WORK PROGRAMME 2011-12

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COOPERATION

THEME 3

ICT – Information and Communications Technologies

(European Commission C(2010) XXXXX)

This work programme for the ICT theme of the FP7 Specific Programme 'Cooperation' defines the priorities for calls for proposals closing in 2011 and 2012 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 ICT Advisory Group[1] (ISTAG), the European Technology Platforms[2] in ICT and other preparatory activities including workshops involving the main stakeholders.

[1] http://cordis.europa.eu/fp7/ict/istag
[2] http://cordis.europa.eu/technology-platforms

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 continue to 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 value creation in Europe, 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 ICT research drivers

This Work Programme defines the priorities for calls for proposals that will result in projects to be launched in the period 2011-12. These projects will start having impacts on markets in 5-10 years, on average. By then, the global ICT infrastructure and market structures are likely to have changed considerably. The research challenges in this Work Programme focus on **high-risk ICT collaborative research forming part of a medium to long-term agenda**.

2.1 ICT, the engine for sustainable growth in a low carbon economy

A recent OECD report[3] highlighted that "investment in a networked recovery will preserve **ICT as a key engine of growth**" given its impact on productivity and innovation across manufacturing and service sectors.

Societal challenges such as energy efficiency, climate change, the ageing population, sustainable health and social care, inclusion, education and security will govern policies and drive economic and societal development for the decades to come. ICT R&D plays a major role in providing responses to such challenges.

The impact of ICT on social behaviours, on democratic processes and on creativity will continue to grow with the wider diffusion of **web-based social networking** and user generated content and services, driven by the roll-out of broadband.

2.2 Changing value chains and new market opportunities

In the general consumer markets, business growth is foreseen in the short to mid term in new **Web and Internet-based services** taking advantage of the new generations of smart phones, networked sensors and convergence around IP (Internet Protocol). In addition to access to digital media through new generation user interfaces and interaction paradigms, and generation of content and leisure services, new opportunities are foreseen e.g. in energy efficiency at home, personalised health systems and location-based services.

As sectors like energy, transport and logistics increasingly rely on the Internet, there is a need to support their collaboration with the European ICT communities in a cross-sector approach

[3] Investing in Innovation for Long-Term Growth, OECD, June 2009

based on a common framework of specifications, standards and trials, to speed up the development and uptake of services based on **Internet-enabled 'smart' infrastructures**.

Cloud computing is transforming the software and the service industry and can have a profound impact on business ICT strategies in all sectors.

Open innovation and open web-based innovation platforms is an important development that can ensure access to new ideas and rapid market uptake of innovations.

International cooperation becomes a must to address the global challenges and to build win-win partnerships with well-targeted countries for technology, economic and social developments.

2.3 Many technology developments at a cross-roads

Alternative paths to components and systems development - including **nano-electronics**, more **integration of functionalities** on chips, the use of **new materials** and progress in **photonics** - will drive a large part of technology developments.

New software development technologies and parallelisation tools will be needed to better exploit the computing capabilities of **multi-core architectures**.

The **Future Internet**, both evolutions of the current and completely new network and service infrastructures, are key developments. In the shorter term, breakthroughs are expected from the integration of (IP-based) networking and service development tools into open platforms for the development of innovative internet-empowered applications. In the longer term, breakthroughs like all-optical networks combined with advances in wireless communication, sensor networks, computing, autonomic network/service management capabilities, trust and security are expected to yield totally new network architectures and systems.

As the Internet moves to highly visual and multimodal interactions, **networked media and content technologies** have a strong potential for service innovation in all sectors.

More intelligent and smart environments e.g. making use of adaptive, learning, cognitive and bio-inspired systems as well as distributed and embedded control is an important avenue for the medium to long term development of ICT.

3 Strategy

3.1 Focus on a limited set of Challenges

This Work Programme helps mobilise the necessary resources around key ICT research challenges and objectives. It continues to focus on a limited set of *challenges* with mid-to-long term goals that require trans-national collaboration, in addition to the FET scheme. Each challenge is addressed through a limited set of *objectives* that form the basis for Calls for Proposals. Each objective specifies the set of *outcomes targeted* by the research work and their *expected impact* on industrial competitiveness and on addressing socio-economic goals.

Key underlying principles are to support the competitiveness of industry in Europe, to ensure leveraging by the EU budget of private spending, and to increase synergies between the private and public sectors across Europe. The impact of EU support should extend beyond the ICT sector by fostering collaboration across various sectors and by addressing Europe's societal challenges. Leveraging private spending is obtained notably by focussing the EU research budgets on risky areas where market failures may impede investment.

With support to 15000+ industrial and academic researchers per year and clear impact on furthering collaboration and partnerships, ICT in FP7 has an increasingly essential role in reinforcing Europe's innovation capacity, helping industry to strengthen its competitiveness, explore new avenues and take higher risks with higher returns.

3.2 A commitment to reinforce Europe's presence in the basic ICT technologies and infrastructures

This Work Programme builds on European strengths, seizes opportunities in emerging fields and intervenes where public and EU support is needed to share risks and build partnerships.

Challenge 1: networking, networked media and service infrastructures

Challenge 1 covers tools and platforms for novel Internet application development and deployment through the launch of a Public-Private Partnership on Future Internet. At the same time, key technological developments in networking, digital media and service infrastructures of the future are addressed.

Challenge 2: cognitive systems and robotics

Challenge 2 aims to enhance the performance and manageability of artificial cognitive systems and to expand and improve the functionalities of robotic systems operating under circumstances that were not fully planned for explicitly at design time. It supports both research on endowing artificial systems with cognitive capabilities as well as research more specifically related to the design and engineering of robotic systems.

Challenge 3: alternative paths to components and systems

Challenge 3 focuses on further miniaturisation and increased performance in electronic and photonic components, in micro/nanosystems integrating functionalities like sensing, actuating, communicating, in alternative routes to new components and systems such as organic electronics and in multicore computing systems, embedded systems, monitoring and control, and cooperating complex systems.

Challenge 4: technologies for digital content and languages

Challenge 4 aims to enable individuals and small organisations to create quality content and innovative services and at allowing people to access and use online content and services across language barriers; it also aims at ensuring reliability of retrieval and use of digital resources across applications and platforms and at scaling up data analysis to keep pace with extremely large data volumes.

3.3 A reinforced ICT contribution to Europe's major socio-economic challenges

ICT R&D helps address Europe's key socio-economic challenges, from a lower carbon economy, to health and well-being in an ageing society, competitive businesses and manufacturing for a sustainable recovery, and learning and sharing of cultural resources.

Challenge 5: ICT for health, ageing well, inclusion and governance

Challenge 5 has a focus on ICT for disease prediction, early diagnosis, prevention, minimally invasive treatment, and overall disease management and support to healthy lifestyles. Another focus is on ICT solutions for prolonging independent living and for extending active working life, as well as ICT solutions enabling accessibility of emerging mainstream ICT solutions, and assistive technologies for people with disabilities. A final focus is on ICT tools for governance and policy modelling.

Challenge 6: ICT for a lower carbon economy

Challenge 6 concentrates on the development of ICT to achieve substantial efficiency gains in the distribution and use of key resources such as energy and water, as well as the application of ICT to decarbonise transport and make it safer. This incorporates the ICT contributions to the Public-Private Partnerships on Energy Efficient Buildings and on Green Cars: ICT for the fully electric vehicle.

Challenge 7: ICT for manufacturing & factories of the future

Challenge 7 incorporates the ICT contributions to the Public-Private Partnership on Factories of the Future. It aims to improve the technological base of manufacturing across a broad range of sectors by improving, not only their efficiency and adaptability, but also the sustainability of manufacturing systems as well as their better integration within business processes.

Challenge 8: ICT for learning and access to cultural resources

Challenge 8 has the objective is to develop technologies and methodologies that make people learn more effectively and support the acquisition of new skills. It also aims to ensure the effective use and exploitation of the cultural resources by developing technologies to make them available, usable and re-usable regardless of their form, location, time sphere etc.

3.4 A strengthened support to Future and Emerging Technologies (FET)

The FET scheme acts as the pathfinder for mainstream ICT research. It aims to lay new foundations for future ICT by exploring new unconventional ideas that can challenge our understanding of the scientific concepts behind ICT and that can impact future industrial ICT research agendas. Hence, its priorities are influenced by new developments and emerging opportunities in a wide range of scientific areas, as well as by the need to nurture the emergence of new, often multidisciplinary, European research communities. FET will operate with a Proactive and an Open scheme, including activities to support new talents and high-tech SMEs, to prepare the set-up of FET Flagship Initiatives, and to strengthen the international dimension of FET.

3.5 A reinforced and focused support to international cooperation

International cooperation in the programme aims to support European competitiveness and to jointly address, with other regions of the world, issues of common interest and mutual benefit, thereby supporting also other EU policies (sustainable development, environmental protection, disaster response, security etc).

International cooperation activities in this Work Programme have three main objectives: (1) To jointly respond to major global technological challenges by developing interoperable solutions and standards, (2) To jointly develop ICT solutions to major global societal challenges, and (3) To improve scientific and technological cooperation for mutual benefit.

This Work Programme includes priorities for coordinated calls for international cooperation with Brazil and Russia. It also includes a set of targeted calls and targeted opening of areas throughout the Challenges and FET.

3.6 Incentives to further develop Pre-Commercial Procurement in ICT in Europe

The ICT Theme contains new incentives that aim to promote the use of pre-commercial procurement in ICT by public authorities at all levels. This Work Programme contains an Objective open to proposals addressing ICT solutions for any domain of public sector needs

(Objective 11.1), as well as Objectives focusing on specific areas of public interest: ICT for health (Objective 5.3), ICT for ageing well (Objective 5.4) and photonics (Objective 3.5).

By acting as technologically demanding first buyers of new R&D, public procurers can drive innovation from the demand side. This not only enables European public authorities to innovate faster in the provision of public services to make them more efficient and effective. It also increases the research capacity and innovation performance of European companies and creates new opportunities to take international leadership in new markets.

Pre-commercial procurement enables an earlier reality check of industry R&D against concrete public purchasing needs, which can help to maximize the effectiveness of the R&D process and optimize public spending in research.

3.7 Contribution to the general activities of the Cooperation Specific Programme

The ICT Theme supports activities such as the RSFF scheme, the Cordis service, EUREKA membership, the COST Programme, cross-cutting ERA-NETs, the International Human Frontier Science Programme and the Intelligent Manufacturing Systems secretariat.

3.8 ICT research for a more sustainable and energy efficient economic growth

The contribution of ICT R&D to a greener economy is a priority that cuts across all objectives of this Work Programme.

This notably comprise "ICT for greening", such as smart grids for efficient energy supply and distribution and for integrating renewable energy sources, and ICT-solutions to improve the environmental and energy performance of buildings, of transport and logistics services and of manufacturing. Challenges 6 and 7 concentrate on these priorities and incorporate the ICT contributions to the Public-Private Partnerships on Energy Efficient Buildings, Factories of the Future, and Green Cars. These aim to further develop green technologies and smart energy infrastructures in the buildings, manufacturing and transport domains.

This Work Programme also includes significant contributions to "Greener ICT" through developments leading to reduction in the energy intensity and carbon emissions of ICT components, systems, services and processes involved in their manufacturing and distribution. This spans from low energy consumption networks and systems in Challenge 1 to components with reduced power consumption in Challenge 3.

3.9 Involving SMEs and users and feeding innovation

SMEs are at the heart of innovation in ICT. They play a vital role with their capacities to generate new ideas and quickly transform these into business assets. This Work Programme provides major opportunities for innovative SMEs, both to finance R&D and innovate their products and services and to build strategic partnerships and operate in wider markets.

