EUROPEAN COMMISSION

ICT - INFORMATION AND COMMUNICATION TECHNOLOGIES

A Theme for research and development under the specific programme "Cooperation" implementing the Seventh Framework Programme (2007-2013) of the European Community for research, technological development and demonstration activities

Work Programme 2007-08

Draft

This Work Programme for the ICT theme of the FP7 Specific Programme "Cooperation" defines the priorities for the calls for proposals to be launched in 2007 and the criteria that will be used for evaluating the proposals responding to these calls.

The priorities reflect the input received from the Programme Committee, the IST Advisory Group[1] (ISTAG), the European Technology Platforms[2] in ICT and other preparatory activities including workshops involving the main stakeholders. The Work Programme is also in line with the main ICT policy priorities as defined in the i2010 initiative[3], - a European Information Society for Growth and Employment.

The Work Programme will be updated on a regular basis.

Throughout this text, budget allocations as given are indicative. Implementation issues including budgetary aspects are currently under discussion between the Commission and Member States representatives.

[1] The ISTAG report on the recommendations for the Work Programmes in FP7, the strategic research agendas of the European Technology Platforms in ICT and other reports on the preparation workshops and Commission internal Groups are available on the IST Web page *http://cordis.europa.eu/ist*.
[2] http://cordis.europa.eu/technology-platforms/
[3] http://ec.europa.eu/i2010/

ICT - Information and Communication Technologies

1 Objective

Improving the competitiveness of European industry and enabling Europe to master and shape future developments in ICT so that the demands of its society and economy are met. ICT is at the very core of the knowledge-based society. Activities will strengthen Europe's scientific and technology base and ensure its global leadership in ICT, help drive and stimulate product, service and process innovation and creativity through ICT use and ensure that ICT progress is rapidly transformed into benefits for Europe's citizens, businesses, industry and governments. These activities will also help reduce the digital divide and social exclusion.

2 Policy and socio-economic context

2.1 i2010, achieving the renewed Lisbon agenda

Today Europe faces an urgent need to reshape its economy and society to meet the challenges of the 21st Century. We must realise higher economic growth through improved competitiveness and productivity, whilst ensuring a sustainable future[4]. We have to adjust to the changing economic realities brought about by the globalisation of markets and the ever-faster pace of technological change. At the same time, we have to modernise our public services and tackle emerging challenges in areas such as health, ageing, inclusion, safety and security.

In its Communication on "Working together for growth and jobs, A new start for the Lisbon Strategy"[5], the Commission highlights the importance of ICT for Europe's economy and society. It underlines that "*our innovation performance is crucially dependent on strengthening **investment in and the use of new technologies, particularly ICTs**, by both the private and public sectors. Information and Communication technologies provide the backbone for the knowledge economy. They account for around half of the productivity growth in modern economies."*

One of the key objectives of the i2010 initiative[6], that sets the strategic framework for ICT policies in the Union, is to achieve "world class performance in research and innovation in ICT by closing the gap with Europe's leading competitors". Leading the progress in ICT is essential to be able to address Europe's key socio-economic challenges and to reinforce its industrial competitiveness. ICT research in FP7 aims at enabling Europe to master ICT development so that it corresponds to the needs of its citizens and businesses. The current Work Programme provides the detailed priorities for Calls for Proposals to be launched in 2007.

[4] Cf. the renewed sustainable development strategy; see European Council: Austrian Presidency Conclusion: 16th June 2006 http://ec.europa.eu/sustainable/sds2006/index_en.htm
[5] COM (2005) 24
[6] "i2010 – A European Information Society for growth and employment, COM(2005) 229

2.2 Partnering in ICT research and development

Increasing competition on a global scale gives Europe no other choice than to mobilise its resources to attract both investment in ICT research and development and the best researchers to its public and private labs. Europe has great knowledge and industrial assets. It has one of the world's largest markets. It should be a leader and be a first choice for ICT research and development and it has the capacity to do so.

More than ever before, partnering at European level is needed to keep pace with soaring research costs in an era of global competition, and increasingly complex and interdependent technologies.

The ICT theme of the Cooperation specific programme in FP7 offers a stable (seven years) framework for collaboration and partnership building in ICT research. It builds on the successes of previous Community RTD programmes in this field that have enabled European industry to lead in world markets in areas like mobile communications, embedded systems or microelectronics.

2.3 ICT in FP7: An approach focused on a limited set of challenges

Achieving the best possible impact for Community support requires focusing and concentrating effort on key RTD challenges. This Work Programme proposes a structure around seven challenges that should be addressed if Europe is to be among the world leaders in next generation ICT and their applications.

The challenges are driven either by industry and technology objectives or by socio-economic goals. For each challenge precise targets and deliverables are identified in a 10 year time frame.

In pursuit of the challenge targets, a set of research objectives will be called for in 2007. These objectives are described in the next chapters of the Work Programme and will provide the focus for the Calls for proposals. For each objective, the Work Programme defines the target outcome of the supported research and the expected impact of these outcomes on the European economy and society.

2.3.1 Overcoming technology roadblocks and reinforcing Europe's industrial strengths

For European industry to be among the leaders in ICT in the next ten years, our researchers and engineers have to master **three ICT challenges.** These have been identified in particular with the help of the European Technology Platforms in ICT and are as follows:

- The **converged communication and service Infrastructure** that will gradually replace the current Internet, mobile, fixed and audiovisual networks.

- The engineering of **more robust, context-aware and easy-to-use ICT systems** that self improve and self-adapt within their respective environments.

- **The increasingly smaller, cheaper, more reliable and low consumption electronic components and systems** that constitute the basis for innovation in all major products and service.

2.3.2 Seizing new opportunities and applying ICT to address Europe's socio-economic challenges

Four challenges for ICT research are driven by socio economic goals and are in line with **the flagship initiatives of i2010**:

- **Digital libraries, knowledge and content development tools and applications** that will help us preserve, develop and disseminate our cultural assets, improve our learning and education systems and strengthen the creativity of our society.

- ICT tools for **sustainable Health systems** enhancing our ability to monitor our health and well-being and to treat major illnesses and diseases.

- **Intelligent and safe vehicles and technologies environmental sustainability and energy efficiency that** are key requirements of our citizens**.**

- ICT systems and applications for better **inclusion and independent living** of all citizens.

In addition to the seven Challenges, a **Future and Emerging Technologies** activity will continue to foster trans-disciplinary research excellence in emerging ICT-related research domains.

The Challenges in this Work Programme build on and extend the Ambient Intelligence vision developed in the previous Framework Programmes.

2.4 Funding schemes

The activities supported by FP7 will be funded through a range of "Funding schemes". These schemes will be used, either alone or in combination, to fund actions implemented throughout the Framework Programme. The funding schemes used for the research objectives identified in this Work Programme are the following:

1. Collaborative projects (CP)

Support to research projects carried out by consortia with participants from different countries, aiming at developing new knowledge, new technology, products, demonstration activities or common resources for research. The Funding Scheme allows for two types of projects to be financed: a) "*small or medium-scale focused research actions"(*STREP), b) "*large-scale integrating projects*" (IP).

2. Networks of Excellence (NoE)

Support to Joint Programme of Activities implemented by a number of research organisations integrating their activities in a given field, carried out by research teams in the framework of longer term cooperation.

3. Coordination and support actions (CSA)

Support to activities aimed at coordinating or supporting research activities and policies (networking, exchanges, coordination of funded projects, trans-national access to research infrastructures, studies, conferences, etc). These actions may also be implemented by means other than calls for proposals.

This work programme specifies for each of the research objectives, the type(s) of funding scheme(s) to be used for the topic on which proposals are invited.

2.5 Involving SMEs and feeding innovation

The role of SMEs in innovation is undisputable. In ICT, they play a vital role in the development of new visions and in transforming them into business assets. They have a large capacity to focus their research effort and to take fast technical and business decisions.

The Community research programmes in ICT provide major opportunities for SMEs to finance high-risk, early-stage research and development, to build strategic partnerships and to operate outside their local markets with higher value innovative products and services.

Particular attention is paid to SMEs' needs and potential in the definition of the priorities of the ICT Work Programme. Building on the experience of SMEs' participation in ICT research under FP6, the aim is to ensure that SMEs constitute an important part of the ICT research consortia together with large companies, universities, and public research labs.

The rules for participation in FP7 will also encourage further SMEs participation. For SMEs in FP7 projects, the Community financial contribution may reach a maximum of 75% of the total eligible costs (as compared to 50% in FP6 and before). The ICT theme in FP7 is therefore expected to draw a high number of innovative SMEs that are ready to undertake research and development both in emerging technology fields with high growth potential and in key ICT application fields.

2.6 Developing global partnerships

The external dimension of the programme aims at supporting European competitiveness through research partnerships with third countries and at addressing issues of common interest and mutual benefit in support of other EU policies, in particular development policies.

International cooperation will be implemented through:

- The opening of all ICT programme objectives to the participation of third country organisations from all International Cooperation Partner Countries (ICPC, see Annex 1) and industrialised countries. All of the ICT theme is open to third country participation. In addition, for several Objectives of the Work Programme, the participation of third country partners is particularly encouraged.

- Specific International Cooperation Actions (SICAs) dedicated to partnerships with ICPC countries in areas of mutual interest and cooperation on topics selected on the basis of their scientific and technological competences and needs. Political dialogues with third countries and regions as well as international support projects have allowed the identification of potential cooperation priorities that are of mutual interest and benefit. The SICAs will have specific rules for participation[7] and specific evaluation criteria[8].

[7] At least four independent legal entities of which at least two must be established in different Member States or Associated countries and at least two must be stablished in different ICPC countries.
[8] See Annex II on evaluation, selection and award criteria

The international cooperation activities proposed in this Work Programme have three main objectives:

- To improve cooperation in the development of standards and interoperable solutions and in roadmapping in order to enable the wider uptake of the results of European research and to improve the competitiveness of European industry. This will contribute to the achievement of economies of scale in the global context of technology exploitation. It will be implemented by supporting mainly Coordination and Support Actions bringing together European and international stakeholders. Depending on the areas addressed, they will target industrialised regions such as the USA and Japan and/or emerging economies such as China, Russia, India and Latin America.

  These Coordination and Support Actions will be called for within the relevant objectives and under horizontal support actions for international cooperation. Examples include the areas of future networks, security, networked media, nanoelectronics, photonics, control systems, ICT for co-operative transport systems, and ICT for independent living and inclusion.

- To improve scientific cooperation for the mutual benefits of Europe and target regions. This will be implemented with third countries where there is clear reciprocity in knowledge sharing and in the areas where there is value for European and third country organisations to cooperate. It will also help support other Community policies notably the development policy.

  Support will be provided to SICAs in the areas of ICT for risk assessment and patient safety, healthcare information systems, ICT for environmental disaster reduction and management, Open Source Software, language and speech technologies and accessible and inclusive ICT. A total of up to 20 M€ is expected to be devoted to these SICAs. These are described in detail in the relevant objectives and in the horizontal action on International Cooperation.

  In addition, third country participation is particularly encouraged in collaborative projects on specific topics addressed in the objectives on Embedded Systems design, Future and Emerging Technologies (FET) and through the Intelligent Manufacturing Systems scheme.

- Finally support to activities linked to ICT-based research infrastructures: This will be done mainly in the FP7 *Capacities* programme but parts related for example to the future Internet are addressed in this Work Programme.

In order to support coherence at the Framework Programme level, coordination will be sought with ICT-related international cooperation activities launched under the *Capacities*[9] and *People*[10] Specific Programmes.

2.7 The socio-economic dimensions of ICT

The economic and social transformations triggered by ICT are wide-ranging, complex, and multifaceted. We are no longer at the dawn of the Information Society but witnessing and

[9] http://cordis.europa.eu/fp7/capacities.htm
[10] http://cordis.europa.eu/fp7/people.htm

experiencing its deployment at all levels of economic activity and social interaction. In addition, technological roadmaps are pointing to even more radical socio-economic changes.

Most R&D projects have a clear socio-economic dimension from the outset. This may include, for example, evidence-based impact assessment and pro-active initiatives in order to accelerate diffusion and societal acceptance.

The programme will also support social and economic research, launched through calls for tenders, to create a better understanding of trends and impacts at the level of society and of the economy, including the global economy. This will complement assessments of the impact of individual projects, help assess the impact of the ICT programme as a whole, and support impact assessments of specific policy options.

In addition, wider benefits are expected to arise from the research projects and actions supported under this programme in terms of their contribution towards science education, and outreach and communication activities.

The pursuit of scientific knowledge and its technical application towards society requires the talent, perspectives and insight that can only be assured by increasing diversity in the research workforce. Therefore, a balanced representation of women and men at all levels in research projects is encouraged. Gender issues should also be addressed when human beings are involved as users, and in training or dissemination activities.

2.8 European Technology Platforms in ICT and the Work programme

European technology Platforms (ETPs) bring together the main industry and academic research stakeholders in a particular field with the aim of better coordinating their research and related activities and achieving common goals. An important outcome of each ETP is a Strategic Research Agenda agreed by its members that also commit to its implementation. These Strategic Research agendas[11] constitute an important input to the Work Programmes in FP7.

The industrial and academic research stakeholders in ICT have at the time of publication set up European Technology Platforms in nine ICT fields. These cover the fields of nano-electronics, photonics, micro-systems, embedded systems, software and services, mobile communications, networked media, satellite communications and robotics.

2.9 Joint Technology Initiatives and support to the Coordination of national programmes

The Commission's proposal for the *Cooperation* Programme indicates that in a limited number of cases, the scope of an RTD objective and the scale of the resources involved justify setting up long term public private partnerships in the form of Joint Technology Initiatives.

These initiatives, mainly resulting from the work of European Technology Platforms and covering one or a small number of selected aspects of research in their field, will combine private sector investment and national and European public funding, including grant funding from the Research Framework Programme and loan finance from the European Investment

[11] Individual Strategic Research Agendas of the European Technology Platforms in ICT are available on the following Web page: http://cordis.europa.eu/ist/about/techn-platform.htm

Bank. These will be implemented on the basis of the appropriate articles of the EU treaty including Article 171.

The Commission is planning to propose two Joint Technology Initiatives to be funded from the ICT theme in the Cooperation programme in FP7. These Initiatives are not part of this Work Programme and will be established by separate decisions. The planned initiatives will address part of the research in the areas of nano-electronics and embedded systems.

2.10 Co-ordination of non-Community research programmes

The actions undertaken in this field in FP7 include the coordination of national or regional research programmes or initiatives (e.g. ERA-NETs, see Annex 4) and the participation of the Community in jointly implemented national research programmes (Treaty Article 169). The actions will also be used to enhance the complementarity and synergy between the Framework Programme and activities carried out in the framework of intergovernmental structures such as EUREKA, EIROforum and COST.

The coordination of national or regional research programmes or initiatives are called for within several objectives in this Work Programme. In addition, the participation of the Community in national research programmes jointly implemented on the basis of Article 169 is planned in the area of ICT for Ambient Assisted Living. This will be the subject of a separate decision.

Objectives under Challenges 1, 2, 3, 6 and 7 as well as FET call for the coordination of national or regional research programmes or initiatives.

2.11 Links with other Programmes

Links with ICT in the CIP

The ICT theme in FP7 is one of the two main financial instruments in support of the i2010 initiative that is the Union's policy framework for the information society. The other main financial instrument is the ICT specific programme within the Competitiveness and Innovation programme (CIP). ICT in the CIP aims at ensuring the wide uptake and best use of ICT by businesses, governments and citizens. ICT in FP7 and ICT in the CIP are therefore complementary instruments aiming at both progressing ICT and its applications and at making sure that all citizens and businesses can benefit from ICT.

Links with the Research Infrastructure part of the Capacities Programme

Support will be provided to ICT-based research infrastructure (eInfrastructure) under the Research Infrastructures part of the Capacities programme. This will build on the success of the GEANT research network and the research Grids infrastructure supported in FP6 and will provide higher performance computing, data handling and networking facilities for European researchers in all science and technology fields. Coordination between this activity and the ICT theme in the cooperation programme will ensure that the latest and most effective technology is provided to European researchers. Support will also be given to other ICT research infrastructure under the targeted calls of the Capacities programme. These will cover

areas such as ICT Living Labs, clean rooms for nano-electronics and Embedded Systems research facilities.

Links with the other Specific Programmes in FP7

In addition to the ICT theme in the Cooperation Specific Programme, the ICT research and development community will also be able to benefit from the other specific programmes that are open to all research areas including the Ideas, People and Capacities programmes.

3 Content of calls in 2007

3.1 Challenge 1: Pervasive and Trusted Network and Service Infrastructures

With its strengths in communication equipment, devices, networks and eServices, Europe is well placed in the world-wide race to define and develop the network and service infrastructures of the future. These will generate new economic opportunities with new classes of networked applications, whilst reducing operational expenditures. The current internet, mobile, fixed and broadcasting networks and the related software service infrastructure need to progress accordingly in order to enable another wave of growth in the on-line economy and society over the next 15 years.

The challenge is to deliver the next generation of ubiquitous and converged network and service infrastructures for communication, computing and media. This entails overcoming the scalability, flexibility, dependability and security bottlenecks, as today's network and service architectures are primarily static and able to support a limited number of devices, service features and limited confidence. Such new infrastructures will permit the emergence of a large variety of business models capable of dynamic and seamless end-to-end composition of resources across a multiplicity of devices, networks, providers and service domains.

The future infrastructures envisaged will need to:

- Be pervasive, ubiquitous and highly dynamic. They have to offer almost unlimited capacities to users, by supporting a wide variety of nomadic interoperable devices and services, a variety of content formats and a multiplicity of delivery modes. They also have to support context awareness and the dynamic behaviour needed for applications with requirements that vary with time and context ;
- Guarantee robustness, resilience, trust and security compatible with networks and software service platforms reaching a complexity and scale that are an order of magnitude greater than those of today's infrastructures;
- Support networked and managed business and service convergence across a multiplicity of environments such as the home, businesses, or nomadic situations.

This entails addressing the evolution from today's large legacy infrastructures towards new infrastructures by striking a balance between backward compatibility requirements and the need to explore disruptive architectures to build future internet, mobile, broadband, and associated service infrastructures.

The evolution drivers of this Challenge relate primarily to the technological evolution of ubiquitous mobile and broadband networks, the availability of dynamic services platforms, trust and security, in the context of converged and interoperable networked environments. In this respect, the proposed activity largely relates to the technological roadblocks and socio

economic scenarios identified in the Strategic Research Agendas of the eMobility, NESSI, NEM and ISI European Technology Platforms.

Participation of organisations from third countries is encouraged for those research activities where mutual benefits can be demonstrated. This relates notably to i) the possibility of progressing through joint strategic research partnerships towards global consensus and standards; ii) opportunities for mutual benchmarking; iii) the exchange of best practices, including regulation and socio-economic issues as technological drivers; iv) large scale validation of technologies and networked applications in a global context. The participation of third country partners and the selection of the most promising targeted regions are left to the initiative of the proponents.

Proposals for large scale projects cutting across several of the objectives 1.1 to 1.4 of Challenge 1 and addressing interrelated objectives from an overall system perspective are encouraged. The intention is to significantly advance the State-of-the-Art for each of the targeted objectives and to obtain a federating, multiplier and catalytic effect on the expected impacts.

