Lecture 3: IST Activities

Anywhere anytime natural access to IST services for all

Strategic Objectives in IST Calls

Strategic Objectives addressed in Call 1	
1.1 Pushing the limits of CMOS, preparing for post-CMOS 1.2 Micro- and nano-systems	*Technology components*
1.3 Broadband for all 1.4 Mobile and wireless systems beyond 3G 1.5 Towards a global dependability and security framework 1.6 Multimodal interfaces 1.7 Semantic-based knowledge systems 1.8 Networked audiovizuals and home platforms 1.9 Networked businesses and governments	*Integrated systems*
1.10 *e*Safety of road and air transport 1.11 *e*Health 1.12 Technology-enhanced learning and access to cultural heritage	*Sectorial applications*

Strategic Objectives covered in Call 2	
2.1 Advanced displays 2.2 Optical, opto-electronic, & photonic functional components 2.3 Open development platforms for sofware and services	*Technology components*
2.4 Cognitive systems 2.5 Embedded systems 2.6 Application services for the mobile user and worker 2.7 Cross-media content for leisure and entertainment 2.8 GRID-based systems for solving complex problems	*Integrated systems*
2.9 Improving risk management 2.10 *e*Inclusion	*Sectorial applications*

I. Applied IST research addressing major societal and economic challenges

1.5 Towards a global dependability and security framework

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

1.9 Networked businesses and governments

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

1.10 *e*Safety for road and air transport

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

1.11 *e*Health

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

1.12 Technology-enhanced learning and access to cultural heritage

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

2.6 Applications and services for the mobile user and worker

To ensure the availability of innovative applications and services for the mobile user and worker and to support the use and development of new work methods and collaborative business platforms. These should be based on interoperable mobile, wireless technologies and the convergence of fixed and mobile communication infrastructures. Such applications and services will enable new business models, new ways of working, improved customer relations and government services including voting. The target applications and services will be capable of being seamlessly accessed and provided anywhere, anytime and in any context.

2.7 Cross-media content for leisure and entertainment

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

2.8 GRID-based systems for solving complex problems

To expand the potential of the GRID approach to solving complex problems which can not be solved with current technologies in application fields such as, but not limited to, industrial

design, engineering and manufacturing, health, genomics and drug design, environment, critical infrastructures, energy, business and finance, and new media. To overcome present architectural and design limitations hampering the use and wider deployment of computing and knowledge GRIDs and to enrich its capabilities by including new functionalities required for complex problem solving. This should help the larger uptake of GRID type architectures and extend the concept from computation Grids to knowledge GRIDs, eventually leading to a "semantic GRID".

2.9 Improving risk management

To develop open platforms, integrated systems and components for improved risk management, improved civil security applications (including threats from anti-personnel landmines) and environmental management. To foster the emergence of a European info-structure and service platforms which will foster the use of interoperable components and sub-systems.

2.10 eInclusion

To develop intelligent systems that empower persons with disabilities and ageing citizens to play a full role in society and to increase their autonomy. eInclusion is a core building block in the establishment of the Information Society for all in Europe. Research activities will also be conducted in two others priorities: 'Citizens and Governance in a Knowledge Society' and 'Support to EU policies'.

3.1 Products and services engineering 2010

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

II. Communication, computing and software technologies

1.3 Broadband for all

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

1.4 Mobile and wireless systems beyond 3G

To realise the vision of "Optimally Connected Anywhere, Anytime". Early preparatory work has characterized Systems beyond 3G as an horizontal communication model, where different terrestrial access levels and technologies are combined to complement each other in an optimum way for different service requirements and radio environments. They may include the personal level (Personal/Body Area/Ad Hoc Network) the local/home level (W-LAN, UWB) the cellular level (GPRS, UMTS) the wider area level (DVB-T, BWA).The resulting access landscape is complemented by a satellite overlay network, providing notably a global multicast layer (*e.g.*, S-DMB). Reconfigurability is a key enabler to support such an heterogeneous and generalised wireless access.

1.8 Networked audiovisual systems and home platforms

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

2.3 Open development platforms for software and services

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

2.5 Embedded systems

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

III. Components and microsystems

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

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

1.2 Micro- and nano-systems

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

2.1 Advanced displays

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

2.2 Optical, opto-electronic, and photonic functional components

To develop advanced materials, micro- and nano-scale photonic structures and devices, solid-state sources and to realise optoelectronic integrated circuits (OEIC). In the last 20 years, optics and photonics have become increasingly pervasive in a wide range of industrial applications. It has now become the heart of a new industry, building on microelectronics with which it will be increasingly linked. Projects are expected to address research challenges for 2010 and beyond in one or more of the following application contexts: “telecommunication and infotainment” (components for “low-cost high-bandwidth” and “Terabyte storage”), “health care and life science” (minimally invasive photonic diagnostics and therapies, biophotonic devices), and “Environment and Security” (photonic sensors and imagers).