SMEs are present notably in areas of high potential growth (such as photonics, security, embedded systems, and ICT for health and ageing) that have been boosted during FP7 in successive Work Programmes, JTIs and PPPs. Significant opportunities also exist for SME involvement in areas focusing on the development of open platforms for digital content and service provision and delivery. Such open innovation models are particularly attractive to SMEs that could participate both as technology providers and in the building of applications on top of such platforms (see e.g. the Future Internet PPP).

In addition to careful selection of priority topics of interest to SMEs, several areas express a preference for support also to projects of relatively small size executed by consortia

dominated by SMEs and with only a few partners. Some areas also offer a lighter scheme for proposal submission, evaluation and contracting (see Objective 4.1 and FET-Open).

Another set of vital players in ICT research and innovation are the users. Around one-third of the budget is specifically dedicated to address priorities arising from innovation driven by demands in the areas of health, ageing, energy, environment, transport, manufacturing, learning and culture (Challenges 5-8). Actions on basic ICT technologies and infrastructures (Challenges 1-4) are also motivated and guided by highly demanding usage scenarios.

3.10 Contributing to European and global standards

Standardisation is recognised as an important research outcome and as a visible way to promote research results. Contribution and active support to industrial consensus eventually leading to standards is strongly encouraged. Integrated Projects are considered as important vehicles to promote research results through standardisation. Set up of project clusters are also encouraged so that industrial consensus can be facilitated across projects dealing with similar issues and so that Specific Targeted Research Projects can be fully integrated in the picture.

Standards are considered as an important element in the field of international cooperation. Beyond access to non-available research capability in Europe, international cooperation in the context of industrial research should have global consensus and standards as a main target, both for the elaboration of new standards and adoption of standards through implementation of research results.

4 Links to related activities

4.1 Joint Technology Initiatives and Joint National Programmes

Joint Technology Initiatives (JTI) are a pioneering approach to pooling public and private efforts, designed to leverage more R&D investments from Member States, Associated Countries and industry, and to reduce the fragmentation of EU R&D.

The focus of the ENIAC JTI[4] in nanoelectronics is on industrial application-driven developments addressing mainly next generation technologies in the 'More Moore' and 'More than Moore' domains. This complements activities under this Work Programme that essentially cover the 'Beyond CMOS' and more advanced 'More than Moore' domains preparing Europe for the design and manufacturing of the next generation components and miniaturised systems.

The ARTEMIS JTI[5] focuses on developing industrial platforms for the development and implementation of embedded systems responding to industry requirements in specific application domains. This complements activities under this Work Programme that mainly cover new concepts, technologies and tools for engineering next generation systems characterised by wide distribution and interconnection, and responding, in addition to timeliness and dependability, to more stringent constraints in terms of size, power consumption, modularity and interactivity.

The Ambient Assisted Living (AAL)[6] joint national programme covers market-oriented R&D on concrete ICT-based solutions for ageing-well with a time to market of 2-3 years, with a particular focus on involvement of SMEs and the business potential. This complements

[4] www.eniac.eu

[5] www.artemis-ju.eu

[6] www.aal-europe.eu

activities under this Work Programme that focuses on integrating emerging ICT concepts with a 5-10 years time to market as well as essential research requiring larger scale projects at EU level, e.g. with strong links to standardisation.

The Eurostars[7] Programme provides funding for market-oriented *R&D* specifically with the active participation of R&D-performing SMEs in high-tech sectors.

4.2 Links with other FP7 themes

Synergies are sought with other FP7 themes to ensure higher impact. This is achieved notably with the three jointly funded Public-Private Partnerships (PPPs) of the European Economic Recovery Plan: Energy Efficient Buildings, Factories of the Future, and Green Cars. These PPPs are presented within the relevant ICT Challenges. They will, however, be called for separately in coordination with the other FP7 themes.

4.3 Links with other FP7 Specific Programmes

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.

In particular, support is provided to ICT-based research infrastructure (e-Infrastructure) under the Research Infrastructures part of the Capacities programme. This 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 will ensure that the latest and most effective technology is provided to European researchers.

4.4 Co-ordination of non-EU-level research programmes

The actions undertaken include the coordination of national and/or regional research programmes or initiatives and the participation of the Union in jointly implemented national research programmes (notably Ambient Assisted Living and Eurostars). Actions are also 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.

4.5 Links with the ICT part of the Competitiveness and Innovation Programme

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.

5 Funding schemes

The activities supported by FP7 will be funded through a range of funding schemes as specified in Annex III of the FP7 decision. These schemes will be used, either alone or in combination, to fund actions implemented throughout FP7. The funding schemes used for the

[7] www.eurostars-eureka.eu

research objectives identified in this Work Programme are the following (see Appendix 2 for more details):

5.1 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).

STREPs target a specific research objective in a sharply focused approach while large scale integrating projects have a comprehensive 'programme' approach and include a coherent and integrated set of activities dealing with multiple issues.

Both instruments play an important and complementary role. With this Work Programme, the objective is to support a balanced portfolio of projects that will enable on one hand focused and agile scientific and technological exploration through STREPs and on the other hand concentration of efforts - where needed - through IPs.

To this end, an indicative budget distribution per instrument is specified for each objective and also to some extent per funding scheme. The distribution is based on the size of the available budget per objective and on the nature of the research needed to achieve the relevant target outcome and expected impact.

The overall aim is to ensure that about half of the support for Collaborative Projects is delivered through IPs and about half through STREPS.

5.2 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.

5.3 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. The Funding Scheme allows for two types of projects to be financed: a) 'Coordination Actions' (CA), b) 'Specific Support Actions' (SA).

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.

6 Content of Calls for Proposals

6.1 Challenge 1: Pervasive and Trusted Network and Service Infrastructures

Challenge 1 covers key technological developments in networking, digital media and service infrastructures. It features a Public-Private Partnership on Future Internet tools and platforms for novel Internet application development and deployment. The focus is on:

- Future Networks that support the convergence and interoperability of heterogeneous mobile, wired and wireless broadband network technologies, including notably novel

Internet architectures; network management and operation frameworks, wireless and broadband broadband systems and ultra-high capacity all-optical networks.

- Cloud computing, Internet of Services and advanced software engineering that emphasise technologies specific to the networked, distributed dimension of software and the access to services and data.
- Architecture and technological foundations for Internet-connected sensors, actuators and other smart devices and objects, enabling person/object and object/object communications.
- Trustworthy ICT including security in networked service and computing environments; trust, privacy and claims management infrastructures; and data policy, governance and socio-economic aspects of trustworthy ICT.
- Networked media and search systems, including digital media delivery platforms, end-to-end immersive and interactive media technologies, and multimedia search technologies.
- Experimental facilities (known as FIRE) for experimentally-driven research on the Future Internet; the facilities will provide larger scale and diversity to test and validate the developments at closer to reality conditions.

A Future Internet Public Private Partnership focuses on the development of innovative open network and service platforms with generic common enablers serving a multiplicity of demand-driven use cases in "smart applications". The PPP includes a strong experimentation and validation dimension, among others based on catalysers like "smart cities". The PPP targets early results with a medium-term outlook before 2015, i.e. a ~5 years horizon.

Objective ICT-2011.1.1 Future Networks

Target Outcomes

The target is the development of energy-efficient future network infrastructures that support the convergence and interoperability of heterogeneous mobile, wired and wireless broadband network technologies as enablers of the future Internet. This includes ubiquitous fast broadband access and ultra high speed end-to-end connectivity, with optimised protocols, addressing and routing capabilities, supporting open generic services and applications. "Clean-slate" and evolutionary approaches to network architecture are equally valid. User-driven research is a priority.

a) Wireless and mobile broadband systems

- **LTE-Advanced and post-LTE systems**; with focus on medium term evolution of LTE systems towards higher rate LTE-Advanced with support to standardisation; in the longer-term, R&D targeting new **radio transmission paradigms and system designs** taking into account the need for radical cost and energy per bit reduction and lower electromagnetic field exposure.
- **Enabling technologies for flexible spectrum usage** for mobile broadband, including new ambitious approaches to **cognitive radio** as well as proof-of-concept reference implementations, taking into account commercial and regulatory constraints and opportunities.

- **Novel radio network topologies**, taking into account the need for autonomy, energy efficiency, high capacity backhaul, low EMF radio exposure, and smaller low power base stations, mixed analogue-digital RF design, and novel signal processing methods.
- **Integration of radio technologies with optical fibre networks,** for consolidation of mobile and wireless networks into integrated communication systems (using e.g. femto-cells) which can deliver ultra high speed wireless access in the home, the street or in the enterprise.

b) High capacity end-to-end infrastructure technologies

- **Ubiquitous fast broadband access**: convergence and interoperability of dynamic heterogeneous broadband and mobile network technologies; robust and reliable broadband networks with optimised interconnection of heterogeneous core, metro and edge networks, wired and wireless, in multiple operator and service provider domains; seamless transparent end-to-end connectivity using optimised protocols and routing for energy efficiency and cost reduction.
- **Ultra high capacity all-optical networks** supporting ever-increasing service bandwidth demands: including network virtualisation; reducing the need for electronic-optical conversion, to solve the problem of the unsustainable growth of power consumption of electronic routers; targeting WDM technologies enabling transportation of 160 wavelengths at 40-100 Gb/s and higher, in combination with enabling technologies such as coherent transmission, complex formats, OFDM; solutions beyond 100G Ethernet.
- An efficient functional split between optics and electronics and between circuit, flow and packet switching as well as **integration with packet transport** in the data, control and management planes should be addressed.
- The work on optical core and access networks provides the system perspective to the development of the necessary photonic components and sub-systems undertaken in Objective 3.5

c) Novel Internet architectures, management and operation frameworks

- **Future Internet architectures** that are resilient, trustworthy and energy-efficient and designed to support open access, increasing heterogeneity of end-points (multimode devices, people, things) and networks (ad-hoc networks, opportunistic networks, networks of networks), with the need of a seamless and generalised handover, in support of the complete range of services and applications. Networks should sustain a large number of devices, many orders of magnitude higher than the current Internet, handle the large irregular information flows, and be compatible with ultra high capacity end-to-end connectivity.

  Visionary and "clean-slate" multi-disciplinary research on new architectures is encouraged, consisting of iterative cycles of research, design and large-scale experimentation of innovative architectures for the Future Internet from an overall system perspective.

  Network management and operation frameworks to support generic service platforms, information exchange, addressing and naming, personal networks, scalability issues, agile connectivity, and the explosion of traffic and endpoints. Work should also address Internet mobility, virtualization, and backward compatibility strategies with the current Internet. Self- or distributed management approaches should lead to a better control of

new heterogeneous networks. Optimisation of control and management may also address tighter integration between network functionalities and overlay service functionalities and optimise integration of services provided by data centres and server farms with the network capabilities.

d) Flexible, resilient, broadband and integrated satellite communication

- **Innovative system architectures and technologies** making possible the advent of ultra high capacity satellite communication systems, radically lowered transmission cost, broadband end-to-end connectivity one order of magnitude higher than that of current operational systems, seamless integration capabilities with Future Internet terrestrial based networks, notably through capability of dynamic joint reconfiguration of satellite-terrestrial protocols and integrated network management..
- **Novel technologies and architectures for resilient and flexible networks** enabling global, multi service, secure and dependable communication (including mobility), for institutional missions. It requires network availability and efficiency, fast information processing and reaction, and interoperability with terrestrial public safety networks, and integration with navigation systems and sensor networks.

e) Coordination and Support Actions and Networks of Excellence

Coordination and support for European network/service requirement definition, exploitation of results and (pre)standardisation.

Definition of a joint policy framework fostering the development and integration of terrestrial mobile, fixed and satellite communications to achieve broadband for all and serve the institutional/public service demand.

Support to concrete initiatives/projects for international cooperation, notably with USA and Japan, in identified priority topics such as cognitive radio.

Networks of Excellence should be tightly focussed on a critical mass of researchers and actors in new and emerging key topics for the Future Network development, in particular acting as a bridge between academic research and industrial exploitation.