Objective ICT-2007.1.1: The Network of the Future

Target outcome

a) **Ubiquitous network infrastructures and architectures** supporting: i) convergence and interoperability of heterogeneous mobile and broadband network technologies ii) flexible and spectrum efficient radio access enabling ubiquitous access to broadband mobile services for short range to wide area networking ; iii) elimination of the barriers to broadband access and ultra high speed end to end connectivity with optimised protocols and routing; iv) context awareness; v) optimised traffic processing between core and edge networks; vi) scalability, delivering an order of magnitude increase in the number of connected devices and enabling the emergence of applications that are machine-to-machine or sensor-based - beyond RFID - and are capable of functioning within a multiplicity of public or private operating environments.

b) **Optimised control, management and flexibility of the future network infrastructure**, supporting the evolution towards cognitive networks and capable of: i) enabling seamless end to end network and service composition and operation across multiple operators and business domains; ii) supporting a wide diversity of service attributes and requirements, which will be an order of magnitude more complex than those of today's infrastructures, through support of programmability and dynamic features, with reconfigurability of resource allocation, of protocols and routing, self organisation and management; iii) managing in real time new forms of ad-hoc communications with intermittent connectivity requirements and time-varying network topology; iv) enabling intelligent distribution of services across multiple access technologies with centralised or distributed control.

c) **Technologies and systems architectures for the Future Internet**, aimed at overcoming the expected long term limitations of current internet capabilities, architecture and protocols, driven by the need for: generalised mobility; scalability from the perspective of devices, service attributes and application environments; security; trusted domains; new forms of routing and content delivery with dynamic peering of end to end delivery and control, of ad-hoc connectivity in a generalised wireless environment. The work of exploratory nature will address how various classes of new requirements constrain the foreseeable evolution of the internet and identify corresponding long term solutions.

Expected impact

- Global standards for a new generation of ubiquitous and extremely high capacity network and service infrastructures. These should support convergence, full interoperability, a significantly larger and diverse number of devices, new services and complex user requirements.
- Reinforced European industrial leadership in wired and wireless networks; developing stronger synergies between various sector actors and contributing to new business models that take advantage of convergence and full interoperability.
- New industrial/service opportunities in Europe, especially in the field of Internet technologies, where Europe has not yet reached a position commensurate to its technological potential.

Funding schemes

CP, NoE, CSA (SSA for roadmapping and conference support, CA for co-ordination with related national or regional programmes or initiatives)

Indicative budget distribution

200 M€:
- CP 180 M€ of which a minimum of 84 M€ to IP and a minimum of 42 M€ to STREP;
- NoE 14 M€;
- CSA 6 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.1.2: Service and Software Architectures, Infrastructures and Engineering

Target outcome

a) **Service architectures, platforms, technologies, methods and tools** that enable context-awareness anddiscovery, advertising, personalisation and dynamic composition of services. They should support flexible business models, provide for service management, and guarantee end-to-end quality of service. They will cater for multiple component technologies and support vendor independence. Opportunities for standardisation should be exploited.

b) **Service/software engineering approaches** development processes, product lifecycle and tools for dynamically composed systems with dependable quality of service and reliability properties and promoting new open development paradigms with a higher degree of involvement of joint user and development communities.

c) **Strategies and technologies enabling mastery of complexity, dependability, and behavioural stability** in complex systems and in systems evolving over time without central design. Appropriate mechanisms should guarantee end-to-end quality of service .

d) **Virtualisation tools, system software, middleware and network-centric operating systems,** including Grid-based systems, that orchestrate unlimited, heterogeneous and dynamic resources distributed across multiple platforms as a single entity, and provide platform-independent access and sharing of knowledge, processing, communication, storage and content. They also enable the definition and execution of tasks and workflows

for collaboration and operation across multiple domains and optimise usage of distributed resources.

Expected Impact:

Improving the competitiveness of enterprises and the efficiency of organisations in Europe by:

- Allowing the creation of dynamic services with guaranteed properties and new networked applications capable of interoperation across a wide variety of business domains and organisations of all sizes. Supporting all organisations developing or using software and services, particularly SMEs, to improve their competitiveness and adjust to the emerging global service economy.
- Increased efficiency and productivity in software development and higher level of software reliability through novel service and software engineering tools and improved mastering of complex systems.
- New opportunities, notably for SMEs, through open and standard platforms and interfaces for: software and service development; middleware for resource sharing; and next generation operating systems.

Funding schemes

CP, NoE, CSA (SSA for roadmapping, strategy and policy formulation, clustering of activities, support for standardisation and conference support, CA for co-ordination with national or regional programmes or initiatives)

Indicative budget distribution

120 M€:
- CP 108 M€ of which a minimum of 44 M€ to IP and a minimum of 35 M€ to STREP;
- NoE 10 M€;
- CSA 2 M€

Call

FP7-ICT-2007-1

Objective ICT-2007-1.3: ICT in support of the networked enterprise

Target outcome

a) Generic integrated solutions for inter-enterprise interoperability and collaboration in the context of the networked enterprise.

b) Architectures and platforms for the integrated enterprise supporting massively distributed networked devices, notably enhanced RFID-based systems.

c) Tools and technologies that enable intra-entreprise collaboration and the definition and execution of tasks and workflows for operation across multiple domains.

Research results should support highly distributed operations, reduced life cycle cost, and integration with legacy systems. The work should in particular support business networks addressing the specific needs of SMEs.

Expected Impact:

- Improving the competitiveness of enterprises in Europe by fostering the creation of new networked applications and services capable of interoperation across a wide variety of business domains and organisations of all sizes.
- Reinforcing Europe's technology and industry strengths in application and business-specific software, service and applications development.

Funding schemes

CP, CSA (one CA for coordination of EU activities on RFID and one CSA for global RFID-related standardisation activities involving in particular organisations from China, Japan, Korea and USA)

Indicative budget distribution

30 M€ of which a minimum of 11 M€ to IP, a minimum of 11 M€ to STREP and 1 M€ for 2 CSAs

Call

FP7-ICT-2007-1

Objective ICT-2007.1.4: Secure, dependable and trusted Infrastructures

Target outcome

a) **Security and resilience in network infrastructures**: building and preserving flexible, scalable and context-aware, secure and resilient architectures and technologies to enable dynamic management policies that ensure end-to-end secure transmission of data and services across heterogeneous infrastructures and networks, including dynamic networks of tiny insecure devices, and multiple provider, business and residential domains; real time detection and recovery capabilities against intrusions, malfunctions and failures;

b) **Security and trust in dynamic and reconfigurable service architectures** supporting assured and scale-free composition of services and service coalitions with managed operation across several administrative or business domains, enabling flexible business models;

c) **Trusted computing infrastructures** ensuring interoperability and end-to-end security of data and services; increased security and dependability in the engineering of software and service systems to ensure the design and development of trustworthy applications and services;

d) **Identity management and privacy enhancing tools** with configurable, context-dependent and user-controlled attributes in static and dynamically changing environments; **trust policies** for managing and assessing the risks associated to identity and private data.

e) Longer term visions and **research roadmaps**; **metrics and benchmarks** for comparative evaluation and open technology competitions, in support of certification and **standardisation**; **international cooperation** and co-ordination with developed countries; **coordination with related national or regional programmes or initiatives** and; **coordination of FP7 projects** addressing security, dependability, privacy and related ethical issues across different challenges and objectives of this work programme.

Expected Impact

- ICT users empowered to handle their digital identity and personal data and to protect their privacy, turning the European view on privacy into an economic advantage; strengthened trust in the use of networks, software and services for governments, businesses and consumers.
- A strong and competitive ICT security industry in Europe.
- Substantially improved security and dependability of networks and service infrastructures having a complexity and scale that are an order of magnitude greater than those of today's infrastructures.
- Wider use of metrics, standards, evaluation and certification methods and best practices in security of networks, infrastructures, software and services.

Funding schemes

a-d): CP, NoE; e) CSA

Indicative budget distribution

90 M€:
- CP 80 M€ of which a minimum of 28 M€ to IP and a minimum of 28 M€ to STREP;
- NoE 6 M€;
- CSA 4 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.1.5: Networked Media

Target outcome:

a) **Interoperable multimedia network and service infrastructures** that

- offer a seamless, personalised and trusted experience of i) multimedia services and applications; ii) home management and control services; iii) media content, for users in a variety of roles (consumer, producer or manager of communication and media), locations, contexts and mobility scenarios;

- maintain the integrity and the quality of the media whilst enabling automatic and intuitive enrichment at every step of the media lifecycle;
- are optimised in particular for unstructured distribution, delivery, sharing, storage and intelligent retrieval of media and applications, and that enable variable media distribution patterns between multiple users.

b) **End-to-end systems** and application platforms that enable i) intuitive, intelligent, professional and non-professional creation, manipulation, storage/handling/search, management and rendering of media; ii) new creative forms of interactive, immersive and very high quality media (such as 3D, virtual and augmented reality) as well as new forms of experiences for individual users or user communities.

c) **Roadmapping and conference support**, for co-ordination with related national or regional programmes or initiatives, for international standardisation and interoperability initiatives.

Expected Impact:

- World leadership in a new generation of media technologies providing significantly higher performances in terms of intelligence, scalability, flexibility, speed, capacity, ease of use and cost.
- New and sustainable market opportunities based on converged business models between content, telecom, broadcast and consumer electronics industries. Reinforced European position vis-à-vis global interoperability and standardisation initiatives.
- Widespread adoption of new digital media consumption and production patterns. Enhanced quality of life through new usage forms contributing to social, intellectual and leisure well-being. New opportunities for content production and exploitation.

Funding schemes

a-b): CP, NoE; c): CSA

Indicative budget distribution

85 M€:
- CP 76 M€ of which a minimum of 30 to IP and a minimum of 24 M€ to STREP;
- NoE 7 M€;
- CSA 2 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.1.6: New Paradigms and Experimental Facilities

Target outcome

a) **Advanced networking approaches to architectures and protocols**, designed to cope with increased scale, complexity, mobility and requirements for security, resilience and transparency of the Future Internet coupled with their v**alidation in large scale testing environments** based on a combination of physical and 'virtual' infrastructures.

b) **Interconnected testbeds** addressing novel distributed and reconfigurable protocol architectures; novel distributed service architectures, infrastructures and software platforms; and advanced embedded or overlay security, trust and identity management

architectures and technologies. Testbeds for systems that provide trusted access to e-services with users requiring no administration and security skills.

Expected Impact

- Strengthened European position in the development of the Future Internet.
- Wider take-up of technological developments in networks and service infrastructure facilitated by a comprehensive validation of the technological and service choices.
- Global consensus towards standards and strengthened international co-operation through interconnected testbeds and interconnection capabilities offered to third countries.
- Higher confidence in the secure use of the Internet through testbeds enabling trusted access to e-Services.

Funding schemes

CP, CSA (SSA for support for standardisation and conference support, CA for co-ordination with related national or regional programmes or initiatives)

Indicative budget distribution

40 M€:

- CP 36 M€ of which a minimum of 12 M€ to IPs and a minimum of 15 M€ to STREP
- NoE 3M€
- CSA 1M€

Call

FP7-ICT-2007-2

Objective ICT-2007.1.7: Critical Infrastructure Protection
(Joint Call between ICT and Security Themes - ICT-SECURITY-1-2007)

The interoperability and interconnectivity of supply systems is one of the cornerstones of the functioning of our societies. The vulnerabilities in the intercommunication of systems, equipment, services and processes and their resilience against malicious attacks of terrorism and (organised) crime are elementary to the security of the citizens.

The objective of the joint call is to make key infrastructures of modern life, such as energy production sites and transmission systems, storage and distribution, information and communication networks, sensitive manufacturing plants, banking and finance, healthcare, or transportation systems more secure and dependable. The aim is to protect such critical infrastructures that can be damaged, destroyed or disrupted by acts of terrorism, natural disasters, negligence, mismanagements, accidents, computer hacking, criminal activity and malicious behaviour and to safeguard them against incidents, malfunctions and failures.

The joint call is structured around two specific foci.

Focus of the ICT Theme

The first focus is called for by the *ICT* theme[12] and is addressing technology building blocks for creating, monitoring and managing secure, resilient and always available information infrastructures that link critical infrastructures so that they survive malicious attacks or accidental failures, guarantee integrity of data and continuous provision of responsive and trustworthy services, and support dynamically varying trust requirements. This includes:

- Understanding and managing the interactions and complexity of interdependent critical infrastructures; mastering their vulnerabilities; preventing against cascading effects; providing recovery and continuity in critical scenarios (including research towards designing and building self adapted and self healing complex systems); and security and dependability metrics and assurance methods for quantifying infrastructure interdependencies.
- Designing and developing secure and resilient networked and distributed information and process control systems; systemic risk analysis and security configuration and management of critical information infrastructures and dynamic assurance frameworks for interconnecting them with critical infrastructures; availability of security forensics.

Call: FP7-ICT-2007-2

Funding schemes: Collaborative Projects and Coordination and Support Actions (see clarification below).

Focus of the Security Theme

The second focus is called for by the *Security* theme and is addressing technology building blocks for creating, monitoring and managing secure, resilient and always available infrastructures that survive malicious attacks or accidental failures and guaranteeing continuous provision of services. The following topics are called:

Topic ICT-SEC-2007-1.1 Risk assessment and contingency planning for interconnected infrastructures

Technical content / scope: The task is to develop integrated frameworks and agreed, common methodologies for (a) global analyses and assessment of risks, failures and vulnerabilities, and (b) management and contingency planning based on the compilation and analyses of emergency plans for infrastructures, to assure interoperability between interconnected and interdependent heterogeneous critical infrastructures.
Call: Joint Call ICT & Security 1
Funding scheme(s): Collaborative project and Coordination and support action (see clarification below).

Topic ICT-SEC-2007-1.2 Modelling and simulation for training

Technical content / scope: Security crises concerning cross-border interconnected European critical infrastructures can lead to effects with high impacts of disruption. The task consists of modelling & simulation including scenario building to support the training of crisis managers.

[12] For more details concerning these topics consult the ICT Work Programme.

Specific solutions should be developed for the various sectors of European critical infrastructures, such as energy, transport, etc.[13]
Call: Joint Call ICT & Security 1
Funding scheme(s): Collaborative project (see clarification below).

Topic ICT-SEC-2007-1.3 Optimised situational awareness through intelligent surveillance of interconnected infrastructures

Technical content / scope: The task consists of developing tools that integrate smart surveillance information from interconnected and heterogeneous infrastructures in order to build up high level situation awareness. The objective is to enable optimised decision making required for cross-border interoperable crisis management to ensure secure, resilient and always available infrastructures. Specific solutions should be developed for the various sectors of European critical infrastructures, such as energy, transport, etc.[14]
Call: Joint Call ICT & Security 1
Funding scheme(s): Collaborative project (see clarification below).

Topic ICT-SEC-2007-1.4 ICT support for first responders in crises occurring in critical infrastructures

Technical content / scope: The task consists of developing novel technologies for personal digital support systems as part of an integral, secure emergency management system to support first responders in crises occurring in various types of critical infrastructures under all circumstances. The action has to build upon ongoing research on emergency management, secure wireless communication, first responder technologies, etc. See as well topic *SEC-2007-4.3.4 Personal equipment* with a view to compatibility and complementarity.

Call: Joint Call ICT & Security 1
Funding scheme(s): Collaborative project (see clarification below).

Expected impact:

Actions in this area will provide significant improvement in the security, performance, dependability and resilience of complex and interdependent critical infrastructures while considering as well organisational dynamics, human factors, societal issues and related legal aspects.

They will reinforce European industry's potential to create important market opportunities and establish leadership.

They will contribute to establishing, strengthening and preserving trust in the use of technologies for the protection of critical infrastructures. This includes creating sufficient awareness and understanding of all relevant issues for the take-up of their outcome (e.g. regarding potential classification requirements, international co-operation needs, communication and implementation strategies etc.), in order to ensure acceptance of such technologies by relevant stakeholders.

[13] See COM(2005) 576 final. Green Paper on a European Programme for Critical Infrastructure Protection.
[14] Same as previous footnote.

They will achieve a more effective protection through enhanced co-operation, coordination and focus across Europe, and contribute to the development and promotion of metrics, standards, evaluation and certification methods and best practice in security of critical information infrastructures.

Indicative budget distribution and clarification on the funding schemes of the joint call:

40 M€: 20 M€ from the ICT theme, for actions addressing the specific focus 1, + 20 M€ from the Security theme, for actions addressing the specific focus 2.

- A minimum of 90% of the call budget is foreseen to be allocated to Collaborative projects of a typical size in the range of 2-5 M€ (total cost) and a duration of 2-4 years.
- Up to 10 % of the call budget are foreseen to be allocated to Co-ordination and support actions (CSAs) of an average size of 0,5 M€.

Call

FP7-ICT-2007-2/ Joint call between the ICT-FP7 Theme and the Security-FP7 theme [ICT-SECURITY-1-2007]

Submission of Proposals:

Proposers should indicate in which of the above two specific foci their proposal best fits. There will be a joint evaluation of proposals submitted under the two specific foci. During the evaluation, evaluators could move, in a transparent manner, proposals from one specific focus to the other, if they consider that a proposal would fit better there and that this would be to the benefit of the proposers.

3.2 Challenge 2: Cognitive Systems, Interaction, Robotics

The increasing complexity of our society and economy places greater emphasis on artificial systems such as robots, smart devices and machines which can deal autonomously with our needs and with the peculiarities of the environments we inhabit and construct. This challenge is to extend systems engineering methods to deal with open-ended and frequently changing real-world environments. A primary aim is to develop system capabilities to respond intelligently to gaps in the system's knowledge and to situations or contexts that have not been specified in its design. In order to meet this challenge, a mix of innovative scientific theory and technology are needed, based on natural and artificial cognition, in conjunction with new systems design and engineering principles and implementations for machines, robots and other devices which are robust and versatile enough to deal with the real world and to behave in a user-friendly and intuitive way with people in everyday situations.

Artificial cognitive systems, advanced interaction technologies and intelligent robots will help open up new opportunities for industry in Europe. Reinforcing leading edge research in these domains will help extend technologies into tomorrow's industries and markets, in fields of potentially high socio-economic significance like industrial production, learning, healthcare, public safety, environmental monitoring, and in emerging sectors such as service robotics. Autonomous surveillance systems can, for example, save crucial time in emergencies or hazardous situations. Artificial cognitive systems and intelligent robots can extend the capabilities of people to perform routine, dangerous or tiring tasks, especially in previously inaccessible, uncharted, or remote spaces on land, sea or air.

Scientific research will also improve our understanding of the mechanisms underlying artificial and natural cognition, in particular learning and the development of competences requiring goal-setting, reasoning, decision-making, language, communication and co-operation. It will enable us to build machines that can understand, learn and generate concepts and translate them across languages with degrees of robustness and versatility not possible today. And it will spur breakthroughs in advanced behaviours of robots, such as in manipulating objects and interacting socially, which are key to their further penetration into real world environments.

The proposed activity supports industrial competitiveness by addressing technological challenges and socioeconomic scenarios as identified inter-alia in the Strategic Research Agenda of EUROP, the European Technology Platform on robotics.

Objective 3.2.1.1 (3.2.3.1): Cognitive Systems, Interaction, Robotics

Target outcome:

a) **Artificial systems** that fulfil one or both of the following requirements:

- they can achieve general goals in a largely unsupervised way, and persevere under adverse or uncertain conditions; adapt, within reasonable constraints, to changing service and performance requirements, without the need for external re-programming, re-configuring, or re-adjusting.
- they communicate and co-operate with people or each other, based on a well-grounded understanding of the objects, events and processes in their environment, and their own situation, competences and knowledge.