IV. Knowledge and interface technologies

1.6 Multimodal interfaces

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

1.7 Semantic-based knowledge systems

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

2.4 Cognitive systems

To construct physically instantiated or embodied systems that can perceive, understand (the semantics of information conveyed through their perceptual input) and interact with their environment, and evolve in order to achieve human-like performance in activities requiring context-(situation and task) specific knowledge.

Future and Emerging Technologies (FET)

FET complements the other objectives of IST with research from a more visionary and exploratory perspective. Its 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'.

http://www.cordis.lu/ist/fethome.htm

FET Proactive Initiatives

What are Proactive Initiatives?

FET proactive initiatives aim at focusing resources on visionary and challenging long-term goals that are timely and have strong potential for future impact. These goals provide a common strategic perspective and a focal point around which a critical mass of research can be assembled and synergies developed.

Proactive initiatives are launched through calls for proposals. The total budget per initiative may be in the range of 15 to 30 million Euro within FP6, although the total budget for proactive initiatives that span more than one framework programme may be even larger.

Several on-going proactive initiatives were started in FP5; some of these are expected to continue, possibly in a different form, in FP6. Depending on budget available, a number of new proactive initiatives will be launched.

Implementation in FP6

While in FP5 proactive initiatives were implemented as project clusters, the intention in FP6 is to implement them exclusively through the new instruments: Integrated Projects (IPs) and

Networks of Excellence (NoEs). Each proactive initiative will typically consist of one or more IPs and, in some cases, a NoE.

For each proactive initiative it is planned to have an **advisory board**, common to all projects, composed of high-level scientists, industrialists, or other stakeholders. The role of the advisory board will be to provide the Commission with a critical assessment of progress in the initiative, as well as provide advice on strategic, technical and managerial issues. The members of the board are selected by the Commission in consultation with the projects.

During the lifetime of a proactive initiative, new solutions and ideas could emerge that are more suitable for the achievement of the objectives of the initiative than the solutions originally envisaged. A **flexible management** approach and **flexible budget allocation** will therefore be necessary, with the ability to quickly re-orient projects if parts of them become obsolete or in order to seize new opportunities. In this context, self-assessment activities and a dynamically revised research roadmap (to be elaborated by the IPs and/or the NoE) will be important for the proactive initiative as a whole. It is planned to hold regular meetings, involving participants of the integrated projects and/or network of excellence within each proactive initiative.

Networks of Excellence in proactive initiatives

In the context of a proactive initiative, NoEs will have a specific role: they should bring together the broader community active in the research domain of the initiative in order to provide a framework of co-ordination for research, training and related activities, and allow the progressive and lasting integration of these activities around pre-specified themes.

The **Joint Programme of Activity** (JPA) of a NoE will be the vehicle for achieving the objectives of the network in terms of technology development, integration of resources, and community-building. The JPA component activities are described in the reference document mentioned above. Further examples of activities a NoE could have as part of a proactive initiative include the following.

Integrating activities:

- The NoE should help elaborate and maintain **a research roadmap** for the area of the proactive initiative, in co-operation with the IPs**.** The roadmap should reflect the breadth of approaches and the synergies expected between disciplines.
- **Setting up joint research platforms**: this may include common electronic data repositories, common access to crucial data, common computer networks and platforms or research facilities, *etc.*
- **European centres of interdisciplinary studies**: A NoE could provide start-up funds for setting up centres for interdisciplinary studies, in areas relevant to the initiative as a whole, that would host researchers from different disciplines and countries for limited periods of time. A NoE could also award grants to finance long-term visits of researchers in such centres.

Research activities:

- A NoE can support small **joint research projects** that should be selected on a **competitive basis**. Research in such projects should be relevant to the initiative as a whole - *e.g.*, filling gaps in the knowledge portfolio, may be more open-ended than research supported in the integrated project(s), or can test the feasibility or credibility of very new research ideas and concepts. Preference should be given to research crossing borders between disciplines.

In general, NoE research funding should increase the **mobility of researchers** both **across countries** and **across disciplines** involved in the initiative.