Expected Impact

- Strengthened positioning of European industry in the fields of Future Internet technologies, mobile and wireless broadband systems, optical networks, and network management technologies.
- Developing the technology for the future generations of the European high-speed broadband and mobile network infrastructure.
- Increased economic and energy efficiency of access/transport infrastructures (cost/bit).
- Contributions to standards and regulation as well as the related IPRs, with a predominant role for Europe in standardization bodies and fora.
- Industry adoption of integrated alloptical networks and of spectral-efficient broadband wireless systems, novel Internet architectures and technologies

Funding Schemes: IP, STREP, NoE, CSA

Indicative budget distribution:

EUR 160 million, of which a minimum of 50% allocated to IPs and 30% to STREPs

Call: Call 8

Objective ICT-2011.1.2 Cloud Computing, Internet of Services and Advanced Software Engineering

The objective focuses on technologies specific to the networked, distributed dimension of software and access to services and data. It will support long-term research on new principles, methods, tools and techniques enabling software developers in the EU to easily create interoperable services based on open standards, with sufficient flexibility and at a reasonable cost.

Target outcomes

a) **Cloud Computing**
- Intelligent and autonomic management of cloud resources, ensuring agile elastic scalability. Scalable data management strategies, addressing the issues of heterogeneity, consistency, availability, privacy and supporting security.
- Technologies for infrastructure virtualisation, cross platforms execution as needed for service composition across multiple, heterogenic environments, autonomous management of hardware and software resources.
- Interoperability amongst different clouds, portability, protection of data in cloud environments, control of data distribution and latency.
- Seamless support of mobile, context-aware applications.
- Energy efficiency and sustainability for software and services on the cloud.
- Architectures and technologies supporting integration of computing and networking environments; implications of Cloud Computing paradigm on networks
- Open Source implementations of a software stack for Clouds

b) **Internet of Services**
- Service engineering principles, methods and tools supporting development for the Internet of Services, including languages and tools to model parallelism.
- Services enabled by technologies for seamless integration of real and virtual worlds, through the convergence with Internet of Things and Internet of Contents.
- Massive scalability, self-management, verification, validation and fault localisation for software-based services.
- Methods and tools to manage life cycle of secure and resilient Internet-scale applications from requirements to run-time and their adaptive evolution over time.

c) **Advanced software engineering**
- Advanced engineering for software, architectures and front ends spanning across all abstraction levels.
- Quality measure and assurance techniques which adapt to changing requirements and contexts, to flexibly deal with the complexity and openness of the Future Internet.
- Management of non-functional requirements typical of Internet-scale applications, like concurrency levels which will be orders of magnitude larger than in today's applications, huge data stores and guaranteed performance over time.
- Tools and methods for community-based and open source software development, composition and life cycle management.

d) **Coordination and support actions**
- Support for standardization and collaboration in software and services technologies.
- Support for the uptake of open source development models in Europe and beyond.
- Collaboration with Japanese entities on cloud computing, particularly on common standards for data portability and on interoperability; services having more efficient energy usage.

Expected impact
- Emergence of European interoperable clouds contributing to an internal market of services in the EU whilst providing very significant business opportunities to SME's; improved trust in cloud-based applications and storage for citizens and business.
- Availability of platforms for easy and controlled development and deployment of value-added services through innovative service front-ends.
- Lower barriers for service providers and users to develop, select, combine and use value-added services through significant advances in cloud computing technologies and standardised and open interfaces.
- Efficient implementation of mainstream software applications on massively parallel architectures.
- Easier evolution of legacy software over time, thanks to innovative methods and tools managing the complete lifecycle of software from requirements to run-time.
- Fast innovation cycles in service industry, e.g. through the use of Open Source development model.
- A strengthened industry in Europe for software-based services offering a large choice of services satisfying key societal and economical needs, with reinforced capabilities to engineer and produce software solutions and on-line services.

Funding schemes
a), b), c): IP, STREP; d): CSA

Indicative budget distribution
- IP/STREP:
  EUR 68.5 million of which a minimum of 30% allocated to IPs and 50% to STREPs
- CSA: EUR 1.5 million

Calls

ICT Call 8

Objective ICT-2011.1.3 Internet-connected objects

The objective is to provide the architecture and technological foundations for developing context-aware, reliable, energy-efficient and secure distributed networks of cooperating sensors actuators and other smart devices and objects. This should enable person/object and object/object Internet-based communications opening a new range of Internet enabled services. The key challenges of the architecture are to move beyond the sector specific boundaries of the early realisations of the "Internet of Things", to cope with the heterogeneity of the underlying technologies, and to enable integration of the novel set of supported services with enterprise business processes.

Target outcomes

a) **An open networked architecture** for Internet-connected objects, with end-to-end characteristics that can conceal the heterogeneity of the underlying network technologies required to support the multiplicity of communication requirements across objects in the physical world, be resilient to disruption of these technologies, and optimally manage a large population of resource constrained devices.

   The architecture should maximise interoperability across providers and consumers of information and services, allow for re-use of object entities in the physical world across several application domains, and provide a coherent framework with open interfaces to manage the physical entities. Due to the mobility of objects and multiplicity of applications contexts, the architecture should support self-management, self-configuration and self-healing properties as well as scalable look up and discovery of "Internet of Things" resources and services and their subsequent mapping onto entities of the real world.

   Supporting technologies need to ensure: (a) the efficient integration of the "Internet of Things" into the service layer of the future Internet, in particular for moving intelligence and service capabilities for filtering, pattern recognition, machine learning and decision-making towards the very edges of the network, up to users' terminals and things; (b) secure and efficient distribution and aggregation of information from the physical and virtual worlds, management of events, transfer of data ownership, and cooperation between objects; (c) communication among networked objects located in diverse, seamlessly connected geographical locations, to make information, knowledge and services available to people (or machines/applications) when and where they actually need it, augmenting their social and environmental awareness.

b) **Adaptive software supporting data acquisition** from a large number of sensors and providing integration with mainstream business platforms and components. Focus is on software to interpret the environmental and context information, detect information related to human intentions/behaviours, enable human-like inferences and multi-modal interactions, and eventually act on behalf of the users' intentions. High attention should be given to interoperability, privacy, security, and the discovery and mapping of real, digital and virtual entities and on the integration of these functionalities in advanced business processes.

c) **Coordination and support actions**
   - Roadmaps, standards, benchmarks and selection criteria for future industrial deployment of novel Internet of Things applications.
   - Analysis of international research agendas and preparation of concrete initiatives/projects for international collaboration, notably with China, Japan, USA and Brazil.
   - Coordination of related national, regional and EU-wide R&D programmes/activities.

Expected impact

- Opening a new range of Internet enabled services based on truly interconnected physical and virtual objects and person/object and object/object communications, and their integration with enterprise business processes.

- Novel business models based on object connectivity and supporting innovative Internet services.

- Emergence and growth of new companies, in particular SMEs, offering innovative technical solutions for making everyday objects readable, recognisable, locatable, addressable and/or controllable via the Internet.

- Consensus by industry on the need (or not) for particular standards. More widely accepted benchmarks. Consensus by all stakeholders on the governance of the "Internet of Things" including key management aspects.

Funding schemes

a)-b): IP and STREP; c): CSA

Indicative budget distribution

- IP and STREP: EUR 27 million; the objective is to support two IPs in addition to STREPs
- CSA: EUR 3 million

Calls

ICT Call 7

Objective ICT-2011.1.4 Trustworthy ICT[8]

Target outcomes

The objective is a trustworthy Information Society based on an ecosystem of digital communication, data processing and service provisioning infrastructures, with trustworthiness in its design, as well as respect for human and societal values and cultures. Projects must ensure strong interplay with legal, social and economic research in view of development of a techno-legal system that is usable, socially accepted and economically viable.

(a) Heterogeneous networked, service and computing environments.

- *Trustworthy (meta) architectures and protocols* for scalability and interoperability, taking account of heterogeneity of domains, partitions, compartments and environments in ecosystems and underlying infrastructures; architectural standards, including meta-level specifications, for conformity, emergency and security policy management.
- *A trustworthy polymorphic future internet* with strong physical security in balance with privacy; federated, seamless, transparent and user-friendly security of the edge networks in smart ecosystems, ensuring interoperability throughout the heterogeneous landscape of access networks.
- *Virtualisation and other techniques* to provide protection, assurance and integrity in complex, high-demand critical services; and security in the presence of scarce resources, and in legal domains with different priorities. Trustworthy global computing with contextual security and secure smart services in the cloud.
- *Metrics and tools for quantitative security* assessment and predictive security in complex environments and for composition and evaluation of large scale systems.

[8] *Trustworthy* is defined in this context as: secure, reliable and resilient to attacks and operational failures; guaranteeing quality of service; protecting user data; ensuring privacy and providing usable and trusted tools to support the user in his security management.

- *Enabling technologies*, such as declarative languages, biometry, technology for certification and accreditation or cryptography for Trustworthy ICT.

(b) Trust, eIdentity and Privacy management infrastructures.

- Development of *trust architectures, protocols and models* for trust assurance, including measures and rating models, and services and devices to enable trust assessment (e.g. by claims on identity, reputation, recommendation, frequentation, voting), to delegate trust and partial trust; and for trust instrumentation and high-level tools at the end-user stage (cognitive and learning instrumentation for trust, profiling services and communities).
- Protocols for *privacy infrastructures* enabling multi-identity and tools to check privacy assurance and enable un-observability and un-linkability through search engines or social networks. Advancement of privacy at the hardware level.
- Interoperable or federated *management of identity claims* integrating flexible user-centric privacy, accountability, non-repudiation, traceability as well as the right to oblivion at the design level. Technologies and standardisation for use of multiple authentication devices, applicable to a diversity of services, and providing auditing, reporting and access control.

(c) Data policy, governance and socio-economic ecosystems.

- Management and governance frameworks for consistent expression and interpretation of security and trust policies in data governance and means for implementation, including in the ubiquitous scale-less Web or Cloud. Technology supported socio-economics frameworks for risk analysis, liability assignment, insurance and certification to improve security and trust economics in the EU single market.
- Multi-polar governance and security policies between a large number of participating and competitive stakeholders, including mutual recognition security frameworks for competing operators; transparent security for re-balancing the unfair, unequal face-to-face relationship of the end-user in front of the network; tools for trust measurement, based on cost-benefit analysis.

(d) Networking and Coordination activities

Support for networking, road-mapping, coordination and awareness raising of research and its results in Trustworthy ICT.

Priority will be given to (i) stimulating and organising the interplay between technology development and legal, social and economic research through multi-disciplinary research communities; (ii) promoting standards, certification and best practices; (iii) coordination of national RTD activities.

Expected impact:

- Improved European industrial competitiveness in markets of trustworthy ICT, by: facilitating economic conditions for wide take-up of results; offering clear business opportunities and consumer choice in usable innovative technologies; and increased awareness of the potential and relevance of trustworthy ICT.
- Adequate support to users to make informed decisions on the trustworthiness of ICT. Increased confidence in the use of ICT by EU citizens and businesses. Increased usability and societal acceptance of ICT through understanding of legal and societal consequences.
- Demonstrable improvement (i) of the trustworthiness of increasingly large scale heterogeneous networks and systems and (ii) in protecting against and handling of network threats and attacks and the reduction of security incidents.

- Significant contribution to the development of trustworthy European infrastructures and frameworks for network services; improved interoperability and support to standardisation. Demonstrable usability and societal acceptance of proposed handling of information and privacy.
- Improved coordination and integration of research activities in Europe or internationally.