Work will result in demonstrators that operate largely autonomously in demanding and open-ended environments which call for a suitable mix of capabilities for sensing, data

analysis, processing, control and acting; and for communication and co-operation with people or machines or both. Where required, systems will integrate high-level cognitive competencies; for example, for reasoning, planning and decision-making, and for active environmental modelling.

Proposals satisfying the above requirements should focus on one of the following areas:

Robots handling, individually or jointly, tangible objects of different shapes and sizes, and operating either fully autonomously (as for instance in difficult terrains with a need for robust locomotion, navigation and obstacle avoidance) or in co-operation with people in complex, dynamic spatial environments (e.g., domestic environments).

Robots, sensor networks and other artificial systems, monitoring and controlling material and informational processes e.g. in industrial manufacturing or public services domains. This may include information gathering and interpretation in real-time emergency or hazardous situations (e.g., through multi-sensory data-fusion) or in virtual spaces related to real world objects and people.

Intuitive multimodal interfaces and interpersonal communication systems providing personalized interactivity in real-world and virtual environments, based on improved human interaction modelling and understanding of contextually-referred communication, for example, by signs and signals in all modes (such as sound, vision, touch) and modalities (such as natural language, both spoken and written), through autonomous adaptation and by addressing user needs, intentions and emotions.

Work proposed in any of these areas should, as appropriate:

- develop and apply engineering approaches that cater for real-time requirements (if present) and systems modularity, and ensure the reliability, flexibility, robustness, scalability and, where relevant, also the safety of the resulting systems; and develop criteria for benchmarking these properties;
- contribute to the theory and application of learning in artificial systems, tackling issues related to the purposive and largely autonomous interpretation of sensor-generated data arising in different environments, and to novel design and implementation principles of pertinent systems architectures.
- explore and validate the use of:
  - advanced sensor, actuator, memory and control elements, components and platforms, based on new, possibly bio-mimetic, materials and hardware designs – e.g., for the realisation of systems with greater structural and functional diversity and modularity,
  - new, possibly bio-inspired, information-processing paradigms, and of models of natural cognition (including human mental and linguistic development), adaptation, self-organisation, and emergence; and take account of the role of systems embodiment and affordances.
  - new ways of combining statistical, knowledge driven and cognitive approaches to language understanding, generation, and translation, by machines.

b) **A principled approach to structuring research** in relevant areas, addressing in particular learning in artificial systems, the requirements for cognitive capacities of robotic, interactive and language support systems, and including the development of experimental scenarios, the development or construction of resources for experimentation, and the development of performance metrics and definitions of autonomy levels for artificial systems.

c) **Co-ordination** with related national or regional research programmes or initiatives.

Expected impact:

- Leading-edge technology companies creating new products and services, and enhancing existing ones.
- New markets such as: extending the industrial robotics market to flexible small scale manufacturing, opening up services (professional and domestic) markets to robots, novel functionalities for embedded systems and assistive systems for interpersonal communications, such as support of dynamic translation, and effective medical diagnostics and therapeutics.
- Robust and versatile behaviour of artificial systems in open-ended environments providing intelligent response in unforeseen situations, and enhancing human-machine interaction
- Extended capabilities of people to perform routine, dangerous or tiring tasks in previously inaccessible, uncharted or remote spaces; saving critical time in emergencies or hazardous situations.
- Leading-edge research in Europe through collaborative and multidisciplinary experimentation with approaches to achieving machine intelligence and artificial cognitive systems, and through investigation of what artificial and natural cognitive systems can and cannot do.

Funding schemes

a): CP; b): NoE; c) CSA

Indicative budget distribution

193 M€:
- CP 173 M€ of which a minimum of 91 M€ to IP and a minimum of 30 M€ to STREP;
- NoE 16 M€;
- CSA 4M€

Calls:

ICT Call 1 [96 M€]; ICT Call 3 [97 M€]

3.3 Challenge 3: Components, systems, engineering

The share of electronic components in the value of engineered products and their impact in terms of added functionality and cost-efficiency is expected to reach unprecedented levels over the next few years. Europe has major strengths in the supply of hardware and software components and their integration and deployment into intelligent systems, from portable devices to cars, airplanes, health systems and manufacturing plants.

The challenge is to strengthen Europe's position as a leading supplier of electronic components and systems. This will support the competitiveness of industrial strongholds such as automotive, avionics, industrial automation, consumer electronics, telecoms and medical systems. In all these domains Europe's leadership depends heavily on the capacity to engineer and produce electronic components and systems and to integrate these into products across all sectors. Furthermore, the social dimension is not to be underestimated given the increasingly important role of electronics in the functioning of modern society.

In addition to input received through various consultations with a large group of research stakeholders, research orientations under this Challenge are in line with the Strategic Research Agendas of European Technology Platforms ENIAC (on nanoelectronics), EPoSS (on systems integration), PHOTONICS21 (on photonics) and ARTEMIS (on embedded systems).

Research addressing this Challenge in particular will encourage international cooperation under the Intelligent Manufacturing Systems scheme.

This research will enable Europe's industry to stay at the forefront of electronics developments and applications. As industry depends ever more on chip making and on embedded software, it is of strategic importance to maintain vibrant chip making and chip integrating functions in Europe as well as the related industries further down the electronics "food chain". All these need early access to latest ICT. Intelligent functions embedded in components and systems will be a key factor in revolutionising many different applications in health, safety and security, transport, and provision of environmentally friendly sustainable applications, and many more. These will also greatly improve industrial production processes by adding intelligence to process control and the manufacturing shop floor, and in helping to improve logistics and distribution, thereby increasing productivity.

Objective ICT-2007.3.1: Next-Generation Nanoelectronics Components and Electronics Integration

Target outcome:

The objectives are to advance miniaturisation in baseline CMOS technology targeting digital components and complex digital Systems on Chip (*"More Moore");* to master diversification targeting non-digital applications, heterogeneous integration in Systems-on-Chip or Systems-in-a-Package (*"More than Moore")* and to prepare for the technology generation beyond the CMOS scaling limits *("beyond CMOS").*

a) ***"More Moore"*** targets nanoelectronics devices beyond 32 nm following the International Technology Roadmap for Semiconductors (ITRS). Specific issues are the increasing process variability and expected physical and reliability limitations of devices and interconnects as well as the need for new circuit architectures and characterisation methods and techniques.

"More than Moore" targets heterogeneous System-on-Chip (SoC) i.e. cost efficient integration of computing, processing and storage with other system functions of various scaling factors (such as analogue, RF (from extremely low frequency up to millimetre-wave silicon and beyond), high speed, high power, high voltage, and interface technologies) on a single silicon chip. It also targets System-in-Package (SiP) i.e. integration of different types of chips and devices in a single package or compact subsystem. Specific issues are power consumption, electro-magnetic interference and heat dissipation.

Industrially driven projects will target:

1. Advances in **Integration and Miniaturisation Technologies,** and in **Devices** covering nanoelectronics process technology, metrology, materials, basic device and interconnect structures and related concepts and tools for modelling and simulation for below 32 nm CMOS and for System-on-Chip. Changes in the electrical characteristics, in thermal and mechanical behaviour, in performance, reliability, testability, manufacturability and power consumption of the components need to be addressed. Integration technology also includes wafer level packaging, assembly technology, integration of passives and 3D packaging.
2. **Design technologies** for next-generation components and electronics integration. They must support a chip complexity of billions of transistors and take into account the increased process variability and changing performances of the advanced devices and processes. This requires a step increase in design productivity for instance through standardised Intellectual Property reuse and scalable and programmable chip architectures. Also targeted are design platforms for *SoC* and *SiP* supporting a heterogeneous, global and comprehensive performance simulation of different technologies covering multiple aspects including electrical, optical, mechanical and thermal behaviour. Emphasis will be put on SoC and SiP system design solutions from formal application specification down to physical implementation, and on the effectiveness of co-simulation between different description levels.
3. **Manufacturing technologies** for: reliable, cost effective industrial manufacturing of sub-45 nm chips; SoC and SiP processes; flexible, automated, adaptive, on-demand and short cycle time manufacturing under economically favourable conditions. This will be based on: (i) models, tools and equipment for AEC/APC-based[15] manufacturing and maintenance; supporting metrology, characterisation and information tools and methods; (ii) advanced modelling techniques and chip design for increasing manufacturability, production yield, testability and reliability and linking manufacturing with design; (iii) alternative pattern transfer technologies, such as maskless lithography; (iv) characterisation techniques supporting multi-site and single wafer, small batch manufacturing; (v) handling of thin wafers and assembly of single chips. This also includes preparatory activities for 450-mm wafer processing and joint assessment of manufacturing and metrology equipment for chips and SiPs by equipment suppliers and users.

b) ***"Beyond CMOS"*** targets advanced technologies and functional devices beyond the traditional ITRS shrink path. It involves new non-FET based logic and memory, and its possible integration with CMOS. A matching of integration, manufacturability and system capability requirements shall be demonstrated in industry-guided pilot projects.

c) **Support measures** will complement the research activities**:**

[15] AEC/APC Advanced Equipment and Process Control

- Access to prototyping, design expertise and training for SME's.
- Access for universities and research institutes to affordable industrial design tools, state-of-the-art technologies for prototyping and training.
- Roadmapping, benchmarking and definition of selection criteria for the industrial use of *"Beyond CMOS"* technologies.
- Stimulating the interest of young people in pursuing a multidisciplinary career encompassing electronics.
- Supporting the development of RTD strategies through roadmapping, consensus building, coordination with Member or Associated States, and international cooperation.
- CSA aiming at coordinating related national, regional and EU-wide RTD programmes or activities.

Expected impact:

- Strengthened competitiveness of European nanoelectronics supply industry across a complete value-chain involving large, mid-sized and small companies, enabling European industry to lead and anticipate progress in the context of the ITRS roadmap.
- New electronics applications of high economic and socio-economic relevance in e.g. communications, health, environment, transport and security.
- European research organisations in leading positions with an increased number of high-skilled jobs in design and user industries and related services.

Funding schemes

a-b): CP, NoE; c): CSA

Indicative budget distribution

86 M€:
- CP 70 M€ of which a minimum of 27 M€ to IP and a minimum of 21 M€ to STREP;
- NoE 8 M€;
- CSA 8 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.3.2: Organic and large-area electronics, visualisation and display systems

Target outcomes

a) **Organic and large-area technologies** for logic, memory and light-emitting functionalities addressing e-paper, smart systems on tags, low-cost RFIDs, lab on chip devices, intelligent packaging, displays, signage, and intelligent lighting systems. Emphasis will be: on large-area and low-cost manufacturing technologies like printing involving additive processes and related materials; on new device structures; on advanced modelling, simulation, and characterisation for circuit design; on encapsulation, interconnects and system in foil integration; on innovative sensing, energy storage and scavenging, and power management functions. Attention should be paid to the overall manufacturing aspects including cost, capital investment and environmental impact.

Support measures will include access to advanced manufacturing and design competences, training and education for organic and large area electronics, joint user assessment of prototype equipment from European suppliers and will develop synergies between the electronics and the printing sectors on circuit design, manufacturing equipment and standardisation.

b) **Advanced visualisation systems and novel display technologies.** Visualisation systems extending colour gamut and dynamic range beyond current state-of-the-art, taking into account human vision and perceptual models. They should support multi-viewer, unaided and unrestricted 3D viewing, as well as natural interaction modalities. This includes signal acquisition, processing and representation technologies for 3D-systems. Research results are to be integrated into working prototypes addressing key professional and consumer applications. Further outcomes will be **portable display systems** such as zero-power / 'ruggedised' displays, flexible and/or transparent devices, energy efficient micro-projectors, and lightweight high-resolution vision glasses.

Expected impact

For large area and printed electronics:

- Reinforcement of Europe's leading role in this promising technology domain enabling traditional industry to benefit from progress in these fields.
- New market possibilities and new manufacturing paradigms, thereby creating new opportunities for local employment.
- New generation of electronic devices opening up a range of new usage opportunities.

For visualisation and display systems:

- Strengthening of European scientific and business position leading to breakthroughs and innovative solutions for professional and consumer markets.
- Wider use of the third physical dimension for professional applications, movies, games and TV.

Funding schemes

CP, NoE, CSA

Indicative budget distribution

63 M€:
- 57 M€ of which a minimum of 14 M€ for IP, and a minimum of 22 M€ for STREP;
- NoE 3 M€;
- CSA 3 M€

Call:

FP7-ICT-2007-1

Objective ICT-2007.3.3: Embedded Systems Design

Target outcomes

a) **Theory and methods for system design:** Methods that can increase system development productivity while achieving predictable system properties, including dependability and security. This will require a formal framework for systems design in addition to holistic and adaptive component-based design and verification methods. Key issues encompass heterogeneity (building embedded systems from components with different characteristics); composability; predictability of extra-functional properties such as performance and robustness (e.g. safety, security, timing and resources); concepts and tools for specifying and evaluating security properties; adaptivity for coping with uncertainty; and unification of approaches from computer science, electronic engineering and control. International cooperation should address foundational research challenges and provide mutual benefits; cooperation activities with the US National Science Foundation (NSF) will continue and extend to other countries.

b) **Suites of interoperable design tools for rapid design and prototyping:** integrated tool chains that respond to the needs of industry for designing and prototyping embedded systems. Research will contribute to one or more of: (1) increased interoperability of tools from SME vendors (Funding schemes: STREP, CSA); (2) consolidating tool developer's joint RTD work through strong long-term partnerships that enjoy the commitment of major tool users; and (Funding schemes: IP) (3) open tool frameworks facilitating new entrants and the integration of the tool chain including associated standardisation (Funding schemes: STREP, CSA). Key issues include: (i) technology for efficient resource management, (ii) optimising compiler technologies, including parallelisation, taking into account features of the targeted execution platforms and extra-functional requirements; (iii) optimised tools respecting trade-offs when co-developing hardware and software; and (iv) model-driven development.

c) **Coordination of national, regional and EU-wide R&D programmes:** initiatives to advance the European Research Area in the field of embedded systems**.**

Expected impact

- Increased productivity of system development by at least one order of magnitude, making it possible to assemble systems in modular fashion.
- Improved competitiveness of European companies that rely on the design and integration of embedded systems in their products by reducing costs and time to market.
- Emergence and growth of new companies that supply design tools and associated software. Stimulate high-tech European companies that offer innovative solutions and tools for embedded systems design.
- Reinforced European scientific and technological leadership in the engineering of complex systems.
- Enhanced synergies between national policies, stronger impact of European RTD strategies and emergence of a European Research Area in embedded systems.

Funding schemes

a): CP (STREP only), NoE; b): see details in the text above; c): CSA

Indicative budget distribution

40 M€:
- CP 34 M€ of which a minimum of 5 M€ to IP and a minimum of 19 M€ to STREP;
- NoE 4.5 M€;
- CSA 1.5M€

Call

FP7-ICT-2007-1

Objective ICT-2007.3.4: Computing Systems

Target outcomes

a) **Novel architectures for multi-core computing systems:** New architectures and the corresponding system-level software and programming environments advancing from single to multi-core scalable and customisable on-chip systems incorporating multiple, networked, symmetric or heterogeneous, fixed or reconfigurable processing elements. Priorities include: (1) versatility in terms of performance, power and coping with the requirements of entire classes of applications and markets, ranging from low-end consumer electronics to high-end computing applications; (2) programmability to allow harvesting the full potential of the hardware at reasonable effort; and (3) reliability and availability. This includes interconnection (from bus to network-on-chip), memory hierarchies, security, operating systems and run-time tools, languages and resource/domain-aware compilers supporting parallelism and concurrency.

b) **Reference architectures for generic embedded platforms:** Development of a limited number of reference designs/architectures for embedded platforms that allow industrial users to engineer new applications with minimal effort. Reference designs/architectures should be as generic as possible, cutting across application domains, and be accompanied by appropriate tools and component libraries. The initial priorities are conceptualisation, analysis, design, demonstration and evaluation of the prototype platforms. The architectures will concentrate on composability, networking, robustness/security, diagnosis/maintainability, and resource management, evolvability and self-organisation.

Expected impact

- Mastery of new computing architectures allowing European companies to achieve world-leading positions in computing solutions and products.
- Increased market share of European suppliers through the availability of inexpensive generic embedded platforms.
- Widespread integration of powerful computing solutions in products.
- European excellence in computing architectures, system software and platforms. Strengthened European competence in the use of high-end computing to enable the development of new applications.

Funding schemes

a): CP (STREP only), NoE; b): CP (STREP only)

Indicative budget distribution

25 M€:
- CP 20 M€;
- NoE 5 M€

Call:

FP7-ICT-2007-1

Objective ICT-2007.3.5: Photonic components and subsystems

Target outcomes

a) **Core photonic components and subsystems,** which are essential in multiple application fields: (1) High performance lasers. (2) High brightness, power efficient solid-state light sources for ICT and general lighting applications. (3) Optical fibres for high performance and for specific functions. (4) High performance image sensors. (5) Sensors exploiting innovative sensing principles.

b) **Application-specific photonic components and subsystems** for application fields, which are strategic for Europe and which are important drivers of photonics technology development: Components and subsystems for: (1) truly cost effective broadband core networks at 40 Gb/s or beyond per channel. (2) scalable, future-proof and economic broadband access and local area networks. (3) minimally invasive medical diagnosis and prevention. (4) sensing for environment, well-being, safety and security.

RTD on photonic components and subsystems may also cover related materials and fabrication technologies (including mounting and packaging), and related photonic system concepts.

c) **Underlying technologies**: (1) *Integration and manufacturing technologies:* Holistic approaches for: reducing the size and cost of photonic components and subsystems; improving their performance, manufacturability and testability; increasing their degree of functional integration; advancing photonic/electronic convergence. (2) *Design methodologies and tools:* Holistic and widely applicable approaches for designing photonic components to improve design quality and efficiency. This includes work on modelling, simulation and characterisation.

d) Complementary measures

- *Joint assessment* by users of prototype components, subsystems and equipment from European suppliers.
- *Networking, integration and structuring* of advanced photonics RTD capacities and activities.

e) Support measures

- Access to centres of expertise and foundries to facilitate the deployment of advanced technologies.
- Raising the interest of young people in careers in photonics, and stimulating cross-national schemes for graduate education.
- Supporting the development of RTD strategies through roadmapping, consensus building, coordination with Member or Associated States, and international cooperation.

Expected Impact

- Leading position of European industry in high-value photonic products.
- New photonic based applications in several industrial sectors with emphasis on communications, health, well-being, environment, safety and security.

- Continued European leadership Europe in RTD in photonics from components to systems, securing the necessary human resources and knowledge to design, produce and use new generations of photonic components.