Spreading excellence:

- A NoE will 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. Means of dissemination include electronic repositories of articles, organisation of conferences, workshops, and meetings with potentially interested companies to stimulate industry interest.
- The NoE will develop an effective framework for **training** of researchers where topics and researchers can be selected on a competitive basis and through open procedures. The organisation of summer schools - possibly making the teaching material available on-line - could in some cases be helpful in promoting the integration of the different disciplines involved.
- Setting up joint **university curricula** spanning different countries and/or disciplines. This is particularly important for research that is highly interdisciplinary and therefore not represented in the standard university curricula.

Links with national activities

Proactive initiatives should pursue co-operation with related initiatives in the Member States and the countries associated to FP6, seeking to maximise synergies with national research programmes and the leverage effect of European funding. Each IP should clearly demonstrate how its work relates to projects taking place at national level; and NoEs should attempt to identify national or private funding that could be secured to further their aims and increase the strategic impact of the proactive initiative as a whole.

International Collaboration

IPs and/or NoEs of a proactive initiative may consider to collaborate with and integrate in their teams research entities from non-associated third countries. Such collaboration is strongly recommended when these entities are bringing into a project critical knowledge and expertise not available within the EU and the countries associated to FP6, and which are considered essential for realising the project objectives. In most cases, such entities participate in the project at their own cost.

However, when an entity is coming from Russia, New Independent States, Mediterranean Countries (including the western Balkans) and Developing Countries, its financing is possible within the limits of the budget available[1].

Participants from other third-countries than the above (*e.g.* USA, Japan, Canada, *etc.*) may also get financial support in duly justified cases (*e.g.* integrating an entity that would permit a project to save spending substantial resources for catching up the state-of-the-art in an essential sub-area of research).

IPs: http://europa.eu.int/comm/research/fp6/pdf/ip_provisions_111102final.pdf
NoEs: http://europa.eu.int/comm/research/fp6/pdf/noe_111102final.pdf

[1] For participants from these countries, IST earmarked a budget of about 90 million Euro.

Proactive Initiatives launched in FP6

Beyond Robotics

This initiative addresses the development of physical mobile artefacts that could serve as companions to humans, function as bionic parts augmenting human capabilities, or act as autonomous microrobot groups.

http://www.cordis.lu/ist/fetro.htm

Complex Systems

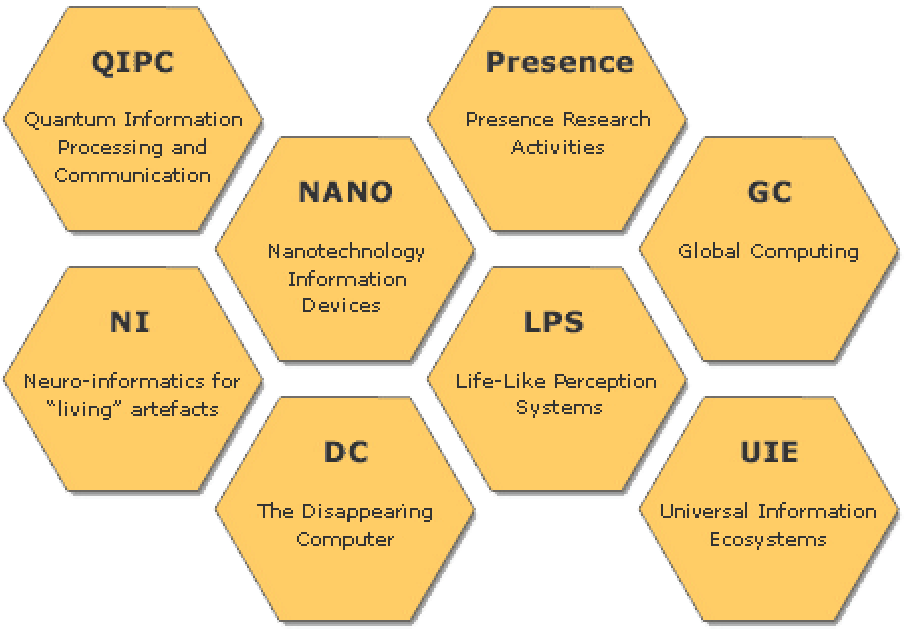
FET is committed to invest into 'complex system' research as it will allow to explore new design and control paradigms and lead to the **conceptual breakthroughs** necessary to conceive **the next generation of information technologies**. In order to be successful research has to be balanced between focus on IT core problems and the need to explore concepts in complex systems in a multitude of domains.