Funding schemes

(a)-(b)-(c): IP and STREP; (d): NoE, CSA *[provisional, will be completed/confirmed in the next iteration]*

Indicative budget distribution

- IP/STREP: EUR 70 million of which a minimum of 50% allocated to IPs and 30% to STREPs
- NoE, CSA: maximum EUR 10 million

Call

ICT 8

Objective ICT-2011.1.5 Networked Media and Search Systems

The objective is to develop advanced digital media platforms and technologies that should: a) overcome the inherent limitations of the Internet as a media delivery platform; b) make available immersive and interactive media technologies providing users with more sophisticated forms of media and enhanced experiences; c) empower users to search the relevant media information corresponding to their usage and context requirements.

Target outcomes

a) Digital Media Delivery Platforms

Architectures and technologies for networking and delivery of digital media, provided through open environments enabling personalisation and high user involvement capabilities.

Technologies for automatic dynamic media adaptation to delivery platforms, either network controlled or edge controlled, facilitating just-in-time and ad-hoc media objects adaptation and fusion. Novel architectures to allow for co-operation between media overlays delivery and underlying networks, i.e. optimisation of available infrastructure capacity and of media delivery. Higher quality video/audio to the web relying on content-aware networking, low latency for real time applications and quality-of-service guarantees. The work covers fixed and mobile environments as well as a multiplicity of user contexts, within or outside of the home / office.

Novel platforms for customised and context adapted hybrid broadcast internet services enabling new user behaviours.

b) End-to-end Immersive and Interactive Media Technologies

Immersive media capture, representation, encoding, adaptation to user devices, production and compression technologies and tools, prosumer-friendly and with automation and collaboration features. Evolution towards a mix of real and virtual worlds with improved interaction capabilities as applied in games; increased media quality as well as multimodality and hypermedia augmentation implemented through open environments and interfaces

Technologies and tools to enable end-to-end diffusion and efficient distribution of 3D, immersive, interactive media over the Internet. Improvement of quality of user experience:

surrounding, immersive and interactive environments on the move, at home and at work, including quality and resolution beyond the current HD capabilities.

c) Multimedia Search

Scalable, multimodal, real-time media (image, audio, and video including 3D media objects) search and retrieval technologies deployed over open platforms. Search engines that facilitate and personalize fast access to web-scale digital media objects, beyond text based indexing and retrieval capabilities of currently available search technologies. User-centric semantic search by effective relevance feed back. Dynamic modelling of digital objects with searchable features, natural interaction and navigation capabilities, intelligent caching/ storing relying on the sharing of network resources. Integration of novel search technologies in networked platforms and applications, especially for mobile, enterprise and location-based search. Fast search targeting virtual information and information captured from the physical world.

d) Coordination and Support Actions

Coordination of related national and EU-wide R&D programmes/activities and cooperation between the relevant authorities

Dissemination of results and organisation of scientific and/or policy events.

Research and technology development roadmaps and stakeholder coordination.

Analysis of international research agendas and roadmaps, pre-standardisation initiatives and preparation of concrete initiatives/projects for international cooperation.

Expected impact

- Reinforced positioning of the European ICT and digital media industry, and wider market opportunities, in particular for technology-providing SME's.
- Digital media/service platforms aggregators provided with innovative offers for immersive, interactive and personalised digital media.
- Effective contribution to global standards and European IPRs reflecting federated and coherent roadmaps.
- Greater creativity stimulated through technologies and tools to capture/produce/search/exchange professional and user generated immersive and interactive digital media content.
- Education and professional training opportunities enhanced through immersive environments and interactivity.
- Reduced carbon footprint through use of immersive platforms for online video applications (e.g. telepresence)

Funding schemes

a), b), c): IP and STREP; d): CSA

Indicative budget distribution

- IP and STREP: 68 M€ of which a minimum of 50% to IPs and 30% to STREPs

- CSA: 2M€

Call

ICT Call 7

Objective ICT-2011.1.6 Future Internet Research and Experimentation (FIRE)

Target outcomes

a) **FIRE Facility:** Maturing and expanding the FIRE Experimental Facility:

   (i) New areas: complementing the offerings of the FIRE Experimental Facility projects (ec.europa.eu/fp7/fire) by new facilities in research areas insufficiently supported by existing prototypes, e.g. social networking, 3D Internet. Each project should provide an operational prototype at an early stage in the project, being gradually expanded in a demand-driven and open way. Each project should also use the mechanism of open calls and dedicate at least 20% of its budget to innovative usage experiments, each of them not exceeding a funding of 200 K€.

   (ii) Extension: advancing early FIRE prototypes to serve the demands of the Future Internet research communities; the prototypes to be extended should clearly demonstrate the success of the services already being offered in terms of number of users, scale and diversity of experiments going beyond of what can be tested on the current internet. Each project should use the mechanism of open calls and dedicate at least 20% of its budget to innovative usage experiments, each of them not exceeding a funding of 200 K€.

b) **FIRE Federation**: implementing a demand-driven high level federation framework for all FIRE prototype facilities and beyond making the facility self-sustainable towards 2015 based on credible business models assuming a significant decrease of EU funding; including the development of a joint FIRE portal, operated until the end of 2015 and a set of common tools addressing issues such as brokering, user access management, one-stop-shopping, measurement and performance analysis. Provisions shall be made for openness towards additional testbeds and facilities, for building as far as possible on proven existing federation models, for the use of open standards, for standardisation and certification policies, and for cooperation with EU national and international initiatives on experimental facilities.

c) **FIRE Experimentation:** Experimentally-driven research in the broad field of the Future Internet using one or more of the existing FIRE facility prototypes. Projects should be challenging both in terms of visionary R&D to be undertaken, e.g. on holistic network and service architectures, on applications with high social value, on low energy and cost solutions, etc.; and in terms of innovative usage of the facility, e.g. large scale & diversity of experiments, broad and systematic involvement of large groups of end-users, complex system-level testing, assessment of socio, economic, or environmental impact, and methodology and tools used for measurements and benchmarking. Proposers must demonstrate a clear commitment of the FIRE facilities they intend to use. Where appropriate, participation from international cooperation countries at use level is encouraged.

d) **FIRE Science:** A multidisciplinary Network of Excellence in the area of holistic Future Internet research to overcome fragmentation and to integrate life and human sciences (e.g. networking, computing, telecommunications, complex systems, security, trust and identity, privacy, sociology, psychology, energy, user interfaces, anthropology, economics, knowledge management). The network shall lay the foundations of an Internet Science allowing a better understanding of the complex nature of Internet networks, services and applications, and their design based on desirable social, economic or environmental objectives, thereby creating an “internet scientist” profile.

e) **Coordination and Support Actions**: EU-wide co-operation with related EU-level and Member States and associated countries activities such as the Public Private Partnership on the Future Internet, or national experimentation facilities; international co-operation with initiatives in industrial countries and emerging economies; co-operation on standardization in order to exploit synergies; socio-economic requirements gathering, impact analysis, and awareness creation.

Expected impact:

- Research projects saving costs on experimentation activities, while at the same time being able to do more diverse and larger scale testing with broad end-user involvement and closer to reality, leading to a better and faster exploitation of research results in infrastructures, products and services.
- Improved European competitiveness in Future Internet research by providing European researchers, in industry and academia, with a unique operational, sustainable, dynamic, and integrated large scale Experimental Facility.
- Broad and innovative use of the Experimental Facility by a significant number of Future Internet research projects in European and national programmes and beyond.
- Better understanding by European industry and academia of the complex nature of the Internet as a system of systems, and enabling them to take this knowledge into account when considering changes, when providing services, and when seeking to take advantage of new market opportunities, including at international level.
- Strategic capability to assess a priori the evolution of Internet networks, services and applications in terms of broad implications at societal, economic and environmental levels, taking into account aspects such as sustainability, privacy, openness, neutrality, and market evolution.

Funding schemes

(a): IPs - it is expected that a minimum of one IP is supported for each of the two sub-objectives, requested funding per IP should normally not exceed EUR 5 million.
(b): One IP
(c): STREPs - requested funding per STREP should normally be in the order of EUR 1 – 1.5 million with a duration of up to 24 months.
(d): NoE; (e): CSA

Calls and indicative budget distribution

- ICT call 7 – target outcome (a), (d)
  - IP: EUR 15 million
  - NoE: EUR 5 million
- ICT call 8 – target outcomes (b), (c), (e)
  - IP/STREP: EUR 23 million of which EUR 8 million for IP and EUR 15 million for STREP
  - CSA: EUR 2 million

Future Internet Public Private Partnership (FI-PPP)

The FI-PPP addresses the need to make public service infrastructures and business processes significantly smarter (i.e. more intelligent, more efficient, more sustainable) through tighter integration with Internet networking and computing capabilities. The aim is i) to increase the effectiveness of business processes and of the operation of infrastructures supporting applications in sectors such as transport, health, or energy; and ii) to derive possible innovative business models in these sectors, strengthening the competitive position of European industry in domains like telecommunication, mobile devices, software and service industries, content providers and media. This requires to (i) identify, define and up-date the Future Internet requirements coming from the different innovative use cases (ii) specify an open standardised generic framework (specification, standards, implementation and research/usage validation trials) combining the required network, data, computing and services components (iii) adapt and complement to the specific needs of use cases.

The PPP follows an industry-driven, holistic approach encompassing R&D on network and communication infrastructures, software, service and content/media technologies and their experimentation and validation in real application contexts. It is expected that projects under the PPP draws upon the wealth of results already achieved through earlier European research, to valorize them further through a systematic integration with a complete system perspective.

The main technical outcome of the PPP is a versatile (multi-use case) and open network and service platform, supported by reusable, generic, standardised and commonly shared technology enablers (horizontal foundation) serving a multiplicity of demand-driven use cases in "smart applications" (vertical sectors). The target platform may draw upon resources from several independently controlled domains through ad-hoc coalition of resources and services, which drives strong requirements towards interfacing standards. Integration of sensor/actuator networks in the platform to provide "physical world" information in support of context-aware smart applications and services is an important technological driver.

The FI-PPP needs to bring together the demand and the supply sides, and requires to involve users early into the research lifecycle. Large scale experimentation and validation in environments including (without being restrictive to) “Integrated Smart Cities” or "smart regions". The platform will thus be used by many actors, in particular by SMEs and public administration services, to validate the technologies in the context of smart applications and their viability to support "user driven" innovation schemes.

In order to achieve a good balance between "application pull" and "technology push", the PPP activities are implemented as a coherent programme with interdependencies between the different Objectives under the common PPP aims and governance structure. The PPP is based on a three-phased approach with four tightly related Objectives and two dedicated Calls under this Work Programme and a third Call under Work Programme 2013.

Objective FI.ICT-2011.1.7 Technology foundation: Future Internet Core Platform

Target outcomes

Design, development and implementation of a generic, trusted and open **network and service Core Platform** making use of and integrating advanced Internet features enabling uptake in innovative "smart applications". This includes the specification of open standardised interfaces from this Core Platform to domain-specific instantiations addressed by projects under the "Use case scenarios and experimentations" Objective. The target Core Platform may draw upon resources from several independently controlled domains through ad-hoc aggregation of resources. The aim is to offer Core Platform functionalities that can be generically reused for multiple user contexts to develop "smart applications".

A major research challenge is the engineering and scaling-up of advanced Internet technologies, enriched by the necessary integration and functional components, enabling a comprehensive capability for generic and domain specific services and applications. The work should take a comprehensive system view of the Internet, underpinning the convergence of network-centric approaches of operators and telecom equipment manufacturers with web-based and service-oriented approaches of the software and service providers and integrators.