Funding schemes

a-c): CP; d): CP, NoE; e): CSA

Indicative budget distribution

90 M€:
- CP 76 M€ of which a minimum of 26 M€ to IP and a minimum of 30 M€ to STREP;
- NoE 9 M€;
- CSA 5 M€

Call

FP7-ICT-2007-2

Objective ICT-2007.3.6: Micro/nanosystems

Target outcomes:

a) **Next-generation smart systems**[16]**:** Major breakthroughs in intelligent sensor and actuator systems complexity, miniaturisation, networking, and autonomy. Micro/nanoscale smart systems with higher performance at lower cost and lower power consumption for specific applications. Energy-management, scavenging and storing techniques. Design and packaging technologies for new sensors, actuators and microsystems, their combination and integration.. Innovative devices and integrated systems with very high density mass storage capacity building upon progress in solid-state semiconductors, micro/nanodevices, mechanics, optics, electronics and magnetism.

b) **Micro/nano/biotechnologies' convergence:** Converging micro/nano, bio and information technologies for the development and production of integrated systems for specific applications, such as environmental monitoring, agriculture and food quality management, safety, security, biomedical and lifestyle applications. Innovative bioMEMS, biosensors, lab-on-chip microsystems and autonomous implants and bio-robots. Research will also address packaging, multilevel interfacing, manufacturing, as well as ethical and societal issues.

c) **Integration of smart materials:** Integration of micro-nano technologies and smart systems into new and traditional materials, e.g. textiles, glass, paper, etc. Major outcome is a new generation of advanced polymeric, biocompatible, bioconnective, flexible and very durable materials. Emphasis is on integration into, for example, smart fabrics (SFIT[17]) using micro/nanosystems at the fibre core, microelectronics components, user interfaces, power sources, software, all-in-one fabric, for personal (wearable) or other applications. Issues such as user-friendliness, quality, cost and comfort should be considered.

[16] Smart systems are understood as systems able to sense, diagnose, describe and qualify a given situation as well as able to mutually address and identify each other. They are able to interface, interact and communicate with their environment and with other smart systems.

[17] Smart Fabrics Interactive Textiles

d) **From smart systems to viable products:** Advanced microsystems manufacturing technologies for the whole value chain (design, materials, processes, micro-/nano-scale devices, packaging testing and reliability) with a focus on cost-effective sensor/actuator and system integration technologies, supported by alternative fabrication and testing processes for short time-to-markets. Pre-industrial validation of new manufacturing concepts suitable for large-scale production will also be addressed.

e) **Smart systems for communications and data management:** Smart micro/nanosystems enabling wireless access and facilitating intelligent networking with emphasis on the hardware required for communications and the management of smart device information. This includes solutions for adaptable RF and HF technologies (e.g. RFID, RF-NEMS and HF-NEMS). Data management, storage and processing functions of smart systems will also be addressed.

f) **Support actions** will ensure broad access to micro/nanosystems manufacturing technologies, in particular by SMEs, identify training and education needs of the area proposing appropriate measures and establish specific measures aiming at coordination and dissemination of smart systems integration RTD at European level.

Expected impact

- Substantial improvement on various aspects of smart systems integration: Higher product quality and reliability, increased miniaturisation, integration and functionality, lower costs, reduced power consumption, higher speed requirements and/or shorter time-to-market.
- Transformation of industrial production by adding intelligence to process control and the manufacturing shop floor, and by improving logistics and distribution - thereby increasing productivity.
- Increased market share for European companies across different industrial sectors by delivering systems with new functional capabilities and improved quality within a competitive timeframe.

Funding schemes

CP, NoE, CSA

Indicative budget distribution

83 M€:
- CP 75 M€ of which a minimum of 20 M€ for IP and a minimum of 32 M€ to STREP;
- NoE 4 M€;
- CSA 4 M€

Call

FP7-ICT-2007-2

Objective ICT-2007.3.7: Networked Embedded and Control Systems

Target outcomes:

a) **Middleware:** seamless connectivity and inter-working of embedded systems through new platforms that support composability, scalability and minimal power consumption while offering open interfaces to third parties for application development. Emphasis is on (1) programmability; (2) dynamic reconfiguration and ontologies; (3) enabling privacy, security and trust; and (4) predictable connectivity and QoS awareness. Priority

application domains are: private/home/building, nomadic and manufacturing. Support may also be provided to industry-driven initiatives for sharing software source code and for standardisation activities in the broader embedded systems domain.

b) **Cooperating objects and Wireless Sensor Networks:** spontaneous cooperation of objects in spatial proximity in order to jointly execute a given task. This will require (1) new methods and algorithms to support different cooperation concepts and modes; (2) hardware/software platforms including operating systems or kernels and communication protocols to enable distributed optimal execution; and (3) programming abstractions and support tools to facilitate third party programming of self-organising systems composed of heterogeneous objects. Research challenges also include dynamic resource discovery and management, semantics that allow object/service definition and querying for data and resources, advanced control that makes the systems reactive to the physical world, as well as security and privacy-enabling features. While the developed technology should be generic, it should be driven by an entire class of ambitious future applications in which scalability and deployment should be addressed. International cooperation on foundational research with the USA and other countries is encouraged.

c) **Control of large-scale complex distributed systems:** New engineering approaches that ensure efficient, robust, predictable, safe and secure behaviour for manufacturing and process plants and for large scale infrastructures such as distributed energy production, energy distribution, airports or seaports etc. Key challenges include (1) developing generic modelling and design methods, dynamically reconfiguring architectures, languages and scalable algorithms for the control of evolvable, distributed and adaptable systems; (2) mastering complexity, temporal and spatial uncertainties such as delays and bandwidth in communications and node availability; and (3) integrating advances in sensor networks for closing the control loop. Research should strengthen and consolidate European excellence in systems sciences and engineering by encouraging the control, computer and communications sciences and engineering communities to work together. International cooperation with the USA, Russia and W. Balkans is encouraged.

Expected impact:

- Control of 10 times more complex systems at 10% of today's effort. Achieve 100% plant availability, reduce maintenance time and cost by 50% and industrial accidents by 30%.
- New services and applications that are tailored to specific needs, seizing new market opportunities.
- More efficient, flexible, secure, easier to maintain and more productive large infrastructures (eg. power grid, water supply), manufacturing and process plants.
- Enable low-cost monitoring of the environment and natural resources.

Funding schemes

a) CP (STREP only), CSA for source code sharing and for standardisation initiatives

b) CP (STREP only), NoE

c) CP (STREP only), CSA for international cooperation

Indicative budget distribution

47 M€:

- CP 41 M€;

- NoE 4 M€;

- CSA 2 M€

Call:

FP7-ICT-2007-2

3.4 Challenge 4: Digital Libraries and Content

In today's society individuals and organisations are confronted with an ever growing load and diversity of information and content, and with increasing demands for knowledge and skills. Coping with these demands requires progress in three closely related domains. First, content should be made available through digital libraries and its long-term preservation, accessibility and usability must be ensured. Second, we need more effective technologies for intelligent content creation and management, and for supporting the capture of knowledge and its sharing and reuse. Third, individuals and organisations have to find new ways to acquire, contribute and exploit knowledge, and thereby learn.

The challenge, therefore, is to harness the synergies made possible by linking content, knowledge and learning; to make content and knowledge abundant, accessible, interactive and usable over time by humans and machines alike. This should take into account current trends in content production and consumption and particularly the move from few-to-many to many-to-many models. Europe, with its unique cultural heritage and creative potential, is well placed to take advantage of this paradigm shift and to be a key actor in the knowledge economy.

The research is expected to firmly establish digital libraries services as a key component of digital content infrastructures, allowing content and knowledge to be produced, stored, managed, personalised, transmitted, preserved and used reliably, efficiently, at low cost and according to widely accepted standards.

The support of more personalised and collaborative services, particularly within self-organising communities, will lead to more creative approaches to content and knowledge production.

Improvements are also expected in terms of the usability, accessibility, scalability and cost effectiveness of the resulting methods, technologies and applications with respect to large amounts of data and concurrent users.

The work will strengthen the link between content, knowledge and permanent learning processes. It will improve our ability to master and exploit content and knowledge and to learn in increasingly dynamic working environments.

The work carried out under this challenge will contribute to the implementation of the "i2010: Digital Libraries" initiative.

Objective ICT-2007.4.1 (ICT-2007.4.3): Digital libraries and technology-enhanced learning

Target outcome

For digital libraries

Medium term:

a) **Large-scale European-wide digital libraries** with innovative access services that support communities of practice in the creation, interpretation and use of cultural and scientific content, including multi-format and multi-source digital objects. They should be combined with robust and scalable environments which include semantic-based search capabilities and essential digital preservation features. Particular attention is given to cost-effective digitisation processes and to the use of digital resources in multilingual and multidisciplinary contexts.

Longer term:

b) **Radically new approaches to digital preservation**, such as those inspired by human capacity to deal with information and knowledge, exploring the potential of advanced ICT to automatically act on high volumes and dynamic and volatile digital content, guaranteeing its preservation, keeping track of its evolving semantics and usage context and safeguarding its integrity, authenticity and long term accessibility over time.

There is a specific focus on the creation of a network of centres of competence for digitisation and preservation, building upon, pooling and upgrading existing resources in the Member or Associated States.

For technology-enhanced learning

Medium term:

c) **Responsive environments for technology-enhanced learning** that motivate, engage and inspire learners, and which can be embedded in the business processes and human resources management systems of organisations. They support the transformation of learning outcomes into permanent and valuable knowledge assets. Focus is on the mass-individualisation of learning experiences with ICT (contextualized and adaptable to age, situations, culture, and learning abilities), through pedagogically-inspired solutions for competency, skills and performance enhancement. Activities integrate pedagogical and organisational approaches and exploit, where relevant, interactivity, collaboration and context-awareness. Interdisciplinary research should deliver a convincing and theoretically sound body of evidence as to which approaches are effective and under which circumstances.

Longer term:

d) **Adaptive and intuitive learning systems**, able to learn and configure themselves according to their understanding and experience of learners' behaviour. Cross-disciplinary research on the synergies between learning and cognition in humans and machines should lead to systems able to identify learner's requirements, intelligently monitoring progress, capable of exploiting learners' abilities in order to let them learn better, and able to give purposeful and meaningful advice to both learners and teachers either for self-learning or for learning in a collaborative environment.

Research on both themes of this objective is to be carried out by cross-disciplinary teams and it should include empirical evaluation studies assessing the broader socio-economic context in which technology is to be embedded.

Expected impact

- Unlocking people's and organisations' abilities to access content, master it, transfer it to the desired contexts and preserve it over time. Widespread use of these resources in the collaborative creation of cultural experiences.
- EU-wide migration of content to digital form involving memory institutions (libraries, archives and museums), leveraging national initiatives, and resulting in a significant increase of content available through digital libraries.
- Faster and more effective acquisition of knowledge, competences and skills, increased knowledge worker productivity, and more efficient organisational learning processes.

Funding schemes

CP, NoE, CSA

Indicative budget distribution

102 M€:
- CP 87 M€ of which a minimum of 39 M€ to IP and a minimum of 21 M€ to STREP;
- NoE 10 M€;
- CSA 5 M€

Calls

FP7-ICT-2007-1 [52 M€], FP7-ICT-2007-3 [50 M€]

Objective ICT-2007.4.2 (ICT-2007.4.4): Intelligent Content and Semantics

Target outcome

Medium term:

a) Advanced **authoring** environments for the creation of **novel forms** of interactive and expressive content enabling multimodal experimentation and non-linear story-telling. These environments will ease content sharing and remixing, also by non-expert users, by automatically tagging content with semantic metadata and by using open standards to store it in networked repositories supporting symbolic and similarity-based indexing and search capabilities, for all content types.

b) Collaborative automated **workflow** environments to manage the **lifecycle** of novel and legacy media and enterprise content assets, from the acquisition of reference materials to the versioning, packaging and repurposing of complex products, including their linguistic and cultural adaptation to target markets and user groups. Empirical results from the psychology of human perception and attention will be used to identify salient multimedia segments and apply summarisation and encoding schemes that will improve content storage and transmission without affecting its perceptual properties.

c) Architectures and technologies for **personalised distribution, presentation and consumption** of self-aware, adaptive content. Detecting and exploiting emergent ambient intelligence they will use features embedded in content objects and rendering equipment to enable dynamic device adaptation, immersive multimodal experiences and contextual support of user goals and linguistic preferences. Privacy preserving learning algorithms will analyse user interactions with devices and other users so as to update and effectively serve those goals and preferences..

d) Actions geared towards **community building**, intended to stimulate cross-disciplinary approaches and a more effective user/supplier dialogue, and other measures, including field validation and standards, aimed at a faster **uptake** of research results. Usability and technology assessment studies, economic analyses and roadmaps to chart the democratisation of personal and community based multimedia production and management tools.

Longer term:

e) **Semantic foundations**: probabilistic, temporal and modal modelling and approximate reasoning through objective-driven research moving **beyond current formalisms**. Theoretical results will be matched by robust and scalable reference implementations. Usability and performance will be tested through large scale ontology mediated **Web integration** of heterogeneous, evolving and noisy or inconsistent data sources ranging from distributed multimedia repositories to data streams originating from ambient devices and sensors, supporting real time resolution of massive numbers of queries and the induction of scientific hypotheses or other forms of learning.

f) **Advanced knowledge management systems** for information-bound organisations and communities, capable of extracting **actionable meaning** from structured and unstructured information and social interaction patterns, and of making it available for activities ranging from information search through conceptual mapping to decision making. Such systems will exploit semantics embedded in multimedia objects, data streams and ICT-based processes, and rely on formal policies to manage user access as well as audit trails in support of dynamic virtual organisations. Research advances will be embedded within end-to-end systems using **computer-tractable knowledge** in support of dynamic data and application integration, automation and interoperation of business processes, automated diagnosis and problem-solving in a variety of domains. Robustness, scalability and flexibility will be tested in real-life settings, together with interworking with legacy systems.

Expected impact

These activities will make digital resources that embody creativity and semantics easier and more cost-effective to produce, organize, search, personalise, distribute and (re)use, across the value chain.

- Creators will be able to design more participative and communicative forms of content.
- Publishers in creative industries, enterprises and professional sectors will increase their productivity with innovative content of greater complexity and ease of repurposing.
- Organisations will be able to automate the collection and distribution of digital content and machine-tractable knowledge and share them with partner organisations in trusted collaborative environments.
- Scientists will operate more efficiently by automating the link between data analysis, theory and experimental validation.

Funding schemes

CP, NoE, CSA

Indicative budget distribution

101 M€:
- CP 91 M€ of which a minimum of 39 M€ to IP and a minimum of 25 M€ to STREP;
- NoE 5 M€;
- CSA 5 M€

Calls:

FP7-ICT-2007-1 [51 M€], FP7-ICT-2007-3 [50 M€]

3.5 Challenge 5: Towards sustainable and personalised healthcare

Europe is facing the challenge of delivering quality healthcare to all its citizens, at affordable cost. Prolonged medical care for the ageing society, the costs of managing chronic diseases, and the increasing demand by citizens for best quality healthcare are major factors. Healthcare expenditure in Europe is already significant (8.5% of the GDP on average) and rising faster than the economic growth itself[18]. The emerging situation calls for a change in the way healthcare is delivered and the way medical knowledge is managed and transferred to clinical practice. ICT are key to implement these changes in this information intensive domain.

ICT may offer useful capability to improve illness prevention and safety of care, facilitate active participation of patients and enable personalisation of care that open new opportunities in health and disease management. The new capabilities of modelling, simulation and biomedical imaging, combined with knowledge about diseases that ranges from molecular to organ and system levels, give rise to a new generation of predictive medicine. This will bring radical improvements to the quality and efficiency of our healthcare systems.

In this challenge support will go to highly interdisciplinary research aiming at:

- Improved productivity of healthcare systems[19] by facilitating patient care at the point of need, health information processing and quicker transfer of knowledge to clinical practice.
- Continuous and more personalised care solutions, addressing the informed and responsible participation of patients and their informal carers (family/friends) in care processes, and responding to the needs of elderly people.
- Savings in lives and resources by focusing on prevention and prediction rather than on costly medical interventions after symptoms and diseases have developed.
- Higher patient safety by optimising medical interventions and preventing errors by helping to optimise medical interventions and to prevent errors.
- Leadership of the eHealth and medical imaging/devices industry that is well rooted in Europe, and attracting back to Europe research activities of the pharmaceutical industry.

All activities will address user needs, personal data security, confidentiality, privacy as well as the reimbursement scheme and legal framework for using new systems. Validation should include quantitative indicators of the added value and potential impact of the proposed applications. The integration in healthcare processes and the interoperability of eHealth systems should be part of the design and validation of the proposed solution. Solutions for chronic disease management will address the needs of many citizens (notably the elderly) for better health, well-being and mobility therefore contributing directly to the priority of achieving an **Inclusive European Information Society** as set in the strategic framework**, i2010 – European Information Society 2010**[20]**.**

[18] Health at a Glance: OECD Indicators 2005.

[19] It is estimated that redundancy and inefficiency account for 25-40% of the $3.3 trillion spent worldwide on healthcare every year ("The no-computer virus", Economist, 28 April 2005).

[20] See COM COM(2005) 229 final : "i2010 – A European Information Society for growth and employment"

Objective ICT-2007.5.1: Personal Health Systems for Monitoring and Point-of-Care diagnostics

Target outcome:

a) **Personalised Monitoring:** Innovative systems and services aimed at health status monitoring for persons at risk or with chronic health conditions, including those associated with ageing[21]. Solutions will be based on wearable or portable/mobile ICT systems, which empower citizens to participate in healthcare processes and facilitate remote monitoring and care at preferred environments, including homes. Emphasis will be on non-invasive or minimally-invasive, multi-parametric monitoring, combined with expert feedback and care, in closed-loop systems. Multi-parametric monitoring will encompass various health parameters (e.g. vital body signs or biochemical analytes) that determine the health state of an individual, and can also include information regarding activity, location, social and environmental context. Intelligent systems will combine and correlate multi-parametric data with expert biomedical knowledge. The developed systems will be interoperable with electronic medical records and the proposed solutions will have potential for adoption in actual healthcare systems. Specific focus will be on:

1) *Chronic disease management*: Proposed solutions will have potential for integration in the healthcare process, including nursing care, primary or secondary healthcare and homecare. Intelligent closed-loop approaches will detect and assess trends and episodes, facilitate adaptive care (e.g. drug administration or new treatment regime) and promote doctor-patient interaction. This will be done, where clinically valid, remotely, anytime, anywhere, avoiding hospitalisation of patients.

2) *Preventive monitoring* for people at risk (e.g. with personal/family history related to a disease or medical episode) to identify evolving patterns/trends in health and lifestyle parameters (e.g. in immune system status, sleep, nutrition, activity), which indicate elevated risks of developing diseases or reveal episodes at early stages. Solutions will ensure the necessary involvement of healthcare professionals, facilitate personalised guidance, encourage citizen compliance or prompt for early medical intervention.

b) **Point-of-Care diagnostics:** Systems for multi-analyte screening applications at primary care level. These will be portable or handheld devices, based on e.g. microarray and Lab-on-a-Chip technologies, capable of carrying out multiple tests at e.g. genome, proteome, metabolome levels. They will be able to identify predisposition to diseases, enable early diagnosis of a disease or their recurrence, and also provide detailed information to aid treatment, such as dosage advice or indicate when an individual should not be treated by a particular drug. Systems will demonstrate significant advances in sensitivity and specificity, and also in processing, analysis and quality control of the data produced. Particular attention will be paid to the interface with hospital and laboratory information systems and with electronic medical record systems.

Projects will aim at targeted solutions that integrate all necessary technologies and components (e.g. sensors and networks, interfaces, intelligent algorithms, services over converged platforms). Wherever necessary, new technologies and components will be developed.

c) **Coordination and Support Actions** on the following three topics: (1) RTD roadmap on Personal Health Systems identifying emerging technologies and potential applications, taking into account user demand, business aspects, ethical and legal considerations. (2)

[21] Specialised activities related to elderly, like integration of health and social care systems, will be coordinated with Challenge 7.