http://www.cordis.lu/ist/fetco.htm

DC - The Disappearing Computer

http://www.cordis.lu/ist/fetdc2.htm

Proactive Initiatives launched in FP5



Quantum Information Processing and Communication (QIPC)

explores the feasibility of novel computing and communication systems that exploit the properties of quantum mechanical operations. The initiative was launched in 1999 after an 18-month preparation phase, which involved the key European "fathers" of quantum computing and included a major public event where more than 100 scientists contributed to shaping its long-term objectives. QIPC has a high-risk nature and long-term outlook (except maybe for the area of quantum cryptography which is rather mature) and is strongly interdisciplinary, with participants coming from the areas of nuclear physics, computer science, semiconductor engineering, quantum optics, and mathematics. When launched, there was only one other similar (but much smaller) programme in Europe - in Germany. DARPA launched a similar programme

about two years later and is following it up with a major $120 million programme announced in 2002. QIPC currently comprises 12 projects with a total funding of around 22 M€, with a further 11 projects worth about 13 M€ in funding are due to start by the end of 2002.

http://www.quiprocone.org/

Nano-technology Information Devices (NID)

is a follow-up to the MEL ARI proactive initiative that was started in the 4th FP. MEL ARI focused in two areas: nano-scale integrated circuits and opto-electronic interconnects. The latter area was considered mature enough to be taken up by industrial actors, and as such was transferred to the Key Actions of the IST thematic priority. The focus on nano-scale ICs was maintained in NID, with increasing emphasis on non-semiconductor oriented approaches, such as molecular and DNA-based devices and molecular self-assembly, the overall aim being to develop new paradigms for information processing hardware that go beyond CMOS and top-down (lithographic) approaches to fabrication. These latter (non-semiconductor) approaches now amount to more than 40% of all work in the initiative. There is now an established community in Europe but when the initiative was started in 1996 it was highly interdisciplinary as semiconductor engineers, physicists, chemists, circuit designers and material scientists came together. Two calls were made during the 5th FP, one in 1999 and one in 2001; NID now includes 29 running projects and a network of excellence with an overall funding of about 43 M€. When MEL ARI started there were few national European initiatives (e.g. the 'Nanotechnologie' network in Germany, the Nanolink programme in the UK) and no major programme in the US. Nowadays the picture has radically changed, with most countries having substantial efforts and the US having launched its NNI programme in 2000. In the same year, the Commission investment in nano-technologies had dropped to 15% of the total European effort, with FET contributing more than 50% of that and being the only part of the framework that has had a targeted programme with budget specifically earmarked for this area. The new nanotechnology priority of the 6th Framework Programme is expected to result in at least doubling the Commission's investment in nanotechnology from 2003 onwards.

http://www.phantomsnet.com/

The Disappearing Computer (DC)

was launched in 2000 and to some extent derives from work in the previous i3 proactive initiative. The aim is to explore ambient intelligence environments from three points of view: the development of artefacts where IT "disappears" into everyday objects, the communication architectures for collections of artefacts, and the interaction of people with information in such environments, including the emergence of new functionality from interactions between artefacts. Participant groups come from a great variety of disciplines, such as design, computer architectures, electronic engineering, psychology, the arts etc. There has been no similar initiative in Europe till now. The initiative currently brings together groups from 16 projects with a funding of 22 M €. A followup call could be made in 2003 (6th FP) that would focus in bridging the gap between low-level architectural designs for "ambient" systems and real user interaction. Some results from current DC projects could feed directly into the IST priority in FP6 given that its focus on ambient intelligence. These results could, for example, relate to ad-hoc wireless communication networks that link together eyeglasses, pens, buttons and wallets to artefacts that can adapt in real-time to their immediate environment or to how people use them. Equally this could cover context-sensitive devices that can be attached to everyday objects and create "on the spot" networks.

http://www.i3net.org/ and http://www.disappearing-computer.net/

Neuroinformatics (NI)

was launched in 2000 as a joint initiative between FET and the Quality of Life programme at DG Research. It was focussed on "Artefacts that Live and Grow". This was the first FET attempt to explicitly tackle the interface between IT and the life sciences and break away from more traditional, albeit important, NI work on computational neuroscience or on complex databases. Its aim is to develop artefacts that adapt and evolve (that "live") on the basis of models and approaches used in living nature, including the brain. The content of the initiative sprang out from several consultation meetings co-organised by FET and the neurosciences part of DG Research. It started with 6 projects managed by FET and 2 projects managed by DG Research and now contains 13 projects overall for a total funding of 18.5 M€. There is no similar work in other parts of the IST thematic priority or any similar programmes at national level or in the US (although the latter supports a significant body of work on biomimetic approaches to complexity, aiming at developing self-reconfigurable autonomous robots for space exploration, agents for managing very large scale networks or assisting humans in decision-making, *etc.*).