Generic Enablers are a key feature of the Core Platform. They offer functionalities that can be reused and composed for a multiplicity of use cases. Core platform functionalities resulting from innovative Internet use cases and operational needs should include:

- the general capability to draw upon resources from several independently controlled domains through ad-hoc aggregation of resources;
- upgraded network capabilities, covering requirements derived from innovative Internet use cases and from the operational needs of smart infrastructures;
- information processing capabilities enabling the generation, composition, sharing and exploitation of huge amounts of data in support of context aware applications and enabling "mash-up" applications;
- generic service infrastructure capabilities enabling application-related services, "things" and contents to be visible and accessible by end-users within and across domain-specific instantiations in a uniform way enabling "services mash-up";
- real time application capabilities based on coupling sensor and actuator networks to the Internet, through a uniform reference architecture;
- adapted network/service management schemes including traffic flow optimisation, trust and security;
- trust and identity capabilities enabling end-users, devices, digital objects and service providers to be identified globally and across multiple domains in a trusted manner;
- use case-independent application and service development tools including application programming interfaces and software development kits;
- where and if appropriate, platform federation and interoperability between platforms, or instantiations thereof, from an architectural perspective and beyond data integration.

The dynamic specification of the Core Platform functionalities largely depends on the requirements stemming from the identified use cases. The testing infrastructure, on which the core platform is to be implemented in phase 2 will be provided by the "Use Case scenarios and experimentations" Objective, building the starting point for large scale experimentation and validation across multiple use case scenarios in phase 3. Therefore, an efficient collaboration with the projects generated under the "Use Case scenarios and experimentations" Objective is a mandatory requirement, which is of particular importance in the phase 1 of the initiative when the common Generic Enablers to be provided through the Core Platform have to be identified based on use case needs. In this context, it is in particular expected that the chief architect of the core platform chairs an architectural board with participants from all other activities.

The Target Outcomes of this Objective covering phases 1 and 2 of the PPP include:

i) System design: through research covering the specification and design of the functionality and interfaces of the Core Platform;

ii) Early prototyping: the phased development and maturing of a reference implementation with a convincing subset of the targeted capabilities of the Core Platform;

iii) Early implementation and validation: the provisioning of the Core Platform on a medium scale pan-European Future Internet testbed infrastructure supporting use case specific experiments.

Funding schemes

One IP

Indicative budget distribution and duration

- EUR 40 million; a minimum of 30% of the budget is expected to be kept flexible for distribution among partners complemented by Open Calls to allow for responding to emerging user needs not known from the outset.
- Duration: 3 years

Call

- FI-PPP 2010

Another call under this line of action is planned under WP 2013, which is expected to address the extension and maturing of the Core Platform prototypes and their implementation on the large scale Future Internet testbed infrastructure. At this stage, the final outcome of this line of activity will be a reference implementation of all targeted capabilities in an operational prototype of the Core Platform, on which application domains have built their domain-specific instantiations and run large scale demonstrations.

Objective FI.ICT-2011.1.8 Use Case scenarios and experimentation

Target outcomes

The work focuses on vertical use case scenarios whose intelligence, efficiency, sustainability and performance can be radically enhanced through a tighter integration with advanced Internet-based network and service capabilities.
The target use cases should cover innovative applications scenarios with high social or economic impact making use of advanced Future Internet capabilities. Without being restrictive, examples of such target use cases include systems for utilities like the electricity grid, for traffic and mobility management, for healthcare, and for ubiquitous access to networked digital media. Each proposed use case is expected to utilize technologies and functionalities leapfrogging current innovative Internet technologies, such as context awareness and sensor networks, advanced real time information processing capabilities handling huge volume of information, ad-hoc service composition and mash-ups, managed broadband connectivity and services, embedded media support for interfaces easing the interpretation of processed contextual data, etc.

The work includes use case characterization; specification of platform requirements; development and technological validation prototypes, and large scale experimentation and validation. Of particular importance for each selected use case is the identification of usage specific requirements versus generic requirements that can be implemented through Generic Enablers. The latter will be developed by the "Core Platform" Objective which takes a central role in collecting requirements and defining generic enabling capabilities and interfaces, feeding them back into the specifications for the use case experiments. It is expected that a prominent role is given to user organisations covering all relevant usage levels of the value chain. The definition and preparation of the experimentation sites shall be based on the

provisions made by the "Capacity Building and Infrastructure Support" Objective. A pan-European approach is targeted for the implementation of experimentations and validations.

The activities are undertaken in two consecutive phases:

Target outcomes after **phase 1:**

i) A comprehensive set of detailed technical, functional and non-functional specifications for an expermentation in the given use case, including thecharacterisation of use case scenarios; the identification of Generic Enablers and architectural requirements to be developed through the Core Platform Objective, complemented by domain-specific capabilities including the definition of open interfaces and interoperability requirements and their validation as domain-specific sub-systems; the assessment of existing R&D activities to build on; and the drafting of a strategy towards contributing to standardisation in the respective application fields.

ii) Development of domain-specific capabilities and conceptual prototypes demonstrating critical technological solutions and the overall feasibility of the approach suggested for phase 2.

iii) A phase 2 implementation plan, including a detailed analysis of the potential experimentation infrastructures, and a plan for user community building.

Target outcomes after **phase 2:**

i) Working experimentation sites building upon common components and Generic Enablers as provided under the Core Platform Objective complemented by the identified use case specific capabilities;

ii) Selected test applications implemented on these experimentation sites;

iii) Validation of the openness and versatility of the Core Platform and its software development kid, through implementation of mixed use case scenarios originating from more than one use case project;

iv) A detailed plan for how to move into phase 3, including detailed plans for the massive expansion of platform usage facilitated by local and regional stakeholders including SMEs.

Phase 1

Funding schemes

- Up to 8 IPs; with priority given to maximising the spectrum of use cases covered.

Indicative budget distribution and duration

- EUR 5 million per use case project
- Duration: max 24 months

Call

- FI-PPP 2010

Phase 2

Funding schemes

- Up to 5 IPs, i.e. consolidation of up to 5 different use cases

Indicative budget distribution and duration

- 13M€ per use case project; a minimum of 10% of the budget is expected to be allocated through Open Calls to allow for local solution providers and system integrators to get involved.
- Duration: max 24 months

Call

- FI-PPP 2011

Another call under this line of action is planned under WP 2013, which is expected to address the massive expansion of platform usage facilitated by local and regional stakeholders including SMEs. The definition and preparation of the experimentation sites shall be based on the provisions made by the "Capacity Building and Infrastructure Support" Objective. A pan-European approach is targeted for the implementation of experimentation and validation trials.

Objective FI.ICT-2011.1.9 Capacity Building and Infrastructure Support

Target outcomes

The goal is to leverage existing public investments in advanced infrastructures to support advanced experiments demonstrating the versatility of the Core Platform across a multiplicity of heterogeneous environments and use cases. Several European regions or cities are increasingly becoming equipped with advanced infrastructures (e.g. sensor platforms, advanced broadband wireless networks, server farms and service environments, energy grids, content delivery networks); the FIRE initiative may also be considered a dynamic experimental infrastructure for Future Internet research.

The aim is hence to identify, taking a pan European perspective, those infrastructures that could eventually be integrated with the Core Platform to support large scale experimentation and validation, and to identify the related interoperability requirements. These interoperability requirements will also help the definition of Generic Enablers under the Core Platform Objective, as they will drive the required level of virtualisation making it possible to seamlessly integrate various heterogeneous infrastructures and to federate them according to use case requirements.

This Objective requires putting in place a partnership strategy with the infrastructure owners and a detailed understanding on the operational usage taking into account that these supporting infrastructures will be used in "shared modes". Finally, supporting infrastructures need to be upgraded according to research results driving additional requirements and constraints to support the target use cases.

Target outcomes after **phase 1:**

i) The identification of existing and future advanced test and experimental infrastructures across Europe and the associated technological constraints that need to be overcome to use these for conducting large scale (ultimately user driven) experimentation and validation of innovative, integrated Future Internet applications. It is expected that the identified infrastructures also cover cities and regions in the enlarged Union.

ii) The maintenance of a web-based repository of available infrastructures potentially engaged in trials and of their key functional characteristics;

iii) The identification of the usage-related operational constraints derived from these infrastructures;

Target outcomes after **phase 2:**

i) The interoperability requirements characterising the Generic Enabler definition of the Core Platform.

ii) The assembly of a pan-European federation of test and experimental infrastructures satisfying the interoperability requirements, equipped with the functionality of the core platform (including its application programming interfaces and software development kits) by the start of phase 3 to support the validation of application scenarios in representative environments.

iii) The necessary adaptation, upgrade and validation of the infrastructures in view of supporting usage requirements stemming from the experimented use cases and a mix of those.

iv) The integration of these infrastructures within the selected use cases experiments targeted in phase 2 (it is expected that targeted use cases are implemented through specific islands only requiring integration of a subset of all available infrastructures).

Phase 1

Funding schemes

- One CSA

Indicative budget distribution and duration

- EUR 3 million
- Indicative duration: 3 years

Call

- FI-PPP 2010 (starting from phase 1)

Phase 2

Funding schemes

- One IP

Indicative budget distribution and duration

- EUR 12 million
- Indicative duration: 2 years

Call

- FI-PPP 2011 (starting from phase 2)

Another call under this line of action is planned under WP 2013, which is expected to address the management of the experimental infrastructure across use cases.

Objective FI.ICT-2011.1.10 Programme Management and Support

The implementation of the PPP activities across a limited set of interrelated projects requires the setting up of a comprehensive management and support organisation. Beyond pure management and co-ordination issues, the objective of this activity is to address all the non-research activities that are needed for a successful implementation of the PPP. The objective is also to prepare sufficiently in advance for the large participation of SMEs during the large scale experimentation and validation phase.

Target outcomes

- Co-ordination and planning of the necessary flow of information across the various PPP projects; the management of dependencies and synchronisation of the project activities across the programme through the set-up and co-ordination of programme boards in agreement with participating projects.
- Planning of large scale experiments; platform operator function (scheduling and planning).
- Support and coordination of the necessary standardisation stemming from the openness requirements of the target Core Platform; set-up a certification programme for relevant enablers and services; coordination of contributions to international standardisation so as to maximise impact in terms of industry in Europe capitalising on the results;
- Develop, agree with participating project, implement and operate the necessary and adequate programme governance structures for an efficient and effective implementation of the programme, catering for effective day-to-day management of programme execution and for advisory roles. It is expected that all programme activities adhere to the programme governance structures;
- Contributions related to regulation and EU policies made to the relevant bodies; support to the necessary regulatory evolution making it possible to operate such a distributed platform across Europe, with a perspective of an internal market for trusted and secure e-services for data repositories, in particular for what concerns use cases related to public sector priorities;
- Identification of SME's as a priority for the trials of phase 3, including a training programme and other support for them.
- Co-ordination of dissemination and awareness activities, including dissemination activities towards European cities and regions, awareness raising actions targeted at policy makers responsible for local or regional developments; co-ordination of participation to large events like international exhibitions and fairs; preparation of high quality dissemination material.
- Maintenance of a programme-level IPR regime. ???

Funding schemes

- One CSA

Indicative budget distribution and duration

- EUR 10 million
- Indicative duration: 4 years

Call

- FI-PPP 2010

Another call under this line of action is planned under WP 2013, which is expected to address programme management and support for phase 3 of the initiative.

Expected Impact of the FI PPP (The 4 objectives described above)

- Significant increase of the effectiveness of business processes and novel approaches to the operation of infrastructures and applications of high economic and/or societal value. This will be supported by reappraised Internet architectures, services and technologies in large-scale application contexts;
- Reinforced industrial capability on novel service architectures and platforms, building on the longer-term requirements of the Internet and encouraging players in Europe to embrace the challenges of smart infrastructures;
- New opportunities for novel business models based on cross-sector industrial partnerships built around Future Internet value chains, involving users and public authorities at local, regional and national levels, and providing SME players with opportunities to offer new products, equipments, services and applications.
- Creation of new European-scale markets, overcoming potential fragmentation, for smart infrastructures, with integrated communications functionality, contributing to economic growth and to European leadership in global ICT applications markets.
- Evolution (not clean slate) of Future Internet infrastructure compatible with the emergence of open, secure and trusted service platform for building networked applications that can be leveraged through user-centred open innovation schemes;
- A comprehensive approach towards regulatory and policy issues such as interoperability, openness, standards, data security and privacy within the context of the Future Internet complex and ‘smart’ usage scenarios. This may also address the required methodologies, procedures and best practice needed to address transnational aspects where a high degree of public-private co-operation is needed. Participation of the public sector in the PPP will be a key asset to progress in these non-technological issues.