Reliability aspects of wireless transmission of health-related information and any needs for exclusive radio frequency bands for continuous provision of care. (3) Promotion and further recommendations for interoperability of Personal Health Systems with other eHealth systems, in the landscape of continuous care.

Expected impact:

- A valuable contribution to the stabilisation of the cost of the health delivery systems without compromising the quality and efficiency of healthcare. Improving the productivity of healthcare systems by facilitating of patient care at the point of need and through better health information processing. Accelerating the establishment of interoperability standards and secure and seamless communication of health data between all involved partners, including patients. .
- Reinforced leadership of the EU Personal Health Systems industry, including consumer ICT products for initial assessment, monitoring and management of the health status.
- Higher quality care at the patient location, and resource savings by reducing hospitalisation and costly medical interventions.Better support and increased reassurance for people at risk. Facilitation of more active participation of citizens in illness prevention and care processes.

Funding schemes

a-b): CP; c): CSA

Indicative budget distribution

72 M€:

a-b): CP 70.5 M€ (IP only); c): CSA 1.5 M€ Up to one CSA of maximum 500 K€ EC funding and 1 year duration for each topic

Call:

FP7-ICT-2007-1

Objective ICT-2007.5.2: Advanced ICT for Risk Assessment and Patient Safety

Target outcome:

a) **Advanced computerised adverse event systems:** Identification of common patterns in safety-relevant events beyond merely reporting nosocomial infections and/or Adverse Drug Events (ADE). These alerting and management support systems must incorporate new tools for prediction, detection and monitoring of adverse events and other relevant events impacting on patient safety. The solutions should be based on innovative data mining , integration techniques of existing databases and electronic health record systems, decision support systems, intelligent medication delivery (e.g. RFID-based), and adverse event reporting systems. Emerging technologies like semantic mining and semantic information integration should be validated on multimedia databases. Each proposal will include a validation scheme leading to quantitative benefits.

b) **New risk prediction for large scale events:** Investigation of all aspects related to ICT research in new risk prediction, assessment and management tools for preparation, surveillance, support and intervention in case of large-scale adverse health events. All relevant stakeholders in Europe and worldwide will be involved. This will complement

the efforts done by DG Health and Consumer Protection's's Health Emergency Operations Facility (HEOF) which uses a set of ICT tools to facilitate the spread of information concerning health related crisis[22].

c) **Collaboration with Latin America countries:** Following previous and existing activities such as @Health project and @LIS programme (Alliance for the Information Society)[23], a research project will aim at establishing collaboration between EU constituency and their Latin America counterparts in the area of patient safety. The proposal should build cooperation, transfer of technology and demonstration activities in the area of alert and decision support systems based on Electronic Health Records. The proposal should focus on the use of EU standards in this area.

Expected impact:

- World-leading levels of patient safety with fewer medical errors and optimised medical interventions resulting in savings of lives and resources.
- Early alerts and improved management of large scale health-related crises through effective and automated risk prediction, assessment and management.
- Accelerated and wider adoption of future electronic health record systems.
- International cooperation between EU constituency and the Latin America counterpart. Uptake of EU standards in the electronic Health Records area in Latin America.

Funding schemes

a): CP; b): CSA; c) CP

Indicative budget distribution

30 M€:

a): CP 26 M€ of which a minimum of 9 M€ for IP and a minimum of 9 M€ for STREP

b): Up to one CSA of maximum 1 year duration and maximum EC funding of 1 M€

c) CP (STREP only): 3M€

Call

FP7-ICT-2007-1

Objective ICT-2007.5.3: Virtual Physiological Human

Target outcomes:

Patient-specific computer models for personalised and predictive healthcare and ICT-based tools for modelling and simulation of human physiology and disease-related processes.

a) **Patient-specific computational modelling and simulation** of organs or systems targeting specific clinical needs such as prediction of diseases, early diagnosis, disease quantification, surgery planning, treatment and training. The computational models

[22] See http://ec.europa.eu/health/ph_threats/com/Influenza/influenza_level_en.htm
[23] See http://ec.europa.eu/comm/europeaid/projects/alis/index_fr.htm

should go beyond the state of the art of available models and be multilevel when appropriate. Projects will address one or more of the clinical application areas defined under the third bullet "Clinical applications and demonstrations".

b) **Data integration and new knowledge extraction:** Innovative software tools for data mining, representation, formalisation and image processing able to integrate heterogeneous multimedia information from distributed databases. These tools will be developed specifically for (1) Coupling scientific research data with clinical and large empirical databases with focus on the association of genotype-related data and phenotype-related data with specific computational models of diseases and treatments; (2) Automated image processing and analysis for the extraction of bio-medical parameters/markers used to assess the presence or evolution of a disease, focusing on specific organs and/or disease and demonstrating quantitative benefits in diagnosis and prognosis. Projects will address one of the clinical application areas defined under the third bullet "Clinical applications and demonstrations".

c) **Clinical applications and demonstration of tangible benefits of patient-specific computational models:** All projects addressing the two technical bullets above will fall into one of the following application areas: (1) Intelligent medical simulation environments for surgery training, planning and interventions; (2) Prediction of disease or early diagnosis by integrating patient specific knowledge and predispositions obtained in biomedical imaging; (3) Advanced environment for simulation and assessment of the efficacy and safety of specific drugs.

All models will be fully verified and validated, so that they can be deployed as part of an ICT infrastructure that provides integral access to clinical users. The use of open environments and open-source software is expected to allow for future extensions of models.

d) **Networking action** on integrating European research in the field of multilevel modelling and simulation of human anatomy and physiology. Sustainable integration will be achieved through a rather limited partnership with demonstrated scientific excellence. Jointly executed research will focus on methodological issues and mechanisms that favour sharing knowledge, multidisciplinary training programmes and reusable software tools.

e) **Coordination and support actions** on (1) Enhancing security and privacy in VPH, in particular for patient data processed over distributed networks. The proposed solutions will address the implications of the use of genetic data, e.g. genetic predispositions, and identify the required technology developments and implementation challenges. (2) Specific International Cooperation Action on healthcare information systems based on Grid capabilities. Insight into research activities undertaken in the target countries of Latin America, Western Balkans, Mediterranean countries, aiming at optimizing the use of bio-medical data and computing resources. New opportunities for collaboration will be explored and a set of future activities identified.

Expected impact:

- New environments for predictive, individualised, evidence based, more effective and safer healthcare. Reduced medical errors and improved patient safety through simulation of adverse drug effects on patient models. Accelerated development of safer drugs and medical devices through in-silico environments.
- Improved semantic interoperability of biomedical information and contribution to a common health information infrastructure.

- Strengthened leadership of EU medical imaging industry contributing to attracting back to Europe the research activities of the pharmaceutical industry.
- Increased European multidisciplinary research excellence in biomedical informatics and molecular medicine by fostering closer cooperation between ICT, medical device, medical imaging, pharmaceutical and biotech companies.

Funding schemes

a-c): CP; d): NoE; e): CSA

Indicative budget distribution:

72 M€:

a-c): CP 62 M€ of which a minimum of 22 M€ for IP and a minimum of 22 M€ for STREP

d): Up to one NoE with a maximum EC funding of 8 M€

e): CSA 2 M€ - Up to one CSA per topic with a maximum EC funding of 1 M€

Call

FP7-ICT-2007-2

3.6 Challenge 6: ICT for Mobility, Environmental Sustainability and Energy Efficiency

This challenge focuses on systems for safer and more efficient mobility of people and goods and on raising Europe's capacity for sustainable growth. Europe has ambitious goals for sustainable development[24] related to climate change and clean energy, sustainable transport and sustainable production and consumption. These require a new push in ICT research in these areas, involving major stakeholders such as the automotive and transportation industries, equipment suppliers, the telecommunications industry, motorway, road infrastructure and fleet operators, utility providers, public authorities, civil protection and service providers.

Research under this challenge addresses the major socio-economic challenges caused by Europe's increasing demand for mobility: increasing congestion, high consumption of energy, pollutant emissions, and above-all accidents causing fatalities and injuries. The forecasted increase of 26% in vehicle-kilometres and 38% in goods transport up to 2010 could in the worst case lead to a loss of 4% of the GDP in Europe, if counter measures are not taken. ICT research on transport issues, as identified notably in the Strategic Research Agendas of the ERTRAC European Technology Platform[25] and the eSafety Forum[26], addresses these challenges.

ICT research also addresses unsustainable trends which undermine future economic growth and impact severely on the quality of life and health of European citizens: increased demand for natural resources (e.g. 1-2% per year for energy, growing water consumption per person per day), rising waste volumes, degraded environment, higher risk exposure to diverse pollutants and to ever more frequent disasters. Through the research identified this challenge will actively contribute to the renewed sustainable development strategy, including the Water Framework Directive, the European Thematic Strategy on Air Pollution and the Action Plan on Environment and Health.

One major goal of this challenge is to achieve mobility in Europe that is virtually accident-free, efficient, adaptive, clean and comfortable. This includes reducing the energy consumed by transport with new ICT technologies applied to vehicles, transport systems, logistics and traffic management. In particular, the research is expected to make a major contribution towards the goal of achieving 50% reduction in road fatalities by 2010. The research, which will make an important contribution to the **i2010 "Intelligent Car" Initiative**[27], is expected to strengthen the competitiveness and technological leadership of Europe's automotive and supplier industries on the very competitive world markets. The challenge also contributes to the objectives resulting from the mid-term review of the 2001 Transport White Paper[28].

Another major goal is to reap the benefits of ICT to optimise the use of natural resources throughout their life cycles, including energy, to design smarter and cleaner processes with minimum waste, and to contain environmental degradation and related threats on human lives, infrastructures and the environment. In particular, research will help to achieve the EU targets of taking the lead towards more sustainable consumption and production in the global economy, hence contributing to a cleaner, safer and healthier global environment. Research will contribute to a stronger European capacity of mastering, predicting and managing the

[24] European Council: Austrian Presidency Conclusions: 16th June 2006, http://ec.europa.eu/sustainable/sds2006/index_en.htm
[25] http://www.ertrac.org/pdf/publications/ertrac_agenda_dec2004.pdf
[26] http://http://ec.europa.eu/information_society/activities/esafety/doc/esafety_2006/fp7_ict_stakeholders_input_pub.pdf.
[27] "Raising Awareness of ICT for smarter, safer and cleaner vehicles", COM(2006) 59 final of 15 February 2006
[28] Keep Europe Moving – Sustainable mobility for our continent, COM(2006) 314 finals, 22.6.2006

environment and its resources making use of ICT tools that interoperate reliably in a single information space.

Objective ICT-2007.6.1: ICT for Intelligent Vehicles and Mobility Services

Target outcome

a) ICT research in **Intelligent Vehicle Systems** will offer a higher degree of accident prevention through improved driver-warning strategies, hazard detection, actuation and sensing including sensor fusion and sensor networks, as well as the integration of independent safety systems and their interaction with the driver. Key targets are increased performance, reliable and secure operation as well as making vehicles "cleaner". New generation advanced driver assistance systems (ADAS) will increase vehicles' intelligence and contribute to safer and more efficient driving.

b) Research in **Mobility Services for People** aims at ICT for user-centered 'always-on' mobility services based on location-aware enhanced personalised services such as context-aware personal communications and always-available information access.

c) ICT research in **Mobility Services for Goods** targets safer, more secure, efficient and environment-friendly ICT-based freight transport solutions in both urban and long-haul operations, supporting the most suitable selection of modes for consignments and safeguarding them along the transport chain as requested by Commission's Communication on freight logistics[29]. Closer cooperation between actors in the field is a key issue.

Research under b) and c) will integrate a number of advanced technologies, e.g. low-cost GNSS receivers, software defined radio technologies, high-accuracy hybrid positioning systems combined with dynamic navigation services, semantic web and multi-agent technologies, as well as technologies such as RFID and smart tags in combination with advanced sensors, communication and mobility management systems. Projects will also address issues such as the development of business models for public private partnerships.

For a-c) specific needs of trucks, busses, two-wheelers and fleets, e.g. in public transport and logistics operations, will be addressed covering also the associated needs of other transport modes.

d) **Coordination and Support Actions** aim at the preparation of standards, agreed specifications and the ramping up of Field Operational Tests.

Expected impact

- World leadership of Europe's industry in the area of Intelligent Vehicle Systems and expansion to new emerging markets.
- Improved safety, efficiency and competitiveness of transport systems across Europe, with strong contribution to growth and jobs and towards the objective of reducing fatalities by 50% in EU-25 by 2010.
- New targets for efficiency and environmental friendliness in Europe's transport sector through new mobility services.
- Higher mobility of people and goods across different transport modes through the provision of accessible and reliable information services.

Funding schemes

[29] COM(2006) 336 final of 28 June 2006: "Freight Logistics in Europe – key to sustainable mobility"

a): CP; b-c): CP, CSA; d): CSA

Indicative budget distribution

57 M€:
- CP 54 M€ of which a minimum of 16 M€ for IP and a minimum of 22 M€ for STREP;
- CSA 3 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.6.2: ICT for Cooperative Systems

Target outcome

a) ICT research in **Co-operative Systems** will deliver advanced, reliable, fast and secure vehicle-to-vehicle and vehicle-to-infrastructure communication for new functionalities, real-time traffic management and new levels of support to active safety systems in vehicles and to the driver. By combining technologies such as accurate positioning and improved sensor networking, research is expected to lead towards "zero-accident" scenarios. An increasing number of vehicles with ICT-links to the transport infrastructure will make it possible to optimise traffic management at large scale.

b) **Field Operational Tests** are large-scale test programmes aiming at a comprehensive assessment of the efficiency, quality, robustness and user-friendliness of ICT solutions for smarter, safer and cleaner vehicles and real-time network management.

c) **Coordination and Support Actions** in the framework of the Intelligent Car initiative aim at international co-operation, standardisation and training activities as well as to assess socio-economic impact.

Expected impact

- Common pan-European architecture, standards and deployment model for co-operative systems.
- World leadership of Europe's transport industry in the emerging area of Co-operative Systems and in road and network operator's tools.
- Significant improvements in safety, security, energy efficiency, emissions reduction, comfort and sustainability of transport. This includes contribution towards the objective of reducing fatalities with 50% in EU-25 by 2010, and on longer term work towards the "zero-fatalities" scenario and a contribution to a significant reduction in the energy consumption and congestion in road transport.
- Proof-of-concept to all stakeholders through Field Operational Tests ensuring the wider take up of intelligent vehicle systems and co-operative systems.

Funding schemes

a): CP, NoE, CSA; b): CP; c): CSA

Indicative budget distribution

48 M€:

- CP 43 M€ of which a minimum of 19 M€ for IPs and a minimum of 12 M€ for STREP;
- NoE 2.5 M€;

- CSA 2.5 M€

Call

FP7-ICT-2007-2

Objective ICT-2007.6.3: ICT for Environmental Management and Energy Efficiency

Target outcome

a) ICT RTD in **Collaborative Systems for Environmental Management** aims to integrate environmental monitoring and management with an enhanced capacity to assess population exposure and health risks, to report to and alert targeted groups and to organise efficient response. The target is a Single Information Space for the Environment in Europe in which environmental institutions, service providers and citizens can collaborate or use available information without technical restraints. The activities will aim at dependable, flexible and user-centric shared solutions for sustainable use of natural resources and for better management of ecosystems including the mitigation of environmental degradation and associated threats. Research is expected to deliver visionary concepts and techniques, or strategic integrated approaches for ICT systems addressing environmental applications that are cost-effective, easy to set up and to operate. The focus is on generic systems that will integrate to a large extent autonomous, adaptive sensor networks[30], extended data fusion, rapid and secure access to distributed information, modelling, simulation and visualisation as well as computing facilities for decision making. Full attention will be on the optimisation of complex data flows across all decision levels, across borders and sectors. Typically, these collaborative systems will be validated in the case of fresh surface water, ambient air, outdoor or indoor.

b) One **Coordination and Support Action** in each of the following areas shall address (1) the rapid adoption of standards, protocols and open architectures, in support of the INSPIRE, GMES and GEOSS[31] initiatives in a holistic way; (2) coordination and roadmapping aspects of ongoing and future research in the field of ICT for natural or industrial disaster risk reduction and emergency management; (3) building the European Research Area through an ERA-NET in the field of ICT for environmental sustainability.

c) **Specific International Cooperation Action** in ICT for environmental disaster reduction and management, the assessment of natural hazards and communities vulnerability together with the development and interoperability of rapidly deployable ICT-based solutions for public warnings and emergency management. Target countries: ACP.

d) New and affordable **ICT for Energy-intensive Systems** for: (1) design and simulation of energy use profiles covering the entire life-cycle of energy-intensive products (manufacturing, use and disposal), services and processes; (2) intelligent and interactive monitoring of energy production, distribution, trading and use, e.g. intelligent metering, network management, in-house consumption management; and (3) innovative tools, business models and platforms for energy efficiency service provision providing continuous and accurate information to decision makers, in industry and policy making. The focus is on energy-neutral new or renovated home and working environments and efficient management of local power grids.

[30] See theme Security and Space for activities on satellite monitoring in support of GMES
[31] http://www.gmes.info, http://inspire.jrc.it, http://www.earthobservations.org

e) **Coordination and Support Actions** for the definition of research agendas, dissemination of research results in ICT-enabled energy-efficiency, promotion of best practice and awareness-raising activities Europe-wide and world wide.

Expected impact:

- Innovative applications and breakthrough ICT solutions in environmental monitoring and management, with perspectives for wide deployment and new market opportunities, while consolidating research efforts and building a European Research Area in the field.
- World-best technological capability to respond adequately to major environmental threats, with links to major environmental initiatives in Europe.
- World leadership in ICT-enabled energy efficiency through intelligent solutions and in support of Europe's objective to save 20% of energy consumption by 2020[32].
- Wide take-up of ICT systems to enable future buildings to become at least energy-neutral
- Position Europe in the international context for development of new ICT-supported approaches to produce, distribute and trade energy efficiently.
- Reduction in personal energy usage through analysis of information coming from the developed monitoring systems.

Funding schemes

a): CP; b): CSA; c): CP (STREP only), CSA; d):CP (STREP only); e): CSA

Indicative budget distribution

54 M€:

CP 43 M€ of which a minimum of 11M€ for IPs and a minimum of 27 M€ for STREP; CSA 11 M€;

[c) CP (STREP only), CSA: Up to 4 M€ will be allocated to the specific international cooperation action]

Call

FP7-ICT-2007-2

[32] Green Paper on Energy Efficiency "Doing more with less"

3.7 Challenge 7: ICT for Independent Living and Inclusion

ICT provides a major opportunity to integrate people at risk of exclusion and empower individuals to fully participate in the knowledge society. ICT also offers important means to address the challenges associated to the ageing population such as the rise in number of people with high disability rates[33], fewer family carers, and a smaller productive workforce.

For many people, in particular for groups at risk of exclusion, e.g. the growing part of the population that is over 60, the complexity and lack of utility, accessibility and usability of ICT is a major barrier.

The objective is to respond to these trends by mainstreaming and radically improving the accessibility and usability of new ICT solutions. This should ensure a better adoption and acceptance of ICT by people with disabilities, functional limitations or lacking digital competences, and may have a large spill-over effect to the wider society. In addition, new opportunities offered by ICTs will be exploited to help offset the impact of the ageing population, significantly prolonging independent living, and increasing active participation in the economy and in society. Finally new ICT solutions for improving social cohesion will be explored and developed.