http://www.cordis.lu/ist/fetni-nt.htm

The Global Computing (GC)

initiative was launched in 2001 to address the fundamental challenges posed by rapidly evolving systems composed of very large numbers of autonomous, interacting and mobile computational entities. In these global systems, activity is not centrally controlled, the configuration varies over time, and the information about the environment is incomplete. The ultimate goal is to provide a solid scientific foundation for understanding, analyzing and designing such systems so that they are flexible, dependable, secure, robust and efficient. Similar work to GC is not carried out elsewhere in the IST thematic priority although GRID or the Disappearing Computer also address distributed computing but in different contexts and with different aims. GC parallels some US activities in the area, such as the "Theory of Computing" funded by NSF, but focuses more on systems. The 13 running projects (with a total funding of 17,6 M €) bring together the best of European theoretical computer science groups, complemented by strong teams in agents, databases, and systems and network engineering.

http://www.cordis.lu/ist/fetgc.htm

Life-like Perception Systems (LPS)

is the second FET initiative that explores opportunities at the biology-IT interface. Its objective is to develop integrated perception-response systems that are inspired by the sophistication of the solutions adopted by living systems. LPS and NI complement each other: NI addresses complete autonomous artefacts while the focus of LPS is on integrated (sub)systems that can, for example, extend the capabilities of machines or augment the human senses. Other initiatives of a similar type in Europe are ROBEA in France (although it covers new robotics technologies more generally), the "autonomous systems" initiative in Sweden that finished in 2001, and a new programme on "brain-computing robotics" that the Swedish Strategic Foundation is considering for 2002. The LPS initiative was prepared during two years through a series of consultation meetings, inviting contributions directly from researchers through an informal open "call for ideas" on the web, as well as via an extensive stock-taking exercise for determining the state-of-the-art and identifying and informing the relevant research communities. The projects involve researchers from the areas of neuromorphic engineering, artificial intelligence, cognitive science, robotics, vision, and prosthetics. There are 10 projects for a total funding of 15 M€ that started work in May 2002.

http://www.cordis.lu/ist/fetbi.htm

Presence Research (PR)

is a new proactive to be launched in the Automn of 2002. It aims at developing novel media that convey a sense of "being there", through research that explores the cognitive and affective roots of our sensory perception. The initiative has attracted contributions from psychology & cognitive sciences, vision, psychoacoustics, neuroscience, computer science, telecom engineering, artificial intelligence, hardware technologies, and media, arts and design. It was prepared through consultation meetings and a working group that brought together top scientists in these fields. As far as we know, there is no similar initiative worldwide.

http://www.cordis.lu/ist/fetpr.htm

What is FET-Open?

The purpose of FET-Open is to enable a range of ideas for future and emerging technologies to be explored and realized. The scheme is open to the widest possible spectrum of research opportunities that relate to information society technologies.

FET-Open offers funding implemented through Specific Targeted Research Projects (STREP) for work that could lead to breakthroughs or major advances, in particular:

- The realisation of **bold ideas that would involve high risks**; or
- High quality **longer term research with sound objectives**.

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

The widest possible spectrum of research opportunities

The evolution of the information society involves the interplay of a range of technological, social and economic elements. IS technologies do not exist in a vacuum - they co-evolve in a complex manner with other societal and economic factors. It is a quickly moving field with many inter-relationships. Keeping the door open to the latest ideas as they arise from the roots, and allowing the best of these to be realised, helps aim funding at leading developments. For these reasons FET is open to any idea related to information society technologies. It not only includes the development of new technologies, but also encompasses new ways of doing things as well as creating new roles for technology. Proposals are receivable at any time, for practically the whole duration of the programme.