6.2 Challenge 2: Cognitive Systems and Robotics

Challenge 2 focuses on artificial cognitive systems and robots that operate in dynamic, non-deterministic, real-life environments. Such systems must be capable of responding in a timely and sensible manner and with a suitable degree of autonomy to gaps in their knowledge, and to situations not anticipated at design time. Actions under this Challenge support research on engineering robotic systems and on endowing artificial systems with cognitive capabilities. Both research strands are intricately intertwined: many functionalities and desirable properties of robotic systems rely on cognitive capabilities. Conversely, robotic systems are suitable platforms for motivating, guiding and validating more basic cognitive systems work.

Hard scientific and technological research issues still need to be tackled in order to make robots fit for rendering high-quality services, or for flexible manufacturing scenarios. Sound theories are requisite to underpinning the development of robotic systems and providing pertinent design paradigms, also informed by studies of natural cognitive systems (as in the neuro- and behavioural sciences).

Research under Challenge 2 will fuel progress for instance from robots that are largely pre-programmed, to robots that are programmable through teaching and learning; from robots that are largely tele-operated, to robots that autonomously plan complex tasks; from robots with rigid components and structures, to those with dexterity and manipulation skills going beyond human level; from robots that operate in tightly controlled environments, to robots that can properly interact and cooperate with people in real-world environments. Future robots will also come in various shapes and sizes (including miniature) and will increasingly incorporate intelligent materials, as well as advanced sensor, actuator and effector, (distributed, brain-inspired) memory and control technologies, and where needed, they will exhibit physical compliance.

Cognitive systems research extends beyond robotics. Hence, this Challenge will also address issues related to monitoring, assessing, and controlling heterogeneous multi-component and multi-degree-of-freedom systems, where this hinges on implementing cognitive capabilities. At an elementary level, such capabilities include establishing and recognising patterns in sensor-generated data. This is a prerequisite to higher-level operations such as scene interpretation, reasoning, planning, intelligent control, and complex goal-oriented behaviour. Learning, in appropriate modes, is essential at all levels.

It is equally important to be able to measure and compare progress towards the ambitious goals set under this Challenge. Developing suitable benchmarks, conducting benchmarking exercises and supporting scenario-based competitions are therefore firmly placed on the agenda.

Although Challenge 2 does not target any specific application area, research will be motivated, guided and validated by realistic, demanding and scalable real-world scenarios, where appropriate backed by industrial stakeholders. Gearing up cross-fertilisation between relevant industry and research communities is a key issue in this respect and industrial participation is therefore greatly encouraged.

Work under Challenge 2 will improve competitiveness in existing and future markets (e.g., manufacturing, professional and domestic services), and provide innovative solutions in areas that include (but are not limited to) assistance and co-working, production, logistics and transport, construction, maintenance and repair, search and rescue, exploration and inspection, systems monitoring and control, consumer robotics, education and entertainment.

Objective 2.1: Cognitive Systems and Robotics

Target outcomes

a) **Robotic systems operating in real-world environments**: Expanding and improving the functionalities of robotic systems and further developing relevant features, such as autonomy, safety, robustness, efficiency, and ease of use. As appropriate, work will include exploring ways of integrating, in robotic systems, new materials and advanced sensor, actuator, effector and leading edge memory and control technologies.

b) **Cognition and control in complex systems**: Enabling technologies based on the acquisition and application of cognitive capabilities (e.g., establishing patterns in sensor data, classification, conceptualisation, reasoning, planning) for enhancing the performance and manageability of complex multi-component and multi-degree-of-freedom artificial systems, also building on synergies between cognitive systems and systems control engineering. This outcome complements Objective 3.3 / target outcome (d).

Realistic, highly demanding, scalable real-world scenarios will motivate and guide research related to targets a) & b), and serve to validate its results. *Specific Targeted Research Projects* (STREP) are particularly suited to *high-risk endeavours*, breaking new grounds, with high potential rewards. They are also appropriate for component-level research for particular domains. *Integrated Projects* (IP) are preferred for *system-oriented efforts*; they are expected to encompass all stages of the research and development lifecycle and, where appropriate, cutting across research topics.

c) **Gearing up and accelerating cross-fertilisation between academic and industrial robotics research** to strengthen synergies between their respective research agendas through joint industrially-relevant scenarios, shared research infrastructures; joint small- to medium-scale experimentation with industrial platforms and implementation of comparative performance evaluation methodologies and tools.

d) **Fostering communication and co-operation between robotics and cognitive systems research communities** through: identification of common interests and areas of co-operation; knowledge sharing between EU, national, and international initiatives; supporting open-source hardware and software developments; updating R&D roadmaps taking account of work under relevant past and ongoing European programmes; addressing issues such as market potential, user acceptance, standardisation, continuing education, ethics, and socio-economic impacts; outreach to relevant professional and general audiences.

e) **Speeding up progress towards smarter robots through targeted competitions** based on suitably evolving reference scenarios focused on capabilities at issue under this Objective, and involving relevant stakeholders. This includes soliciting private sponsorships, organising and managing pertinent events as well as accompanying dissemination measures and public relations activities.

Expected impact

For a), b) and c):

- Integrated and consolidated scientific foundations for engineering cognitive systems under a variety of physical instantiations.
- Significant increase in the quality of service of such systems and of their sustainability in terms of, for instance, energy consumption, usability and serviceability, through the integration of cognitive capabilities.
- Innovation capacity in a wide range of application domains through the integration of cognitive capabilities.

– Improved competitive position of the robotics industry in existing and emerging markets for instance in the following sectors: manufacturing; professional and domestic services; assistance and co-working, production, logistics and transport, construction, maintenance and repair, search and rescue, exploration and inspection, systems monitoring and control, consumer robotics, education and entertainment.
– Consensus by industry on the need (or not) for particular standards. More widely accepted benchmarks. Strengthened links between industry and academia.

For d):
– Stronger cohesion between relevant industrial and academic R&D communities; and a higher level of awareness among wider (including non-professional) audiences of the potential of the technologies at issue.

For e):
– Greater innovation through competitions which allow to measure and compare progress towards the ambitious goals set under this Challenge.

Funding schemes:

a)-b): STREP, IP; c) IP; d-e) CSA

Indicative budget distribution:

EUR 155 million

Calls:

ICT call 7: target outcomes (a), (d)
- IP/STREP: EUR 70 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs
- CA: EUR 3 million

ICT call 9: target outcomes (b), (c), (e)
- IP/STREP: EUR 80 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs
- CA: EUR 2 million

6.3 Challenge 3: Alternative Paths to Components and Systems

Challenge 3 covers electronic and photonic components, integrated micro/nanosystems, multicore computing systems, embedded systems and their monitoring & control and cooperating complex systems. It complements the developments undertaken in the ENIAC and ARTEMIS JTIs.

More specifically, Challenge 3 focuses on:

- The deep miniaturisation, energy-efficiency, performance increase and manufacturability of nano-electronic devices using alternative solutions to the traditional miniaturisation path, for information and communication systems and other applications in 2020 and beyond.
- The integration of new functionalities for the next generation of application-specific components and smart systems through the convergence of microelectronics, nano-materials, biochemistry, measurement technology and ICT.
- The design, modelling and operation of systems composed of a large number of independent, heterogeneous and interacting embedded systems as well as their monitoring and control; and the management of interconnected large, yet autonomous systems ("Systems of Systems").
- The parallelisation and programmability methods to allow the adaptation of existing software to multicore computing architectures and systems, from embedded devices to general-purpose and to high performance computing.
- The further development of core and disruptive photonic technologies (lasers, waveguides, photodetectors, amplifiers, LEDs, optical fibres, etc), fundamental in strategic applications such as medicine, communications, lighting, sensing and measurement, and manufacturing.
- The development of advanced, low temperature processing, and potentially printable devices and systems on large area and/or flexible substrates, such as light emitting and sensing devices, photovoltaics, displays, printed electronics for smart tags, or wearable smart textiles.

Objective ICT-2011.3.1 Very advanced nanoelectronic components: design, engineering, technology and manufacturability

This objective covers the combination and convergence of advanced More-than-Moore elements with Beyond-CMOS devices and their integration and interfacing with existing technology. It addresses research from a "System Perspective", i.e. linking new advanced component technologies with advanced system design to support miniaturised electronic systems for 2020 and beyond. Developed components and technologies need to fulfil the criteria of "systemability", "integratability" and "manufacturability" where appropriate.

The interaction of circuit, device and technology research communities will be stimulated. Research for disruptive approaches and holistic research solutions to address new levels of miniaturisation at component and system level are targeted as well as related novel manufacturing solutions and access to manufacturing and integration platforms for European equipment and material suppliers.

The activities under this objective are complementary to the activities in the ENIAC JTI[9].

Target outcomes

a) Beyond CMOS technology:

- New switches and interconnects which offer scalability, performance and energy efficiency gains, operational reliability and room temperature operation with preferably CMOS process and architectural compatibility .
- Advanced system integration technology and new methods for computation.
- Emerging memories targeting the concept of non-volatile universal memory.
- Nano-photonic devices & interconnects integrated with nano- and Beyond–CMOS.
- Carbon based electronic devices.
- Novel materials for interconnects, nano-packaging, Beyond-CMOS (logic and memory).
- Understanding fundamental artefacts and limits: nano-scale thermal processes; computational material and device science.

b) Circuit-technology solutions, addressing in a *combined manner*:

- Architectures including energy efficiency, spin devices; silicon with molecular switches; ferromagnetic logic; heterogeneous and morphic system architectures.
- Circuit design, methodology and tools addressing e.g. power dissipation constraints; SRAM stability; digital-analogue convergence; device variability, model accuracy; reliability and novel functionality.
- Technology addressing e.g. device leakage current, power dissipation, process variability; monolithic as well as 3D integration of Beyond-CMOS and advanced More-than-Moore; co-integration of photon and electron based devices.
- Modelling and simulation: e.g. quantum and atomic scale effects; electro-thermo--mechanical effects; band-to-band tunnelling; drift diffusion effects; variability; modelling for new materials, processes and devices, and higher abstraction level models for cross technology cross IP level simulation.
- Design-technology solutions for energy efficiency, high reliability and robustness including ultra low power techniques and zero-power concepts; thermal aware design, solutions for complex single or multi-technology systems; reuse and standardisation with respect to IPs , design for self-testing, self-healing and self-configuring.

c) Nano-manufacturing and Joint Equipment Assessment, comprising the complete manufacturing supply chain for flexible and customised manufacturing of integrated nano- and Beyond-CMOS components:

- Manufacturing approaches to Beyond-CMOS and advanced More-than-Moore', and to their integration with nanoCMOS including 3D integration.
- Enhanced variability control; integrated metrology/inspection/analysis concepts and tools to support 3D approaches; functionalised assembly and packaging (also at wafer level).

[9] The JTI addresses application-guided industrial cooperative research in the 'More Moore' and 'More than Moore' domains for the next generation components and systems and targets large strategic initiatives. In manufacturing, the JTI targets larger volume fabrication with emphasis on generic manufacturing and equipment development. See http://www.eniac.eu

- Joint Assessments of (combined) equipment/metrology/process solutions ranging from proof of concept for 'disruptive' approaches and for 450 mm to prototype testing with suppliers and users;
- 200/300 mm wafer integration platforms and short user-supplier feedback loops.

d) **Coordination and Support Actions**

- Broker services to offer European researchers and SMEs access to training, to CAD tools and to advanced technologies, design kits and IP blocks for education, prototyping and small volume production.
- Roadmaps; benchmarks; strategy papers; studies of limits of Beyond-CMOS and advanced More-than-Moore processes, devices and architectures w.r.t systemability, integratability, energy efficiency, scalability and manufacturability.
- Stimulation of young people towards electronics careers; training and education for high school students; access for students and PhDs to production lines and research labs.
- International cooperation, in particular with the USA, Taiwan, Korea and Japan.
- Support, coordination and standardisation actions including preparatory work for 450 mm wafer processing targeting material and equipment companies.