EU level activities under this challenge addresse essential longer term RTD in ICT for independent living and active ageing and are expected to be complemented by a major initiative based on Article 169 of the Treaty, bringing together the research programmes of Member or Associated States for large-scale trans-national collaboration on applied RTD for 'Ambient Assisted Living'. A close coordination between these two actions will be ensured.

This challenge requires a multi-disciplinary and user-centred approach to RTD combining advanced technology research and systems level integration. Resulting solutions should meet user requirements and achieve wide acceptance.

Between 2010 and 2012, the research is expected to provide a substantial contribution towards the i2010 objective of an inclusive society and deliver ICT solutions that, in line with the 2006 Riga Ministerial declaration on Inclusion, help substantially reduce the 30% of the European population currently not using ICT. Research is also expected to provide prototypes of systemic ICT-based solutions capable of extending independence and prolonging active participation in society for the ageing population, as well as advanced solutions for other groups at risk of exclusion, notably marginalised young people. This should help create important new market opportunities for European industry and establish global leadership in inclusive ICT.

Objective ICT-2007.7.1: ICT and Ageing

Target outcome

a) Advanced prototypes of **systemic solutions for independent living and active ageing**, including mobility aspects and reorganization of integrated care and rehabilitation processes, leading to a **significant prolongation of personal autonomy and participation in society** across **prevailing age-related impairments**. The longer term multi-disciplinary work should build on and integrate progress in a number of underpinning technologies[34] and complement relevant work already launched under FP6.

[33] Age and disability are strongly correlated: 15% of the EU population has a disability; 70% of them will be over 60 by 2020.

[34] Examples are home platforms, mobile communications, context/location aware sensors, sensor networks, sensor data collection and fusion, micro and embedded systems, advanced robotic systems.

Proposals should aim to increase system efficiency and end-user acceptance by exploring usage of novel approaches such as self-learning and adapting systems, affective computing principles, models of human behaviour, human activity recognition, the flexibility of new mobile paradigms and devices, tracking technologies and sensors, ontologies for sharing of contextual information between different services and objects, 3D based multi-media interaction systems and virtual community technologies with appropriate privacy and ethical safeguards.

b) **Open systems reference architectures, standards and platforms** enabling systems and services for independent living, smart workplaces and mobility. These should support seamless integration and plug-and play operation of sensors, devices, sub-systems and integrated care services into cost-effective, self-maintaining, reliable, privacy-respecting and trusted systems.

c) **RTD roadmaps and socio-economic research** including recommendations on how to best address ethical and privacy questions associated to ICT and ageing.

d) **Contribution to standards setting, and strategic international cooperation with US and Japan** ensuring global relevance and impact of European RTD and preparation of future research areas within ICT & ageing.

Proposals should have ambitious objectives at the level of a complete system and aim at breakthroughs that go well beyond the state of the art. Industrial participation is encouraged in order to promote technology transfer and strengthen the exploitation potential. Due account shall be taken of the special accessibility and usability needs of the target user group. The work shall wherever possible build on test environments allowing for early user involvement and impact analysis in the RTD process.

Expected impact

- Increased personal independence, prolonging active participation in society – including an ubiquitous and friendly access to public information - and integrated care processes for the ageing population.
- New markets for independent and active living products and services through a set of open standards and platforms providing seamless and reliable integration of devices and services.
- Strengthened European industrial position in ICT and Ageing technologies and services by creating a common longer-term RTD agenda including relevant standardisation efforts and ethical or privacy issues.
- Reinforced European academic and industrial knowledge base and excellence in multi-disciplinary research on ICT for independent living and active ageing.

Funding schemes

a): CP; b): CP (IP only); c-d): CSA

Indicative budget distribution

30 M€:
- CP 27 M€ of which a minimum of 12 M€ to IP and a minimum of 6 M€ to STREP;
- CSA 3 M€

Call

FP7-ICT-2007-1

Objective ICT-2007.7.2: Accessible and Inclusive ICT

Target outcome

a) New approaches and solutions for **deeply embedding generalised accessibility support** within future mainstream ICT-based products and services. Examples are user interfaces and content representations adaptable to people with specific needs. It includes open, plug & play accessibility architectures and standards enabling a seamless integration of personalised assistive solutions for ICT access. The research is expected to develop and demonstrate the proposed solutions in a realistic user context and strong industrial participation is envisaged to promote consensus building and facilitate exploitation.

b) New methods and tools for **computer simulation of the user interaction and computer-based validation frameworks (**e.g. immersive environments**)** providing support to developers of ICT-based products and services for verification and optimisation of accessibility features at all development stages.

c) **Advanced self-adaptive ICT-enabled assistive systems based on non-invasive Brain to Computer Interaction (BCI)**, possibly combined with other interaction modalities. The multi-disciplinary research should aim to combine a critical mass of European research to integrate progress in sensor technology, self-adaptive systems and assistive technologies into effective BCI-based systems usable outside the laboratory, e.g. in a home environment. The solutions should be capable of compensating for functional impairments and augmenting the individual performance of people with disabilities, in application fields such as access to ICT-based products and services, neuro-prosthesis control and support to rehabilitation and training.

Proposals addressing sub-area b) and c) are expected to contribute to the emergence of common European implementation platforms, RTD roadmaps, dissemination and outreach activities. Industrial participation is encouraged.

d) Targeted and exploratory ICT research on innovative communication and shared creative environments aimed at **facilitating social inclusion of marginalised young people.** A limited number of small scale preparatory actions should contribute to a future research agenda. Proposals addressing this area should be supported by organisations having a track-record in research on ICT and marginalised young people.

e) In the field of accessibility: Coordination of national research activities. In the field of assistive technologies: Coordination of constituencies and development of future research agendas; international co-operation with North America and Asia; achieving a better understanding of ethical issues; market requirements, barriers and cost-benefit aspects.

Expected impact

- New market opportunities for European industry and promote a global leadership in inclusive ICT.
- Mainstreamed accessibility of ICT and radical improvement in accessibility of future ICT products and services[35] by people with disabilities and functional limitations. Open, standards-based and seamless interfacing of general purpose and assistive ICT and embed personalised accessibility features deep into mass-market ICT technology design.

[35] E.g. digital terrestrial and mobile television, next generation mobile handsets, web 2.0, content management systems, Digital Rights Management solutions, virtual/immersive environments, home appliances

- Facilitated development and production of accessible ICT products and services through the availability of new tools and methods to allow developers to verify and optimise accessibility at all development stages.
- Wide spread practical use of BCI-based assistive technologies to demonstrate a potential quantum leap in self-learning assistive solutions. (c)
- Stronger RTD capacity through delivery of proof of concept for ICT solutions facilitating social inclusion of marginalised young people. (d)

Funding schemes

a): CP (IP only); b-c): CP (Up to one IP, STREP); d): CP (STREP only); e): CSA

Indicative budget distribution

43 M€:
- CP 40 M€ of which a minimum of 20 M€ to IP and a minimum of 8 M€ to STREP;
- CSA 3 M€

Call

FP7-ICT-2007-2

3.8 Future and Emerging Technologies

The challenge is the timely identification and substantiation of new directions that have a high potential for significant breakthrough and that may become the foundations of the information and communication technologies and innovations of tomorrow. This is especially important in areas where industry roadmaps still contain major roadblocks that cannot be addressed by incremental approaches.

Research will consist of radical interdisciplinary explorations of new and alternative approaches towards future and emerging ICT-related technologies, aimed at a fundamental reconsideration of theoretical, methodological, technological and/or applicative paradigms in ICT. It will deliver proofs-of-concept for radically new options where none existed before, or that demonstrate new possibilities where none were suspected. It will further establish a credible and sufficiently strong science and technology basis in such new and emerging areas, by supporting research for refining visionary concepts, by bringing them to the maturity level where investment from industry can be attracted, and by helping new interdisciplinary research communities to establish themselves as bridgeheads for further competitive RTD.

Expected impact:

Future and Emerging Technologies (FET) research is long-term and high-risk but 'purpose driven'. It derives its *raison d'être* from the broader context of the ICT programme to which it explicitly contributes in at least two ways.

First, by being open to a broad spectrum of needs, opportunities and solutions, it avoids the risk of 'tunnel vision' in ICT research and acts as an early indicator of new directions and opportunities for research in ICT ('FET-Open').

Second, it serves as a pathfinder that prepares for future directions in which the ICT programme, together with industry, may create the critical mass that can really make a difference for Europe in the long run ('FET proactive'). These directions are motivated by fundamental long-term challenges in ICT that will be key to the long-term sustainability of a technological future in Europe, such as:

- Rethinking the nature of computing, where basic notions of information, computation and communication are revisited, and fundamental characteristics of matter (quantum behaviour, dynamics of atoms, molecules, cells, neurons, photons) are exploited to develop radically new types of logic and components ('QIPC and other quantum technologies' and 'Bio-ICT convergence').
- Opening new directions for the physical realisation of ICT beyond CMOS that can achieve greater miniaturisation, efficiency and integration; and to learn to design and manage massive numbers of such devices integrated in a single chip ('Nano-scale ICT devices and systems' and 'Massive ICT systems').
- To embrace change within ICT systems as a fundamental property, so that they can develop, grow, self-assemble, replicate, evolve, adapt, repair themselves and self-organise over long periods of time, while maintaining essential operational conditions of security and dependability ('Pervasive adaptation').
- To understand and harness the transformational forces of new ICTs on society, especially when large-scale deployment (of, for example, massive commercial services, high bandwidth mobile communication, immersive collaborative environments, surveillance systems or ubiquitous robotics) leads to emergent effects

that are often unanticipated by the designers but readily exploited for new uses ('Science of Complex Systems for socially intelligent ICT').

- To respond to increasing expectation for trustworthy, dependable and long-lasting systems and information – expectations which current technologies can not meet ('ICT forever yours').
- To exploit the understanding of information processing in biological systems in order to develop new perspectives in ICT with clear advantages in terms of functionality, operating conditions (e.g., power needs, packaging requirements), resilience and adaptability, or to achieve technologies that can be naturally combined with biological systems ('Bio-ICT convergence').
- To master fundamental aspects of physical embodiment for smart devices in order to pave the way for a whole new range of smart artefacts (e.g. robots) of unprecedented diversity and behavioural characteristics ('Embodied Intelligence').
- To address the physical-virtual confluence that is enabled by advanced media and interface technologies but, if it is to become a broader enabler, needs new directions with a solid basis in research on human perception and action, the study of experiences, awareness, and the development of tighter couplings between the human and technological realms, leading to a re-conception of human-machine interaction and machine perception ('Human-Computer Confluence').

This research will establish the scientific and technological foundations of the technologies and innovations of tomorrow, in terms of knowledge, know-how and the readiness of a vibrant research community.

FET-Open will call for STREPs (2-stage submission procedure) and for coordination actions (CAs).

FET-proactive initiatives will call for STREPs, for IPs, or for both. In addition they will call for coordination actions (CAs).

The stimulation of international cooperation on foundational research in the areas addressed by a pro-active initiative is also encouraged. This is particularly relevant in Quantum Information Processing and Communication (QIPC), where such international cooperation will reinforce European leadership in this area. Similarly, international cooperation on foundational research promises to further enhance European leadership in nano-scale ICT devices and systems, and in complexity science, among others.

The 2007-2008 funding will be used to address the following themes in pro-active initiatives:

Call 1: FP7-ICT-2007-1

ICT-2007.8.1Nano-scale ICT devices and systems

ICT-2007.8.2Pervasive adaptation

ICT-2007.8.3 Bio-ICT convergence

Call 3: FP7-ICT-2007-3

ICT-2007.8.4Science of Complex Systems for socially intelligent ICT

ICT-2007.8.5Embodied Intelligence

ICT-2007.8.6 ICT forever yours

The following themes are likely to be among pro-active initiatives for funding in 2009-2010:

Massive ICT systems. The objective is to research, demonstrate and validate new computing architectures and algorithms that will allow designing, programming and managing future high-performance ICT components with up to one Tera (10^{12}) devices integrated in a single chip.

Human-computer confluence. To investigate an invisible, implicit, embodied or even implanted interaction between humans and system components, for natural interaction (including communication) in surrounding environments, themselves augmented with pervasive and ubiquitous infrastructures and services.

QIPC and other quantum technologies. To overcome major scientific, technological and theoretical challenges for quantum technology to deliver on its promise to radically outperform its classical counterpart not only in terms of processing speed, capacity and communication security, but also, in the ability to solve classes of practical problems which currently cannot be solved. This initiative also invites the exploration of a wider range of non-classical implementations of ICT. More generally, it will be important to strengthen international collaboration on foundational research in this area where Europe has established itself firmly at the leading edge.

FET-Open

Target Outcome:

FET-Open addresses the widest possible spectrum of research topics that closely relate to Information and Communication Technologies as these arise bottom-up. Since the supported topics are not predefined by the Work Programme but identified by the researchers themselves, FET-Open flexibly accommodates the exploration of new research horizons. Unconstrained by established approaches, it offers the opportunity to try out an unproven idea where the risk is too high for a larger RTD investment to be justified. Once established as credible and valid, a research topic may gradually grow into a wider field, supported by a dedicated research initiative or be taken over by mainstream programme activities in ICT. Rather than doing blue-sky research, a project in FET-Open should contribute to the realisation of a clear long term vision in the ICT domain and the project's objectives must address a key challenge for the realisation of this vision.

Expected Impact:

For STREP:

- ICT-relevant, visionary, high quality, long-term research of a foundational nature, involving bright new ideas of high-risk – high-pay-off, aiming at a breakthrough, a paradigm shift, or at the proof of a novel scientific principle, or
- Research refining the visionary ideas that have gone past the proof-of-concept phase to bring them to the maturity level where they could be taken up by the mainstream ICT programme objectives.

For CA:

- Emergence, shaping and consolidation of new and dispersed research communities and, where appropriate, the coordination of FET-relevant national or regional research programmes or activities or the stimulation of international cooperation in any area of relevance to FET. Each CA should aim at establishing critical mass, scientific excellence and multi-disciplinary diversity, as appropriate, around a new scientific discipline or research topic, defining future research directions, federating the research

communities around a common challenge and contributing to the preparation of joint programs of work.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

65 M€:
- CP 61 M€ (STREP only);
- CSA 4 M€ (CA only)

Call

Continuous, receivable from 6 March 2007 onwards

Objective ICT-2007.8.1: FET proactive 1: Nano-scale ICT devices and systems

Target outcome:

To demonstrate unconventional solutions to increase computing performance, functionality or communication speed, or to reduce cost, size and power consumption of ICT components beyond the expected limits of CMOS technology.

Research should cover at least one of the following points:

- Demonstration of new concepts for **switches or memory cells**, to substantially improve performance, cost, integration density and/or power dissipation beyond those of ultimate CMOS technology using nanostructures or non-charge based approaches. Complementary challenges include circuit architectures, assembly and reconfiguration.
- Demonstration of new concepts, technologies and architectures for local and chip-level **interconnects** with substantial improvements over current solutions. Key drivers are: transmission speed, integration density, reduction in power consumption, integration of new functions, ease of design and manufacturing.
- Demonstration of **radically new functionalities** by the integration of blocks from a few nanometres down to the atomic scale into high added-value systems. Candidates include NEMS and NEMS arrays; approaches based on photons, plasmons, phonons; approaches exploiting internal degrees of freedom of atoms and molecules and based on atomic precision control and addressability.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas, the mapping and benchmarking of research at European level, and the identification of drivers to assess research in nano-scale ICT devices and systems. They also address the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on topics described above.

Expected Impact

Projects on switches, memories or interconnects should open, verify and assess new unconventional approaches to ICT. They should demonstrate proof of concept at laboratory level to prepare future applied RTD. Projects on new functionalities should open radically new directions in ICT devices and technologies and aim at experimental demonstrations of principle, feasibility and concrete advantages.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ of which a minimum of 10 M€ to IP and a minimum of 4 M€ to STREP;
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-1

Objective ICT-2007.8.2: FET proactive 2: Pervasive adaptation

Target outcome:

Technologies and design paradigms for massive-scale pervasive information and communication systems, capable of autonomously adapting to highly dynamic and open technological and user contexts. Adaptation strategies (bio-inspired, stochastic or others) will operate at different time scales and speeds, from short term adaptation to long-term evolution, and will imply changes in software, hardware, protocols and/or architecture at different levels of granularity and abstraction. Projects will focus on one or both of the following areas:

- **Evolve-able and adaptive pervasive systems,** able to permanently adjust, self-manage, evolve and self-organise in order to robustly respond to dynamically changing environments, operating conditions, and purposes or practices of use.
- **Networked societies of artefacts** that adapt to each other and to changing needs, collectively harness dispersed information and pursue immediate or long-term goals for context-sensitive service delivery in rapidly changing and technology-rich environments.

Both technological and user aspects (in a social context) need to be considered in a multidisciplinary and integrated approach, considering in particular aspects such as:

- **Adaptive security and dependability**: theories, techniques and architectures, able to cope with the volatile landscape of risks, threats, attacks and context dependent user expectations for privacy and security in evolving and heterogeneous pervasive systems.
- **Dynamicity of trust**: capabilities for establishing trust relationships between humans and/or machines that jointly act and interact within ad-hoc and changing configurations.
- **Security for tiny and massively networked devices**: efficient, robust and scalable cryptographic protocols, algorithms and other security and privacy mechanisms, including hardware-based ones, as well as collective, biologically or socially inspired ones.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas and, where appropriate, the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on topics described above.

Expected impact:

Projects should make key contributions to achieving a new generation of massively scalable systems that, in spite of heterogeneity, noise and often unreliable conditions, can display a fundamental capacity for self-controlled adaptation and organisation. They should foster new

human-centric services, reducing management and maintenance cost, and ensure security and trust in pervasive applications, addressing the needs for both accountability and privacy.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ of which a minimum of 10 M€ to IP and a minimum of 4 M€ to STREP;
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-1

Objective ICT-2007.8.3: FET proactive 3: Bio-ICT convergence

Target outcome:

New perspectives in ICT that exploit the understanding of information processing in biological systems have demonstrable advantages in terms of functionality, operating conditions, resilience or adaptability or lead to systems that can be naturally combined with biological systems. Projects will integrate some of the following topics:

- **Novel computing paradigms**, derived from the information representation and processing capabilities of biological systems (networks of neurons or other cells), or from the computational interpretation of biological processes (molecular signalling, metabolism) and with measurable advantages over current approaches to difficult problems in information processing.
- **Biomimetic artefacts**: ad hoc hardware implementations of bio-inspired systems in areas where standard devices do not provide the required performance. This may use analogue and digital circuits, evolvable hardware, artificial cells, neuro-morphic chips or sensors for achieving life-like functionality or properties such as self organisation, robustness or growth.
- **Bidirectional interfaces** between electronic or electro-mechanical systems and living entities, at or close to the cellular level, with adequate control and/or signal processing algorithms, enabling direct interfacing to the nervous system or to other types of cells.
- **Biohybrid artefacts**, involving tightly coupled ICT and biological entities (e.g., neural or other types of biological tissue) for new forms of computation, sensing, communication or physical actuation or adaptation.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas and, where appropriate, the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on its topics described above.

