | | |
| 2.3.4 (viii) Advanced Computing Architectures | IPs, NoEs | 100/0 | |
| 2.3.4 (ix)Presence and Interaction in Mixed Reality Environments | IPs | 100/0 | |
| 2.3.4 (x) Situated and Autonomic Communications | IPs, NoEs | 100/0 | |

## 9) Minimum number of participants[33]

| **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 |

[33] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC: Associated candidate countries. Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

**10) Restriction to participation**

None

**11) Consortium agreement**

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

**12) Evaluation procedure**:

The evaluation shall follow a one-stage procedure. Proposals will not be evaluated anonymously.

**13) Evaluation criteria**

See the section on evaluation criteria in Section 4 of this Workprogramme.

**14) Indicative evaluation and selection delays**

Evaluation results are estimated to be available within two months after the closure date.

## IST Call 5

**1) Specific programme**: Integrating and Strengthening the European Research Area

**2) Thematic priority/domain**: Information Society Technologies (IST)

**3) Call title**: IST Call 5

**4) Call identifier**[34]: FP6-2004-IST-5

**5) Date of publication**[35]: May 2005

**6) Closure date(s)**[36]: 21 September 2005 at 17.00 (Brussels local time)

**7) Total indicative budget**:

**8) Areas and instruments**

Proposals are invited to address the following objectives:

| Strategic Objectives 2005-06 | Instruments | Ratio New[37]/ Traditional[38] Instruments (%) | Indicative Budget |
|---|---|---|---|

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

[35] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

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

| | | | |
|---|---|---|---|
| 2.5.1 Photonic components | IPs, STREPs, CAs, SSAs | 65/35 | |
| 2.5.2 Micro/nano based sub-systems | IPs, STREPs, CAs, SSAs | 70/30 | |
| 2.5.3 Embedded Systems | IPs, STREPs, SSAs, CAs | 60/40 | |
| 2.5.4 Advanced Grid Technologies, Systems and Services | IPs, STREPs, SSAs, CAs | 70/30 | |
| 2.5.5 Open Platforms for software and services | IPs, NoEs, STREPs, SSAs, CAs | 70/30 | |
| 2.5.6 Research networking testbeds | IPs, NoEs, STREPs, SSAs, CAs | 65/35 | |
| 2.5.7 Multimodal Interfaces | IPs, STREPs | 60/40 | |
| 2.5.8 ICT for Networked Businesses | IPs, NoEs, STREPs, Cas, SSAs | 55/45 | |
| 2.5.9 Collaborative Working Environments | IPs, STREPs, SSAs, CAs | 75/25 | |
| 2.5.10 Access to and preservation of cultural and scientific resources | IPs, STREPs, CAs | 40/60 | |
| 2.5.11 eInclusion | IPs, STREPs, CAs, SSAs | 50/50 | |
| 2.5.12 ICT for Environmental Risk Management | IPs, STREPs, CAs, SSAs | 60/40 | |
| FET Proactive Initiative | | | |
| 2.3.4 (xi) Simulating Emergent Properties in Complex Systems | STREPs | 0/100 | |

## 9) Minimum number of participants[39]

| **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 |

[37] New Instruments: IPs and NoEs.

[38] Traditional instruments: STREPs, SSAs and CAs

[39] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC: Associated candidate countries. Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

**10) Restriction to participation**

None.

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

**12) Evaluation procedure**:

The evaluation shall follow a one-stage procedure. Proposals will not be evaluated anonymously.

**13) Evaluation criteria**

See the section on evaluation criteria in Section 4 of this Workprogramme.

**14) Indicative evaluation and selection delays**

Evaluation results are estimated to be available within two months after the closure date.

## FET Open

**1) Specific programme**: Integrating and Strengthening the European Research Area

**2) Thematic priority/domain**: Information Society Technologies (IST)

**3) Call title**: Future and Emerging Technologies – Open Domain (Continuous Submission)

**4) Call identifier**[40]: FP6-2004-FETO

**5) Date of publication**[41]: November 2004

**6) Closure date(s)**[42]: 10 May 2005 at 17.00 (Brussels local time)

**7) Total indicative budget**: (**to cover full proposals submitted by the cut-off/closure dates of 31 December 2004 and 10 May 2005)**.

**8) Areas and instruments**

The domain is open for actions using the following instruments:

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[40] The call identifier shall be given in the published version of this call.
[41] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[42] Where the envisaged date of publication is anticipated or delayed (see footnote above), closure date(s) will be adjusted accordingly in the published call for proposals.

| Objective | Instrument(s) |
|---|---|
| FET Open | STREPs |

**9) Minimum number of participants[43]**

| Objective | Minimum number |
|---|---|
| STREPs | 3 independent legal entities from 3 different MS or AS, with at least 2 MS or ACC |

**10) Restriction to participationNone**

**11) Consortium agreement**
It is not mandatory that participants in RTD actions resulting from this call conclude a consortium agreement although such agreements are strongly recommended.

**12) Evaluation procedure** :

STREPs may be submitted by invitation only. Only those successfull *short* STREP proposals submitted by the deadline of 31/12/04 under the call published on 17/12/02 who have not had the opportunity to submit a *full* STREP proposal by 31/12/04 will be invited to submit a *full* STREP proposal by the closure date of 10th May 2005.

**13) Evaluation criteria**

See the criteria for FET Open in the section on evaluation criteria in paragraph 4.2 of this Work Programme and the weights and thresholds below.

**14) Indicative evaluation and selection delays**

Evaluation results: 2 months from the closure date.

[43] MS = Member States of the EU; AS (incl. ACC) = Associated States; ACC: Associated candidate countries. Any legal entity established in a Member State or Associated State and which is made up of the requested number of participant may be the sole participant in an indirect action.

## 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 development 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. |
| 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. |
| SiP | System in Package |
| 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 |

# ANNEXES

***Annex 1:*** General Introduction to the Workprogramme of the Specific Programme "Integrating and strengthening the European Research Area"

***Annex A***: Overview of Calls for Proposals foreseen in this Work Programme (see relevant work programme part for details)

***Annex B:*** Common evaluation criteria for evaluating proposals

***Annex C***: List of Groups of target countries for specific measures in support of International Co-operation