Expected impact

- Increased European knowledge, resources and skills at the frontier of nanoelectronics technology and miniaturised electronic systems, enabling further European partnerships in world-wide collaborations. European research organisations in leading positions.
- A more integrated nano-electronics technology, device and design research community, better targeted to the business strategy of the European industry.
- Increased attractiveness for investments in components miniaturisation, functionalisation and manufacturing in Europe; increased business opportunities and market share.
- New electronic applications of high economic and socio-economic relevance.
- Strengthened competitiveness of the European foodchain for the nanoelectronics industry (materials, equipment and component suppliers, academia and institutes).

Funding schemes

a): STREP; b): IP, STREP; c): IP, STREP; d): CSA

Indicative budget distribution

- IP/STREP: EUR 55 million; the objective is to support at least one IP under b) and at least one IP under c) in addition to STREPs.

- CSA: EUR 5 million

Call:

ICT Call 8

Objective ICT-2011.3.2 Smart components and smart systems integration

Smart (miniaturized) systems have the ability to sense, describe, and qualify a given situation, as well as to mutually address and identify each other. They are able to predict, decide or help to decide, and to interact with their environment by using highly sophisticated interfaces between systems and users. They can be standalone, networked, or embedded into larger

systems, they comprise heterogeneous devices providing different functionality (e.g., sensing, actuating, information processing, energy scavenging, communication, etc.) and excel in self-reliance and adaptability. Their development thus requires the integration of inter-disciplinary knowledge.

Smart components demonstrate enhanced performance and functionality derived from advanced core micro and nanoelectronics technology. Research is needed on specific devices, processes, technologies and design platforms to support applications in 2017 and beyond. The activities in this area are complementary to the activities in the ENIAC JTI[10] and to the activities of the 'Green Car' initiative[11] (cf. Objective 6.8).

Micro-Nano Bio Systems (MNBS) are smart systems combining microsensing and microactuation, microelectronics, nano-materials, molecular biology, biochemistry, measurement technology and ICT.

Within this objective, a high level of industry participation is expected and demonstration aspects are encouraged.

Target outcomes

a) **Future smart components and smart systems**

Materials, technologies, processes, manufacturing techniques and design methods for:

- Innovative smart components (Systems on Chip or Systems in a Package) demonstrating very advanced performance (very high performance analogue, very high frequency, integrated passives); high voltage and high power operation or operating under special conditions (e.g. high temperature, high reliability, long lifetime).
- Miniaturized and integrated smart systems with advanced functionality and performance including nanoscale sensing systems.
- Autonomously operating, power efficient and networked smart systems.
- Robust systems, compatible and adaptive to environment and lifetime requirements.

Projects should address one or more of the points above. Research should be driven by advanced system requirements and address innovation at the various levels: advanced functionalities, key enabling technologies, basic methodologies.

Advanced Functionalities include: Nanoscale, multidimensional sensing; Communication and data processing through micro/nanoscale and RF devices; Scavenging, storage and management of energy and power; Interfacing and interaction requiring very high analogue or frequency performances, operation under harsh environments, voltage or power conditions; Human-Machine Interfacing using gesture, tactile and motion detection; Comfort and ergonomy, e.g. by wearable solutions.

Key Enabling Technologies include: Material combination of e.g. semiconductors, ceramics, polymers, glass, textiles, cellular tissue, rigid and flexible substrates; Advanced materials and processes for monolithical integration of smart components (on silicon or other materials e.g. SiC, III-V, …); New devices, processes, packaging and integration technologies that can meet advanced, high performance requirements; New sensors, actuators and components (RF, etc.) exploring the nano dimension.

[10] The JTI research agenda targets large initiatives to develop the next generation of processes, technologies, devices and components which are demonstrated in close-to-market applications. See http://www.eniac.eu

[11] The 'Green Car' initiative targets to further improve, integrate and transfer innovative smart components for their use in the next generation electric car.

Basic Methodologies include: New architectures for devices and smart components that can fulfil the complexity and the very advanced, very high performance requirements; Tools for modelling and design of smart components and smart systems with optimum embedded software; Fabless industry concepts taking advantage of the European research infrastructure; Manufacturing approaches, which are flexible and modular where additional functionalities can be cost efficiently integrated; Techniques, processes and equipments for optimized yield, reliability, reproducibility, testing and validation; Standardization of interfaces and levels of quality, reliability and robustness.

b) **Micro-Nano Bio Systems (MNBS)**

- Increased intelligence of devices (computation/decision power, sensing capabilities)
- Enhanced miniaturisation and integration of devices and systems
- Increased integration of bioactive components (molecular & cellular components) as well as processes.

The novel generation of MNBS shall be smaller, perform better, and be faster and cheaper, while still delivering highly reproducible results, exhibiting increased sensitivity and being extremely, and proven, reliable.

Research actions should be driven by application requirements from application sectors such as health, medical and pharmaceuticals, transport and mobility, security and safety, environment and food quality assurance, etc.. and address whenever relevant, bio-chemical calibration and bio-molecule stability aspects.

For those actions addressing in particular the health area, emphasis is on:

- highly integrated, safe, active and autonomous "smart" implants which provide real-time performance feedback and are able to tolerate interfering body signals;
- integrated systems for rapid, sensitive, specific and multi-parametric in vitro molecular analysis/detection and cellular manipulation based on biodegradable materials. Cost, manufacturing and real scenarios validation should be considered;
- autonomous body sensor and actuator based systems for non- or minimally-invasive targeted early detection, diagnosis and therapy.

The focus of projects targeting environment protection and food/beverage safety and quality control should be on:

- integrated multisensing micro-nano systems able to analyse environment, food and beverage samples for the simultaneous and rapid identification of potentially dangerous species e.g. pathogens, allergens, chemicals, etc;
- integrated sensor and actuator systems for safety and security that are able to support the individuals operating in harsh environments through contextual monitoring, feedback and networking capabilities.

c) **Coordination and Support Actions**

- Coordination and interaction of national and EU R&D programmes in the area of smart systems
- Actions aiming at strengthen the cooperation between the various actors along the value chain of smart systems integration, from scientific research to industrialisation.
- Actions aiming at stimulate the take-up of smart systems approaches by relevant industrial sectors

- Roadmaps to link very advanced application requirements with smart components and smart system needs; benchmarks with the aim to identify new research needs.
- Linking of R&D strategies and stimulation of international cooperation

These coordination and support actions should involve relevant smart components and systems stakeholders.

Expected impact

- Closer business relationships between materials, equipment and component suppliers, integrators, manufacturing plants and institutes. Strong involvement of industry participants interacting closely with R&D organisations and users.
- Increased European knowledge and skills at the frontier of smart component and smart systems integration, increased efficiency and effectiveness of smart components and smart systems engineering contributing to the competitiveness of the European industry involved, increased attractiveness to investments and putting European research organisations in leading positions.
- Substantial market shares gained in high end markets requiring very high performance smart products and new electronic applications.
- Contributing to environment protection through smart solutions for energy management and distribution, smart control of electrical drives, smart logistics or energy-efficient facility management.

Funding schemes

a-b) IP/STREP c) CSA

Indicative budget distribution

a): EUR 38 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs
b): EUR 39 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs
c): EUR 3 million

Calls:

- ICT Call 7 for a) and c)
- ICT Call 8 for b)

Objective ICT-2011.3.3 New paradigms for embedded systems, monitoring and control towards complex systems engineering

The objective is to push forward the limits of embedded systems, monitoring, control and optimisation technologies and "System-of-Systems" engineering. The aim is to develop novel methodologies and advanced engineering approaches for designing, developing and executing/running complex/large scale, distributed, and cooperating systems. These systems need to satisfy high performance, reliability, survivability and power-awareness requirements and cope with internal and/or external uncertainties/disturbances. Linking and connecting together large yet autonomous adaptive systems, call for new paradigms of systems design, towards "System of Systems" engineering, e.g. complementing the "correct by construction" by a "correct by evolution" design approach. Multi-disciplinary cooperation and multi-aspect concurrent design (where appropriate) from the computing, control, communications, energy consumption and information theory & engineering points of view is highly encouraged, including, where relevant, support or enhancements of new educational curricula and training.

Target outcomes

To facilitate the design and development of advanced Embedded Systems composed of any number of independent, mainly heterogeneous and interacting intelligent embedded components and sub-systems, emphasis is on:

(a) Novel dependable and scalable architectures and tools mainly for energy efficient and energy-aware, heterogeneous embedded systems; projects may include, whereas relevant, enhancements of educational curricula.

(b) Secure composition concepts, methods and novel validation / verification / testing techniques and tools, including meta-modelling.

To achieve stable and robust behaviour of (in particular closed loop) real life systems, actions should address the systematic engineering, through (embedded) intelligence, diagnostics, advanced control and optimisation techniques and the development of systems capable of dealing with complex, distributed and/or uncertain dynamics and/or very large amounts of sensory data and standardisation of configuration interfaces and exchange platforms. Emphasis is on:

(c) Robust distributed estimation/prediction, cooperative networked control, synchronisation, and optimisation methods in industrial environments.

(d) Energy-aware, self-organising, monitoring and control systems including fault-adaptive methods for adjusting to/recovering from failures. Projects may include usage of wireless sensor/actuator networks in closing reliably the control loops. Research actions should demonstrate proof of concept. This outcome complements Objective 2.1 / target outcome (b.

At a much higher and at global system level, actions should analyse and advance the management of behaviour of very large scale, or complex man-made systems towards the design, development and engineering of System-of–Systems (SoS). Emphasis will be on concepts, methods, architectures and tools towards building SoS addressing societal needs e.g. in distributed energy systems and grids, multi-site industrial production, emergency coordination and global traffic control. The work should demonstrate its potential use across more than one application sectors. Focus is on:

(e) Basic underpinning technologies such as large scale modelling and simulation to understand the operation and behaviour of the constituent systems of SoS and of their interdependencies and to allow them to work together for a common goal and/or a global end-to-end optimisation of behaviour. Concepts, methods, architectures or tools addressing the autonomy versus cooperation challenges in SoS engineering as well as the management of dynamic properties as constituent systems of SoS change, are added or removed as the SoS structure and goals evolve.

(f) Coordination and support actions for elaborating strategic research and engineering roadmaps by bringing together all the relevant stakeholders and elaborating representative case studies.

To facilitate and promote international cooperation, focus is on:

(g) Analysis of international research agendas and preparation of concrete joint R&D initiatives for international collaboration, in particular with the USA mainly in the area of SoS and Western Balkan Countries (WBC), mainly in the monitoring and control area. Separate proposals per geographic area are expected.

Expected Impacts

- Improved industrial competitiveness through strengthened capabilities in advanced embedded systems, in monitoring, control and optimisation of large-scale complex systems, in areas like energy, transport, and production, and in engineering SoS.
- New business eco-systems providing innovative products and services based on SoS.
- Reinforced European scientific excellence and technological leadership in the design and operation of large-scale complex systems.
- Wider educational and training activities in systems and control engineering in Europe at all levels.
- International cooperation with targeted geographical areas creating mutual benefits which will further European interests on focused technical topics.

Funding schemes

(a), (b), (c), (d): IP, STREP

(e): IP; It is expected that a minimum of one IP is supported.