Expected impact:

This multi-disciplinary research should foster joint progress and synergy in ICT and the bio- and neuro-sciences. Novel computing paradigms should lead to a fundamental rethinking of notions of information and computation that may be better suited for certain classes of problems and that can be implemented in biological, biomimetic or biohybrid devices. Such devices will need to satisfy requirements of, e.g., performance, resilience or energy

consumption that are currently difficult to meet. Research on bio-interfaces and bio-hybrid devices should enable new bio-compatible ICT uses that rely on direct interactions between the technological and the living, such as for robust brain-machine interfacing or for powerful sensory-motor capabilities.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ of which a minimum of 10 M€ to IP and a minimum of 4 M€ to STREP,
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-1

Objective ICT-2007.8.4: FET proactive 4: Science of complex systems for socially intelligent ICT

Target outcome:

Key concepts and tools for a data-intensive science of large scale techno-social systems, i.e., systems in which ICT is tightly entangled with human, social and business structures which, as a result, mutually transform each other for instance through evolution of acceptance, trust, innovative uses and technology changes. Projects will develop systematic means to gain knowledge on such systems and to model, predict and characterise their behaviour, their dynamics and evolution. They will demonstrate the use of this understanding in novel paradigms and designs for socially intelligent ICT. Projects will integrate the following topics:

- **Theoretical and algorithmic foundations** for scaleable modelling and simulation of such multi-level systems, taking into account the relevant technological, psychological and social dimensions and with realistic diversity of behaviours, social and spatial structures and knowledge on how humans and technologies relate to and impact on each other (e.g., acceptance, use, trust).
- **Data-driven simulation,** tools and techniques able to cope with huge sets of heterogeneous and often unreliable data to efficiently reconstruct dynamic system models at multiple levels. This includes data-rich probing technologies, protocols and experiments to gain realistic data on techno-social systems, and knowledge extraction based on scaleable and distributed methods.
- **Prediction and predictability:** mathematical and computational methods that help to characterize the nature and impact of transitions, novel properties and self-organising effects that can occur as systems massively scale up. . Understanding the limits of predictability will allow reliable, quantitatively accurate predictions leading to strategies for better guided ICT induced transformation or for keeping systems in their viability domain.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas, the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on topics described above.

Expected impact:

This research should contribute to a new multidisciplinary understanding of the ways in which ICT changes, moulds and becomes part of the systems to which it is applied, and lead to better targeted deployment of socially intelligent ICT systems. Breakthroughs will lead to deeper understanding and the ability to predict and design for instance new generations of autonomous information- or high-bandwidth communication systems by exploiting models of self-organisation, adaptability and social behaviour. Applications include e.g., massive service economies and other technology-dependent experimental economic models, ICT mediated communities, P2P systems, emergency management and disaster relief systems. Projects should indicate how efficient data gathering, simulation, prediction and control techniques can lead to more human-centric systems, can harness collective intelligence or behaviour, can support businesses and policy makers with best practices that have a clear and definable societal and economic added value or can contribute to solving long-term challenges such as sustainable growth, energy efficiency, or social inclusion.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ (IP only);
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-3

Objective ICT-2007.8.5: FET proactive 5: Embodied Intelligence

Target outcome:

New technologies and design approaches for building physically embodied intelligent agents and artefacts, with emphasis on the relationship between shape, function and the physical and social environment, and addressing one or several of the following:

- **Mind-body co-development and co-evolution** through permanent and extended multi-modal interaction of agents with the physical and social environment. Projects will develop a better understanding of the role of such interaction in open-ended learning and adaptation processes, including morphological change for shaping perception, cognition, cooperation and social intelligence. They will demonstrate qualitative and quantitative improvements in agent capabilities and characteristics.
- **Morphology and behaviour:** new design principles for sensing, actuation and locomotion components and for robot architectures that are based on a deeper understanding of the role of form and material properties in shaping behaviour, and of the ways in which these afford relationships and interactions with the environment and with other agents. Projects will aim to demonstrate advantages in physical and performance characteristics of the robot e.g., in terms of control, weight, flexibility, resilience, or other characteristics.
- **Design for emergence:** design paradigms and techniques for purposive agents where behaviour is not strictly programmed but robustly emerges from the interaction of the various components (each with local intelligence), the environment and its ubiquitous

information resources. Projects will develop smart components and techniques for the design of ambitious classes of scalable robotic systems, incorporating where possible prior knowledge on tasks or environments, while leaving the necessary room for emergence and adaptation.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas and, where appropriate, the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on topics described above.

Expected Impact:

This research should advance the state of the art in intelligent systems and in particular in robotics and ICT, as well as in other disciplines (neuroscience, sociology, biology). It should bring essential contributions for achieving robotic systems of greater morphological diversity, for a larger spectrum of uses, more natural and safer to interact with and more easily integrated in everyday environments. This will be key to unlock the 'long tail' of the robotic service market by enabling a wide variety of affordable robots for specific uses.

Funding schemes

CP, CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ of which a minimum of 10 M€ to IP and a minimum of 4 M€ to STREP;
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-3

Objective ICT-2007.8.6: FET proactive 6: ICT forever yours

Target outcome:

The mass diffusion of digital systems and their pervasiveness in our everyday lives increases our expectations on the dependability, security and longevity of these systems. This requires new built-in mechanisms for enhancing confidence in their usage, for protecting them from malicious intents and for preserving them from the threat of ageing, in the context of highly decentralised and incremental development and deployment practices. Projects should focus on one or several of the following:

- **Eternal Systems**: to develop a theoretical and practical framework for extremely long-lived systems, requiring minimal intervention and management to thrive in spite of changes in usage, host device, network context or data- and data protection formats. Systems should be future proof, able to preserve and update their original functionality in a machine-independent way, and ultimately by being self-sustaining and evolving.
- **Knowledge, diversity and time**: New approaches for eternal and reliable access to knowledge assets, in which knowledge parts are produced locally, but exploited globally, and are endowed with 'a sense of time and context' to make them robust against ageing, diversity of use and evolving semantics.
- **Secure and dependable software:** methods and tools for high-level verifiably secure and dependable programming, and new metrics to aid assessability of the security and

dependability of highly distributed and heterogeneous software or of ambient systems.

Coordination actions (CAs) should support the consolidation of research communities, their visibility, the coordination of research agendas and, where appropriate, the coordination of national or regional research programmes or activities. The initiative also encourages international cooperation in foundational research on topics described above.

Expected impact:

The research should contribute to systems that are more versatile in their interaction with modules, systems and services in their environment: adapting to change in the environment with minimal intervention, harnessing dispersed and dynamic content by exchanging knowledge at a semantic level that is robust against diversity of origin and use, preserving and even changing original functionality and properties over time, providing security to their environment through verifiably secure programming models, and offering assessable security of systems in the context of their environment.

Funding schemes

CP (IP only), CSA (CA only)

Indicative budget distribution

20 M€:
- CP 19 M€ (IP only);
- CSA 1 M€ (CA only)

Call

FP7-ICT-2007-3

3.9 Horizontal support actions

Objective ICT-2007.9.1 (ICT-2007.9.2): International cooperation

In addition to specific international cooperation activities that are addressed in the relevant objectives within the 7 Challenges and FET, horizontal international cooperation actions will be supported under this objective.

Target outcome:

a) Identification and promotion of cooperation opportunities, support to policy dialogues

Promotion of the EU ICT programme and identification of co-operation opportunities in fields of mutual interest by providing information in relevant countries and regions, increasing visibility of mutual RTD potential and networking relevant stakeholders. Actions will also aim at networking existing co-operation projects in view of exploiting synergies, maximising impact and contributing to the definition of co-operation strategies.

Strengthened Information Society policy dialogues with main partners. Actions will in particular ensure a co-ordination with the international activities launched in the Capacities Specific Programme, notably the INCO-NET schemes, the development of S&T Co-operation Partnerships and the support to the co-ordination of national policies and activities on international S&T co-operation.

b) Development-related ICT research exploitation and cooperation roadmaps

Specific International Collaboration Actions for development-related ICT research "cooperation roadmaps" identifying initiatives at local, regional or global level. These actions will focus on specific issues faced by developing ICPCs and will seek the direct involvement of organisations from these countries. The themes to be covered include:

- Language and speech technologies with particular focus on Arabic-speaking regions / countries (including Mediterranean Partner Countries and ACP countries). The overall objective is to reduce language barriers and broaden access, usage and interaction between ICT services and applications. This preparatory action will focus on requirements and options for cost-effective natural language systems (written or spoken) in domains such as automated translation, information retrieval and indexing. It will also aim to reinforce collaboration with Arabic research communities on natural language processing (NLP) methods and benchmarking, including for language resources such as corpora and knowledge bases.
- Open Source Software with particular focus on Asia, ACP and Latin America. To promote interoperability and the emergence of global open standards and practices. The objective will be to concentrate on OSS-based tools, services or applications of high potential for societal impact and wide diffusion of ICTs and to address in particular issues such as security, dependability, quality of service, maintainability and affordability.
- Accessible and inclusive ICT with particular focus on Latin America and ACP. To address the challenges related to the wide adoption and diffusion of ICTs and services. The focus should be on low-cost approaches for access devices and corresponding software, peripherals and infrastructures, as well as issues related to

the development of content and connectivity, notably through the deployment of wireless services and mobile web applications.

Expected impact

- Paving the way for strategic partnerships in view of gaining access to knowledge, developing global standards and interoperable solutions and strengthening EU competitiveness.
- Wider diffusion of the information society, especially in developing countries and strengthened EU policy for development.

Funding schemes

CSA

Calls

FP7-ICT-2007-1: 7 M€ - a) 5M€ with target regions ACP, India, South-East Asia and b) 2M€ (each sub theme is expected to be covered by only one action).

FP7-ICT-2007-3: 5 M€ - a) with target regions Eastern Europe and Central Asia (including Russia), Mediterranean Partner Countries, Latin America

Objective ICT-2007.9.3 Trans-national co-operation among National Contact Points

Target outcome

Reinforcing the network of National Contact Points (NCP) for ICT under the Seventh Framework Programme, by promoting further trans-national cooperation within this network.

The action will focus on identifying, understanding and sharing good practices and their context. This may entail various mechanisms such as benchmarking, joint workshops, training, twinning schemes and the establishment and operation of an effective partner search mechanism across the network of NCPs. Practical initiatives to benefit cross-border audiences may also be included, such as trans-national brokerage events. The specific approach should be adapted to the nature of the theme and to the capacities and priorities of the NCPs concerned. A degree of collaboration and networking with similar projects in parallel themes – especially in the context of joint/co-ordinated calls will be encouraged.

Special attention should be given to helping less experienced NCPs to access the know-how accumulated in other countries and to apply it in a locally relevant and efficient manner.

Proposals are expected to include and enable the active participation of all NCPs and other organisations which have been officially appointed by the relevant national authorities in the EU and associated countries. In individual special cases the NCPs can decide to subcontract this activity to specialist agencies. Other participants from the EU and associated countries are ineligible. If certain NCPs wish to abstain from participating, this fact should be explicitly documented in the proposal

The action may also involve official FP7 contacts from third countries.

The Commission expects to receive a single proposal under this heading.

It is expected that the project should last for a period of three years.

Expected impact

- An improved NCP service across Europe, therefore helping to simplify access to FP7 calls, lowering the entry barriers for newcomers, and raising the quality of submitted proposals.
- A more consistent level of NCP support services across Europe.
- More effective participation of organisation from third countries, alongside European organisations, in line with the principle of mutual benefit.

Funding schemes

CSA

Indicative budget distribution

3 M€

Call

FP7-ICT-2007-3

4 Implementation of calls[36]

	Budget[37] (M€)	Call 1	Call 2	Call 3	FET Open
Challenge 1:					
1. The network of the future	200	200			
2. Service and software architectures, infrastructures and engineering	120	120			
3. ICT in support of the networked enterprise	30	30			
4. Secure, dependable and trusted infrastructures	90	90			
5. Networked media	85	85			
6. New Paradigms and experimental facilities	40		40		
7. Critical infrastructure protection[38]	20		20		
Challenge 2:					
1. Cognitive systems, interaction, robotics	193	96		97	
Challenge 3:					
1. Next generation nanoelectronics components and electronics integration	86	86			
2. Organic and large-area electronics and display systems	63	63			
3. Embedded systems design	40	40			
4. Computing systems	25	25			
5. Photonic components and subsystems	90		90		
6. Micro/nanosystems	83		83		
7. Networked embedded and control systems	47		47		
Challenge 4:					
1. Digital libraries and technology-enhanced learning	102	52		50	
2. Intelligent content and semantics	101	51		50	
Challenge 5:					
1. Personal health systems for monitoring and point-of-care diagnostics	72	72			
2. Advanced ICT for risk assessment and patient safety	30	30			
3. Virtual physiological human	72		72		

[36] Most of the amount for Call 1 is from the 2007 budget; the remaining amount for Call 1 and for Calls 2, 3 and FET-Open relates to the 2008 budget and is under the condition that the preliminary draft budget for that year is adopted without modifications by the budgetary authority.

[37] Budget allocations as given are indicative. Implementation issues including budgetary aspects are currently under discussion between the Commission and Member States representatives.

[38] This joint call between the ICT-FP7 Theme and the Security-FP7 Theme may not fall together with ICT Call 2, but may be organised separately.

Challenge 6:					
1. ICT for the intelligent vehicles and mobility services	57	57			
2. ICT for cooperative systems	48		48		
3. ICT for the environmental management and energy efficiency	54		54		
Challenge 7:					
1. ICT and ageing	30	30			
2. Accessible and inclusive ICT	43		43		
FET					
Open scheme	65				65
1. Nano-scale ICT devices and systems	20	20			
2. Pervasive adaptation	20	20			
3. Bio-ICT convergence	20	20			
4. Science of complex systems for socially intelligent ICT	20			20	
5. Embodied intelligence	20			20	
6. ICT forever yours	20			20	
Horizontal support actions					
International cooperation	12	7		5	
Trans-national co-operation among NCPs	3	3			
Total	**2021**	**1197**	**497**	**262**	**65**

ICT conference, studies, evaluations and reviews

In addition to calls for proposals, calls for tenders are also expected to be published on specific activities that the ICT priority will support. These include:

- The organisation of the ICT annual conference for a maximum indicative amount of 4 M€ per year.
- Studies including socio-economics and impact analysis studies and studies to support the monitoring, evaluation and strategy definition for the ICT priority in FP7 as well as publications and other events. The total maximum indicative amount is 18 M€ for 2007-2008.

Details will be provided in the texts of these calls for tender.

Furthermore, the ICT priority will support independent experts assisting in proposal evaluations and project reviews for an amount estimated at 15 M€ in 2007 and 10 M€ in 2008.

European Information and Communication Technologies Prize (EICTP)

Continued support will be given to the European Information and Communication Technologies Prize (EICTP). This scheme promotes European innovation and

entrepreneurship in ICT through public recognition of companies that excel in turning technology and research results into products for the market.

In 2006, the EICTP superseded the European Information Society Technology Prize, which operated from 1995 to 2005. The current EICTP contract is managed by Euro-CASE and may be renewed to cover up to the 2007 and 2008 EICTP scheme with a maximum estimated contribution of 3.4 M€.

HFSP Programme

The indicative support of ICT to the HFSP programme will amount to 1.5 M€ per year for 2007-2008.

IMS Secretariat

The indicative support of ICT to the Intelligent Manufacturing Systems secretariat will amount to 200 K€ for 2007-08.

Risk Sharing Finance Facility

In addition to direct financial support to participants in RTD actions, the Community will improve their access to private sector finance by contributing financially to the 'Risk-Sharing Finance Facility' (RSFF) established by the European Investment Bank (EIB).

The Community contribution to RSFF will be used, by the Bank, in accordance with eligibility criteria set out in the Work Programme 'Co-operation' (Annex 4)[39]. RSFF support is not conditional on promoters securing grants resulting from calls for proposals described herein, although the combination of grants and RSFF-supported financing from EIB is possible.

In accordance with the Specific Programme 'Cooperation', which stipulates that the Community contribution to RSFF will be funded by proportional contributions of all Themes, except Socio-economic Sciences and the Humanities, the Commitment Appropriations for this Theme to RSFF in 2007-08 will be EUR 46 million. This amount will be committed entirely in 2007.

The use of the Community Contribution from the Specific Programme 'Cooperation' will be on a 'first come, first served' basis and will not be constrained by the proportional contribution of Themes. Further information on the RSFF scheme is given in Annex 4 of this work programme.

Call title: ICT Call 1

- Call identifier: FP7-ICT-2007-1
- Date of publication: Jan/Feb 2007[40]

[39] Exact reference to be verified

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

- Closure date: April 24, 2007[41]
- Indicative budget: 1197 M€
- Topics called:

Challenge	Objectives	Funding schemes
3.1: Pervasive and Trusted Network and Service Infrastructures	ICT-2007.1.1The network of the future	CP, NoE, CSA
	ICT-2007.1.2Service and software architectures, infrastructures and engineering	CP, NoE, CSA
	ICT-2007.1.3 ICT in support of the networked enterprise	CP, CSA
	ICT-2007.1.4Secure, dependable and trusted infrastructures	CP, NoE, CSA
	ICT-2007.1.5Networked media	CP, NoE, CSA
3.2: Cognitive systems, interaction, robotics	ICT-2007.2.1Cognitive systems, interaction, robotics	CP, NoE, CSA
3.3: Components, systems, engineering	ICT-2007.3.1Next generation nanoelectronics components and electronics integration	CP, NoE, CSA
	ICT-2007.3.2Organic and large-area electronics and display systems	CP, NoE, CSA
	ICT-2007.3.3 Embedded systems design	CP (STREP only), NoE, CSA
	ICT-2007.3.4	CP (STREP only), NoE

[41] Where the envisaged date of publication is either advanced or delayed, the deadline may be adjusted accordingly

	Computing systems	
3.4: Digital libraries and content	ICT-2007.4.1 Digital libraries and technology-enhanced learning	CP, NoE, CSA
	ICT-2007.4.2 Intelligent content and semantics	CP, NoE, CSA
3.5: Towards sustainable and personalised healthcare	ICT-2007.5.1 Personal health systems for monitoring and point-of-care diagnostics	CP (IP only), CSA
	ICT-2007.5.2 Advanced ICT for risk assessment and patient safety	CP, CSA
3.6: ICT for mobility, environmental sustainability and energy	ICT-2007.6.1 ICT for the intelligent vehicles and mobility services	CP, CSA
3.7: ICT for independent living and inclusion	ICT-2007.7.1 ICT and ageing	CP, CSA
3.8: Future and emerging technologies	ICT-2007.8.1 Nano-scale ICT devices and systems	CP, CSA (CA only)
	ICT-2007.8.2 Pervasive adaptation	CP, CSA (CA only)
	ICT-2007.8.3 Bio-ICT convergence	CP, CSA (CA only)
3.9 Horizontal support actions	ICT-2007.9.1 International-cooperation	CSA

- Evaluation procedure: Proposals will be evaluated in a single-step procedure.
- Indicative evaluation and contractual timetable: []
- Consortia agreements *[Specify if consortia agreements are not required in any areas]*
- Particular requirements for participation, evaluation and implementation:

Call title: ICT Call 2

- Call identifier: FP7- ICT -2007-2
- Date of publication: May/June 2007

- Closure date: Sep/Oct 2007
- Indicative budget: 497 M€
- Topics called:

Challenge	Objectives	Funding schemes
3.1: Pervasive and Trusted Network and Service Infrastructures	ICT-2007.1.6 New paradigms and experimental facilities	CP, CSA
	ICT-2007.1.7 Critical infrastructure protection[42]	CP (STREP only), CSA
3.3: Components, systems, engineering	ICT-2007.3.5 Photonic components and subsystems	CP, NoE, CSA
	ICT-2007.3.6 Micro/nanosystems	CP, NoE, CSA
	ICT-2007.3.7 Networked embedded and control systems	CP (STREP only), NoE, CSA
3.5: Towards sustainable and personalised healthcare	ICT-2007.5.3 Virtual physiological human	CP, NoE, CSA
3.6: ICT for mobility, environmental sustainability and energy	ICT-2007.6.2 ICT for cooperative systems	CP, NoE, CSA
	ICT-2007.6.3 ICT for environmental management and energy efficiency	CP, CSA
3.7: ICT for independent living and inclusion	ICT-2007.7.2 Accessible and inclusive ICT	CP, CSA

- Evaluation procedure: Proposals will be evaluated in a single-step procedure.
- Indicative evaluation and contractual timetable: []
- Consortia agreements *[Specify if consortia agreements are not required in any areas]*
- Particular requirements for participation, evaluation and implementation:

Call title: ICT Call 3

- Call identifier: FP7-2007-ICT-3

[42] Joint initiative between ICT and security themes

- Date of publication: Dec 2007
- Closure date: Mar 2008
- Indicative budget: 262 M€
- Topics called:

Challenge	Objectives	Funding schemes
3.2: Cognitive systems, interaction, robotics	ICT-2007.2.2Cognitive systems, interaction, robotics	CP, NoE, CSA
3.4: Digital libraries and content	ICT-2007.4.3 Digital libraries and technology-enhanced learning	CP, NoE, CSA
	ICT-2007.4.4 Intelligent content and semantics	CP, NoE, CSA
3.8: Future and emerging technologies	ICT-2007.8.4 Science of complex systems for socially intelligent ICT	CP (IP only), CSA (CA only)
	ICT-2007.8.5 Embodied intelligence	CP, CSA (CA only)
	ICT-2007.8.6 ICT forever yours	CP (IP only), CSA (CA only)
3.9 Horizontal support actions	ICT-2007.9.2 International-cooperation	CSA
	ICT-2007.9.3 Trans-national co-operation among NCPs	CSA

- Evaluation procedure: Proposals will be evaluated in a single-step procedure.
- Indicative evaluation and contractual timetable: []
- Consortia agreements *[Specify if consortia agreements are not required in any areas]*
- Particular requirements for participation, evaluation and implementation:

Call title: FET Open

- Call identifier: FP7-2007-ICT-C
- Date of publication: Jan/Feb 2007
- Date from which proposals are receivable: 6 March 2007

- Closure date: 31 December 2008[43]
- Topics called:

Challenge	Objectives	Funding schemes
3.8: Future and emerging technologies	FET Open	CP (STREP only), CSA (CA only)

- Evaluation criteria: see *annex 2* of the Work Programme for specific evaluation criteria applicable to FET Open

– Evaluation procedure:

- proposals for STREPs have to be submitted in two stages: first a *short*, strictly anonymous, proposal of maximum five pages is submitted describing the key objectives and motivation for the proposed work;
- *short* proposals may be submitted at any time from the opening of the call until the final closure date (currently 31/12/2008 – see footnote 44). They are evaluated anonymously as they come in with the help of remote evaluators;
- if the *short* proposal is successful, the proposers are invited to submit a *full* proposal by a specified cut-off date. This cut-off date is determined by the submission date of the *short* proposal, as indicated in the table below;
- the evaluation of *full* proposals is not anonymous and is carried out through a combination of remote evaluation and panels of experts that convene in Brussels;
- proposals for CAs are submitted in one stage and will not be evaluated anonymously.

Batch	**Start date of *short* STREP proposal submission period**	**End date/ time of *short* STREP proposal submission period**	***Full* STREP proposal cut-off date / time (for successful *short* proposals)**	**CA proposal cut-off date / time**
1	6/3/2007	24/4/2007	4/9/2007 17:00	4/9/2007 17:00
2	25/4/2007	4/9/2007	8/1/2008 17:00	8/1/2008 17:00
3	5/9/2007	8/1/2008	6/5/2008 17:00	6/5/2008 17:00

[43] It is planned that the call will subsequently be extended beyond 31/12/2008.

4	9/1/2008	6/5/2008	2/9/2008 17:00	2/9/2008 17:00
5	7/5/2008[44]	2/9/2008	31/12/2008 17:00	31/12/2008 17:00
6	3/9/2008[44]	31/12/2008		

- Participation:

  Restrictions: none

  Industrial/SME participation: optional

- Indicative evaluation and contractual timetable:
  - Evaluation results for *short* proposals: three months from proposal reception;
  - Evaluation results for *full* proposals: three months from the cut-off or closure date.

– Indicative budget: 65 M€, which is expected to be committed for successful proposals from the cut-off dates up to and including 2/9/2008. A minimum of 10M€ and a maximum of 20M€ will be allocated per batch.

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

5 Indicative priorities for future calls

Challenges are expected to remain largely valid well beyond this first work programme as they express aims to be achieved in a 10-15 years timeframe. For the next Work Programmes, changes will take place within the scope of the Framework and Specific Programmes. They will take into account the experience from the first calls as well as technological developments, socio-economic evolutions and political priorities.

[44] It is planned that the call will subsequently be extended beyond 31/12/2008, at which time:
- the fifth *full* and CA proposal cut-off date may be revised
- the sixth *full* and CA proposal cut-off date will be fixed
- the sixth end date for *short* proposal submission may be revised

Annex 1: International cooperation partner countries

ACP

- AFRICAN

- Angola
- Benin
- Botswana
- Burkina-Faso
- Burundi
- Cameroon
- Cape Verde
- Central African Republic
- Chad
- Comoros
- Congo (Republic)
- Congo (Democratic Rep. of)
- Côte d'Ivoire
- Djibouti
- Equatorial Guinea
- Eritrea
- Ethiopia
- Gabon
- Gambia
- Ghana
- Guinea
- Guinea-Bissau
- Kenya
- Lesotho
- Liberia
- Libya
- Madagascar
- Malawi
- Mali
- Mauritania
- Mauritius
- Mozambique
- Namibia
- Niger
- Nigeria
- Rwanda
- Sao Tome and Principe
- Senegal
- Seychelles
- Sierra Leone
- Somalia
- South Africa[45]

[45] Signed an agreement with the EC covering Science & Technology

- Sudan
- Swaziland
- Tanzania
- Togo
- Uganda
- Zambia
- Zimbabwe

- CARIBBEAN

- Antigua and Barbuda
- Barbados
- Belize*
- Cuba*
- Dominica
- Dominican Rep.
- Grenada
- Guyana*
- Haiti
- Jamaica
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and Grenadines
- Suriname*
- Trinidad and Tobago

- PACIFIC

- Cook Islands
- Timor Leste **
- Fiji
- Kiribati
- Marshall Islands
- Micronesia, Federal States of
- Nauru
- Niue
- Palau
- Papua New Guinea**
- Solomon Islands
- Tonga
- Tuvalu
- Vanuatu
- Samoa

ASIA

- Afghanistan
- Bangladesh
- Bhutan
- Burma/ Myanmar
- Cambodia
- China[1]***
- India[1]***
- Indonesia
- Iran
- Iraq
- Lao People's Democratic Republic
- Malaysia
- Maldives
- Mongolia
- Nepal
- Oman
- Pakistan
- Philippines
- Sri Lanka
- Thailand
- Vietnam
- Yemen

EASTERN EUROPE AND CENTRAL ASIA (EECA)

- Armenia[2]
- Azerbaijan[2]
- Belarus[2]
- Georgia[2]
- Kazakhstan
- Kyrgyz Republic
- Moldova[2]
- Russia[1]***
- Tajikistan
- Turkmenistan
- Ukraine[1,2]
- Uzbekistan

LATIN AMERICA
- Argentina[1]
- Bolivia
- Brazil[1]***
- Chile[1]
- Colombia
- Costa Rica
- Ecuador
- El Salvador
- Guatemala
- Honduras
- Mexico[1]
- Nicaragua
- Panama
- Paraguay
- Peru
- Uruguay
- Venezuela

MEDITERRANEAN PARTNER COUNTRIES (MPC [2]
- Algeria
- Egypt[1]
- Jordan
- Lebanon
- Libya
- Morocco[1]
- Palestinian-administered areas
- Syrian Arab Rep.
- Tunisia[1]

WESTERN BALKAN COUNTRIES (WBC)
- Albania
- Bosnia-Herzegovina
- Former Yugoslav Republic of Macedonia (FYROM)****
- Montenegro
- Serbia[3]

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*For participation in the « Specific international cooperation actions», these countries can also be considered in Latin American regions.

**For participation in the «Specific international cooperation actions», these countries can also be considered in Asian regions.

***For participation in the « Specific international cooperation actions» Brazil, China, India and Russia may be considered individually as a regions on there own. Thus, the required 2 or more partners can be located in these countries. However, in this case, at least 2 different partners from different provinces, oblasts, republics or states within Brazil, China, India or Russia are necessary.

**** On 16/12/2005 the Former Yugoslav Republic of Macedonia (FYROM) became a Candidate Country. FYROM is not an associated country to FP7 and thus remains a target country for International Cooperation Specific Actions.

[2] These countries are also part of the European Neighbourhood Policy (ENP).

[3] Including Kosovo as defined by UNSC resolution 1244 of 10 June 1999

Annex 2: Evaluation, selection and award criteria

To be completed

Annex 3: Funding schemes

1. Collaborative projects (CP)

Support to research projects carried out by consortia with participants from different countries, aiming at developing new knowledge, new technology, products, demonstration activities *or common resources for research. The size, scope and internal organisation of projects can vary from field to field and from topic to topic. Projects can range from small or medium-scale focused research actions to* large-scale *integrating projects for achieving a defined objective. Projects may also be targeted to special groups such as SMEs.*

The Funding Scheme allows for two types of projects to be financed: a) "*small or medium-scale focused research actions"*, b) *"large-scale integrating projects*".

a) *Small or medium-scale focused research actions* (**STREP**)

Targeting a specific objective in a sharply focussed approach; they shall have a fixed overall work plan where the principal deliverables are not expected to change during the lifetime of the project.

Their content will consist of either of the following two, or a combination of the two:

a) a research and technological development project designed to generate new knowledge which would improve European competitiveness and/or address major societal needs

b) a demonstration project designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly (e.g. testing of product-like prototypes)

and naturally

c) project management activities.

Such type of projects could also include innovation-related activities, in particular with respect to the management of the knowledge produced and the protection of intellectual property.

b) *Large-scale integrating projects* (**IP**)

Larger scale actions, including a coherent integrated set of activities tackling multiple issues and aimed at specific deliverables; there will be a large degree of autonomy to adapt content and partnership and update the work plan, whereas appropriate.

Their content will consist of a combination of most or all of the following (indents a and/or b being a must):

a) objective-driven research and development, i.e. clearly defined scientific and technological objectives, aiming at a significant advance in the established state-of-the-art; in addition, typically of multidisciplinary character

b) a demonstration project designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly (e.g. testing of product-like prototypes)

c) innovation activities relating to the protection and dissemination of knowledge, socio-economic studies of the impact of that knowledge, activities to promote the

exploitation of the results, and, when relevant, "take-up" actions; these activities are inter-related and should be conceived and implemented in a coherent way

d) training of researchers and other key staff, research managers, industrial executives (in particular for SMEs), and potential users of the knowledge produced within the project. Such training activities should contribute to the professional development of the persons concerned

e) any other specific type of activity directly related to the project's objectives (as identified in the relevant work programme or call for proposals)

f) project management activities.

2. Networks of Excellence (NoE)

Support to a Joint Programme of Activities *implemented by a number of research organisations integrating their activities in a given field, carried out by research teams in the framework of longer term co-operation. The implementation of* this Joint Programme of *Activities will require a formal commitment from the organisations integrating part of their resources and their activities.*

The funding scheme will support the long-term durable integration of research resources and capacities (researchers, services, teams, organisations, institutions) in fields of strategic importance for European research, through the establishment of a single virtual centre of research, in order to overcome demonstrable, detrimental fragmentation, thus strengthening European scientific and technological excellence on a particular research topic.

Networks of Excellence (**NoE**) will aim at consolidating or establishing European leadership at world level in their respective fields by integrating at European level the resources and expertise needed for the purpose. This will be achieved through the implementation of a Joint Programme of Activities (JPA) aimed principally at creating a progressive and durable integration of the research capacities of the network partners while at the same time advancing knowledge on the topic.

Since Networks of Excellence are aimed at tackling fragmentation of existing research capacities, they should be implemented provided that:

- research capacity is fragmented in the (thematic) area being considered;
- this fragmentation prevents Europe from being competitive at international level in that area;
- the proposed integration of research capacity will lead to higher scientific excellence and more efficient use of resources.

The implementation of the Joint Programme of Activities will require a formal commitment from the organisations integrating part or the entirety of their research capacities and activities.

The Joint Programme of Activities (JPA) is the collective vehicle for achieving the durable integration of the research resources and capacities of the Network of Excellence. In order to do so, the JPA should consist of a coherent set of integrating activities that the participants undertake jointly. The JPA will have several components:

- activities aimed at bringing about the integration of the participants research activities on the topic considered, such as:

- establishing mechanisms for co-ordinating and eventually merging the research portfolios of the partners
- staff exchange schemes
- complete or partial relocation of staff
- establishment of shared and mutually accessible research equipment, managerial and research infrastructures, facilities and services
- exploration of the legal requirements (facilitators/barriers) for durable integration,
- setting up of joint supervisory bodies
- measures for joint public relations …

- jointly executed research to support the durable integration, e.g. systemic development, or development of common tools, or at filling gaps in the collective knowledge portfolio of the network, in order to make the research facilities useable by the network. (NB: in addition to this research, participants in a network will pursue their "own institutional portfolio", including research, development or demonstration in the area covered by the network itself. The latter research, development or demonstration activities are not part of the "joint programme of activities" and thus will not be part of the eligible costs of the network)
- activities designed to spread excellence, such as:
  - The main component of these activities will be a joint training programme for researchers and other key staff;
  - Other spreading of excellence activities may include: dissemination and communication activities (including public awareness and understanding of science), and, more generally, networking activities to help transfer knowledge to teams external to the network.
  - Spreading of excellence may also include the promotion of the results generated by the network; in such a context, networks should, when appropriate, include innovation-related activities (protection of knowledge generated within the network, assessment of the socio-economic impact of the knowledge and technologies used and development of a plan for dissemination and use of knowledge), as well as any appropriate gender and/or ethical related activities
- all the network's activities should be carried out within a coherent framework for the management of the consortium linking together all the project components and maintaining communications with the Commission.

3. Coordination and support actions (CSA)

Support to activities aimed at coordinating or supporting research activities and policies (networking, exchanges, trans-national access to research infrastructures, studies, conferences, etc). These actions may also be implemented by means other than calls for proposals.

The Funding Scheme allows for two types of actions to be financed: a) "*co-ordination or networking actions"*, b) *"specific support actions*".

a) *Coordination or networking actions* (**CA**)

Coordinating or networking actions will always have to be carried out by a consortium of participants, normally three from three different countries.

The coordination or networking actions cover the following activities:

> the organisation of events - including conferences, meetings, workshops or seminars -, related studies, exchanges of personnel, exchange and dissemination of good practices, and, if necessary, the definition, organisation and management of joint or common initiatives together of course with management of the action.

The coordination and networking actions normally stretches over a longer period.

b) *Specific support actions* (**SSA**)

Specific support actions may be carried out by a single participant, which can be based in any member state, associated country or a third country. Therefore there are no restrictions on the size of the consortium.

Although normally awarded following calls for proposals, there are also the possibilities to award specific support actions through public procurement carried out on behalf of the Community or to grant support to legal entities identified in the Specific Programmes or in the work programmes where the Specific Programme permits the work programmes to identify beneficiaries.

The objective of specific support actions are to contribute to the implementation of the Framework Programmes and the preparation of future Community research and technological development policy or the development of synergies with other policies, or to stimulate, encourage and facilitate the participation of SMEs, civil society organisations and their networks, small research teams and newly developed or remote research centres in the activities of the thematic areas of the Cooperation programme, or for setting up of research-intensive clusters across the EU regions.

The specific support actions can be of different types covering different activities:

- monitoring and assessment activities, conferences, seminars, studies, expert groups, high level scientific awards and competitions, operational support and dissemination, information and communication activities, support for transnational access to research infrastructures or preparatory technical work, including feasibility studies, for the development of new infrastructures, support for cooperation with other European research schemes, the use by the Commission of external experts, management or a combination of these.

Annex 4: ERA-NET

The objective of ERA-NETs is to step up the cooperation and coordination of research programmes carried out at national or regional level in the Member or Associated States through the networking of research programmes, towards their mutual opening and the development and implementation of joint activities.

Under FP7 ERA-NETs is continued and reinforced, notably through the introduction of the ERA-NET-Plus module in which the Commission can provide an incentive to the organisation of joint calls between national or regional research programmes by "topping-up" joint trans-national funding with Community funding.

ERA-NET projects can network four types of activities: (1) Information exchange – (2) Definition and preparation of joint activities – (3) Implementation of joint activities – (4) Funding of joint trans-national research actions:

- ERA-NETs launched under FP6 wishing to submit a follow-up proposal under FP7 have to propose a strong coordination action focusing directly on steps three and four, in order to achieve mutual opening and trans-national research via joint/common calls, joint/common programmes or, if appropriate, other joint trans-national actions.

- New ERA-NETs, which address new topics and without any experience from FP6, should address at least the first three steps, but are encouraged to aim at the "four step approach", as described above.

Glossary

3D	Three Dimensional
AEC	Advanced Equipement Control
"Ambient Intelligence"	A concept in ICT that presents what should come beyond the current "keyboard and screen" interfaces to enable ALL citizens to access ICT services wherever they are, whenever they want, and in the form that is most natural for them.
APC	Advanced Process Control
CA	Coordination action
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
CSA	Coordination and Support Action
EC	European Commission (europa.eu.int)
EIROForum	Partnership of Europe's seven largest intergovernmental research organisations (http://www.eiroforum.org/)
EU	European Union
EUREKA	A Europe-wide Network for Industrial RTD (*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.. – *cordis.europa.eu*)
GEOSS	Global Earth Observation System of Systems (www.epa.gov/geoss/)
GMES	Global Monitoring for Environment and Security - *http://gmes.jrc.it/*
HFSP	Human Frontier Science Program (*www.hfsp.org*)
ICT	Information and communications technologies
IMS	Intelligent Manufacturing Systems Initiative (*http://www.ims.org/*)
INSPIRE	Infrastructure for spatial information in Europe (www.ec-gis.org/inspire/)
IP	Internet Protocol
IPR	Intellectual Property Rights
IPs	Integrated Projects
ICTC	Information and Communication Technologies Committee
IST	Information Society Technologies.
ISTAG	Information Society Technologies Advisory Group
ISTC	Information Society Technologies Committee
NEMS	Nano-Electromechanical Systems
NoEs	Networks of Excellence
NSF	National Science Foundation (*http://212.208.8.14/nsf.htm*)
QIPC	Quantum information processing and communication

RF	Radio Frequency
RFID	Radio Frequency Identification
RTD	Research and Technology Development.
SFIT	Smart Fabric Interactive Textile
SiP	System in Package
SOC	Systems on a- Chip
SSA	Specific Support Actions
STREPs	Specific Targeted Research Projects