Bold ideas that would involve high risks

In reality many breakthroughs have depended on sparks of the imagination that resulted in leaps and bounds that were inherently unpredictable. Sometimes new ideas can seem to be ‘crazy’, or impractical; yet, trying out what seems to be risky can often materialise into ‘new things’, or ‘new ways of doings things’ that can ultimately become trend-setting. For this reason, it is important to have an environment within which invention and creativity can thrive. Therefore, FET is open to considering bold ideas whose realisation would involve high risks. The philosophy is to let people try things out – even if these things are only based on a dream, or a hunch, with the promise of really leading to something in the future. In this context there is no distinction of how far or how close to the market an idea might be - the important issue is the potential that it has for leading to a breakthrough.

Longer term research with sound objectives

At the same time it would be wrong to think that it is only 'wild' ideas that lead to major advances. Good, sound ideas can often take a long time and a lot of research in order to come to fruition - they too lead to major advances in the longer term. This is often the case for research work of a generic nature that could ultimately underpin a wide range of application areas. It is also true that one idea leads to another and that progress sometimes comes from the accumulation of many small innovations (for example, innovative superefficient algorithms). Many ideas may thus have matured past the 'wild phase' and been tested and proved valid to some degree, but still need persistent and long term work in order to take them to levels acceptable for industrial or commercial take-up.

Research networking test-beds

Research Networking and IST

'Research Networking' is a key area within the Information Society Technologies (IST) Programme. Its objective is to integrate and validate, in the context of user-driven large scale test-beds, the state-of-the-art technology that is essential for preparing the future upgrades in the infrastructure deployed across Europe. This should help support all research fields and identify the opportunities that such technology offers together with its limitations. The work is essential for fostering the early deployment in Europe of Next Generation Information and Communications Networks based upon all-optical technologies and new Internet protocols and for incorporating the most up-to-date middleware. Work focuses on two complementary approaches:

- the broadband interconnection of national research and education networks; and
- the establishment of advanced European experimental test-beds.

http://www.cordis.lu/ist/rn/home.html

Work Programmes:

- Research Infrastructures: http://www.cordis.lu/ist/rn/wp-res-inf.htm
- IST - Research Networking Test-beds: http://www.cordis.lu/ist/rn/wp-ist.htm

The *e*Europe perspective

The IST Programme is therefore extremely well placed to respond to the challenges defined by the *e*Europe initiative. The *e*Europe 2002 Action Plan emphasises 'Faster internet for researchers and students' as one of its priority activities. In this action line it states the importance of creating:

> 'A very high-speed trans-European network for electronic scientific communications linking research institutions and universities, as well as scientific libraries, scientific centres and, progressively, schools.'

http://europa.eu.int/information_society/eeurope/index_en.htm
http://www.cordis.lu/ist/rn/eeurope.htm

Research Networking in Europe

Developments in computer science and information processing are changing the way researchers visualise their results, while networking technologies such as the internet or the all-optical networks make it easier to share those results with others.

All this adds up to a revolution in the way scientists work – a phenomenon some are calling 'e-science'. At the heart of e-science lies the need to support collaborations between geographically dispersed, or 'virtual', research teams using electronic networks enabling them to not only communicate with their fellow scientists but also to access resources such as large databases, scientific experiments and high-performance computing.

In data-intensive areas of research, such as particle physics or genome research, high-performance Research Networking and GRIDs are now essential for mining, sharing and analysing data as well as visualising the end results. They are becoming increasingly important in other disciplines too.

Given this background, it is essential for Europe to stay at the forefront of Research Networking. The challenges are two-fold:

- Firstly, to build and deploy a high-capacity network infrastructure based on state-of-the-art technologies to meet the current and anticipated needs of Europe's research community (i.e. GÉANT);
- Secondly, to push back the technological boundaries even further by undertaking innovative research on advanced networking technologies and establishing experimental test-beds.

General accompanying actions

The general accompanying actions run in parallel with the Strategic Objectives, and are employed to prepare (before), support (during) and facilitate the rapid adoption and transfer (after) of technologies and research results. They include activities such as support to International Cooperation, socio-economic studies including statistical indicators, dissemination and awareness, standardisation and foresights.

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

In addition, continued support will be given to the European IST Prize scheme. The objective of the Prize is to promote European innovation and entrepreneurship in IST by providing public recognition to companies that excel in turning technology and research results into products for the market. The Prize scheme will be organised by the European Council of Applied Science and Engineering, Euro-CASE, building on experience they have acquired over the last seven years. Euro-CASE status as a non-profit association of 17 European Academies allows it to ensure an effective and impartial evaluation of the applications received. The foreseen expenditure will

include appropriate operation costs and a total of 700,000 Euro per annum to be handed out as monetary prizes.

IST Contacts

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