(f), (g): CSA. Funding per CSA under (g) should not exceed EUR 0.5 million

Indicative Budget distribution

IP/STREP: EUR 46 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs

CSA: EUR 4 million

Call

Call 7

Objective ICT-2011.3.4 Computing Systems

The objective is to achieve breakthroughs in the transition to multi-core architectures across the whole computing spectrum: embedded computing, general-purpose computing (PC/servers) and high-performance computing (HPC). This transition affects the underlying hardware, the system software (compilers, tools, OS, etc) and the programming paradigms.

Target outcomes

a) Parallel and Concurrent Computing

Automatic parallelisation, new high-level parallel & concurrent programming languages and/or extensions to existing languages (including their runtime implementation) that provide portable performance taking into consideration that user uptake is a crucial issue. Projects should go beyond on-chip, off-chip boundaries addressing the challenges of programming, testing, verification and debugging, performance monitoring and analysis, and power management especially for large scale parallel systems and data centres, and heterogeneous and accelerator-based multi-core systems. Research priorities include domain-specific languages; concurrent algorithms and transformation of concurrency to parallelism through adaptive compilers and runtime systems; new verification and optimisation environments for

parallel software; efficient execution exploiting heterogeneous cores; new approaches to scalability of high-performance computing application codes.

(b) Virtualisation

Virtualisation technologies that are ensuring task isolation and optimised resource allocation as well as guaranteeing performance, timing and reliability constraints. The focus is on full virtualisation solutions for heterogeneous multicore platforms including the design of virtualisation-ready heterogeneous multicore hardware platforms and support for accelerator virtualisation.

(c) Customisation

Unifying hardware design and software development with emphasis on rapid discovery and production of optimal customisations of heterogeneous single-chip multicore systems and associated tool-chains for particular applications. Research priorities include: reconfigurable flexible, soft or hybrid architectures and instruction sets; automatic tool-chain generation; system modelling and simulation; efficient exploration of the customisation space; customisation for power efficiency; parallel programming for single-chip multicore architectures; architectural and system-level reliability techniques to counter increasingly probabilistic behaviour of transistors in lower geometries.

(d) Architecture and Technology

The focus is on the impact of next-generation chip fabrication technology on system architectures, tools and compilers. Research areas include: implications of 3D stacking; alternative (non von Neumann) models of computation. The key challenge is to bridge parallel computing architectures and chip fabrication technology.

(e) International Collaboration

The purpose is to analyse international research agendas and to prepare concrete initiatives for international collaboration, in particular with the USA, India, China and Latin America, for all topics of this objective. Separate proposals per geographic area are expected.

Expected Impact

- Drastically improved programmability of future parallel multicore/multichip computing systems, providing efficient execution and portable performance of codes on a large variety of computing platforms

- Efficient and ubiquitous use of virtualisation for heterogeneous multi-cores.

- Accelerated system development and production, enabling new products to be realised with a considerably shorter time-to-market.

- Reinforced European excellence in multi-core computing architectures, system software and tools.

- Strengthened European leadership in cross-cutting technologies that are applicable to different market segments of computing systems and, in particular, European leadership in parallel computing systems for large data centres.

Funding schemes

(a)-(d): STREP, NoE
(e): CSA

Indicative budget distribution

STREP: EUR 40 million
NoE: EUR 4 million
CSA: EUR 1 million

Call

ICT Call 7

Objective ICT-2011.3.5 Core and disruptive photonic technologies

Target Outcomes

a) Core photonic technologies

Extending the state-of-the art for application fields where Europe is strong, including notably *application-specific photonic components and sub-systems* (such as laser and other light sources, modulators, transmitters and receivers, multiplexers, cross-connects, detectors and sensors, fibre components) for a given set of application fields. The aim is to provide new opportunities for advanced products, with a view to industrialisation. Priority is given to innovative or 'breakthrough' approaches rather than incremental developments. The interrelated materials, processing and device integration issues including electronics/photonics integration may also be dealt with. *Cross-cutting technology* actions further address device integration in a more systematic way.

Research actions should be driven by user requirements, should include validation of results for the targeted applications, and should cover the supply chain as appropriate (in particular in Integrated Projects).

Application-specific photonic components and subsystems should cover one of the following application fields:

1. ***Optical data communications*:**

   (i): *Communication networks* that are more transparent, dynamic, energy efficient and faster[12]. For *core networks*, the goal is scalable technology for truly cost effective transport at 100 Gb/s single-channel rate and beyond (including gains through higher spectral efficiency), scalable towards 100 Tb/s systems (node-throughput). For *access networks*, the goal is affordable technology enabling 1-10 Gb/s data-rate per client over more than 100 km.

   (ii): *Optical interconnects* aiming at cost- and energy-effective technology for Tb/s optical data links in short range communication. Applications range from on-board and board-

[12] Photonic components and subsystems for communication networks support the overall vision and requirements of Objective 1.1 "Future networks".

to-board links at the smaller scale, to links in data centres and local area networks at the larger scale.

Further to "digital" optical transmission also "radio-over-fibre" techniques may be addressed, in particular for local area networks and access networks. Research actions should bring together researchers, component manufacturers and suppliers of communication equipment.

2. ***Biophotonics for early, fast and reliable medical diagnosis*** of diseases, such as cancer, infectious and eye-related diseases. The applications vary from point-of-care diagnosis to functional imaging. Typical issues are high sensitivity, selectivity, resolution, and depth of penetration, according to the targeted technique and disease. Particular emphasis is on a strongly multidisciplinary approach involving also medical end-users. Technical results should undergo preclinical validation, with clinical trials being excluded.

3. ***Imaging and sensing for safety and security*****:**

   (i) CMOS integrated, compact, affordable, high-performance mega-pixel image sensors (with CMOS-compatible detection layer) operating at ambient temperature and low power. Focus is on single-photon detection at video-rate read-out speed and very high dynamic range, and/or functional integration based on smart pixels with sub-picosecond temporal resolution, pixel-level hyperspectral or multispectral resolution, and polarisation sensitivity.

   (ii) Compact, cost effective, widely tuneable, high-performance photonic sources enabling a highly sensitive, selective and reliable detection of hazardous organic and inorganic substances. Emphasis is on advanced technology such as novel quantum cascade lasers and terahertz sources.

   Technical results should be validated for safety and security applications. Research actions should bring together researchers, component manufacturers and suppliers of safety & security imaging/sensing equipment.

4. ***Lighting and displays*****:**

   High brightness LEDs and 'light engines' (i.e. LED with driver electronics, optics and thermal management for lighting applications; or LED backlighting modules for displays). Focus is on:

   – Improved efficacy at high brightness at LED and light engine level (in particular light engines for warm white light with efficacy above 130 lm/W, CRI at least 90, and consistent colour over 25000 hours);
   – High brightness, high efficiency green components with intensity peak around 540 nm;
   – Novel approaches to white components (e.g. new phosphors, monolithic sources, hybrid approaches).

   The relevant system integration issues may also be addressed to some extent. Research actions should demonstrate a potential for significant system and operating cost reduction.

   LED suppliers and/or manufacturers should be involved.

Cross-cutting technology covers:

5. ***Photonics integration platforms*** that enable the cost-effective, automated volume manufacturing of a large variety of complex, compact, high-performance photonic

integrated circuits ("PICs") combining active and passive components. Platforms should address a range of different application fields. The technology must be scalable for new technology generations, in particular for higher integration complexities at reduced cost per function. The platforms should address also the relevant design, modelling and simulation tools and generic manufacturing and packaging technology. Research actions should present a credible route to industrial manufacturing in Europe.

b) Disruptive photonic technologies

Technologies at the proof-of-principle stage that offer a potential for breakthrough advances in functionality, performance, component size or cost reduction. They often exploit effects at the limits of light-matter interaction (e.g. quantum effects, plasmonics, sub-wavelength structures and effects, photonic crystals, nano-photonics) or exploit the use of new materials (including meta-materials). The objective here is to bring such technologies from the research lab closer to applications, by demonstrating their industrial potential through a functional component with involvement of industrial players.

Examples include: New components for high performance (including extreme high power) laser systems, in particular compact, cost-effective high-performance laser sources; Exploiting nano-photonic structures and new materials for enabling PICs of higher performance, functionality or complexity; New photonic functions realised in optical fibres by integrating non-conventional materials; Utilisation of quantum effects for secure communication; Electro-optic modulation, signal processing and beam steering exploiting alternative materials, novel wave-guide structures or slow-wave effects; New photonic approaches for life sciences, such as biophotonics based tools for investigating bio-chemical and metabolic processes and/or the origins of disease at the cellular level; New photonic approaches for information displays, lighting, memory and storage.

c) ERANET-Plus action

A joint call for proposals on a photonics topic of strategic interest, to be funded through an ERANET-Plus action between national and regional grant programmes.

d) Pre-Commercial Procurement action

A pre-commercial procurement ("PCP") action for establishing and implementing a joint PCP call for tender on a photonics topic of common European interest. The action shall be implemented according to the conditions outlined in Objective 11.1 and Appendix 8.

e) Coordination and support actions

- An ERA-NET action for the coordination of related national, regional and EU-wide R&D programmes/activities and cooperation between the relevant authorities. This action may also cover the field of organic electronics.
- Technology road-maps for high power / high energy laser components and systems and identification of new joint research and industrial opportunities in the field of high power lasers, across different application fields and related high power laser research infrastructures;
- Cooperation and coordination between regional clusters and/or national technology platforms with focus on best practice exchange and promotion of research and innovation;
- Targeted international cooperation activities driven by stakeholders representing the photonics community, aiming at the identification and development of "win-win" cooperative activities, including for example pre-standardisation, with selected industrialised countries;

- Supporting the coordination of the European photonics research constituency in the Photonics21 ETP; this may include specific coordination activities aiming at further defining and promoting joint community structuring efforts towards significantly larger scale future activities.
- Access of SMEs and researchers to advanced technologies, design expertise and/or manufacturing facilities.
- Education and training actions with strong support from industry: Education actions to foster entrepreneurial and interdisciplinary skills at graduate and post graduate level; Training actions for industry (in particular SMEs) that provide state-of-the-art skills and hands-on experience in addressing industrial R&D challenges.

These coordination and support actions should involve the key stakeholders in photonics.

Expected Impact

- Actions under *Application-specific photonic components and subsystems* should reinforce European industrial leadership, competitiveness and market share in the concerned application fields; and/or provide significant societal impact with regard to health, safety, or security.
- Actions under *Cross-cutting technology* should secure a European manufacturing basis for components in the concerned application fields, contributing thus also to secure European industrial leadership and market share in those application fields.
- Actions under *Disruptive photonic technologies* should provide clear evidence for a longer-term potential of European industrial leadership or relevant societal benefits in the concerned application fields, or provide significant opportunities for new applications.
- The *ERANET* and *ERANET-Plus* actions should foster closer cooperation and greater alignment between the participating national/regional/EU-wide research programmes in topics of strategic interest.
- The PCP action should accelerate the introduction of advanced photonic technologies and applications on the European market.
- *Coordination and support actions* in high power / high energy lasers should lead to increased knowledge exchange and cooperation and help opening new market opportunities; Cooperation and coordination between regional clusters and national technology platforms should increase their overall effectiveness in promoting research and innovation; Targeted international cooperation activities should lead to greater cooperation between European players and their counterparts elsewhere on common goals for mutual benefit which will further European interests; Supporting the coordination of the European photonics research constituency should facilitate the European consensus building on research priorities and strategies; Access of SMEs and researchers to advanced technologies should foster the broader uptake of advanced photonics technologies; And, education and training actions should foster stronger and more durable collaboration between industry and academia leading to a competitive advantage of European photonics industry at large.

Funding Schemes

a): 1-4: IP, STREP; 5: IP;
b): STREP;
c): ERANET-Plus;
d): CP-CSA;
e): CSA

Indicative budget distribution

a): EUR 78.5 million of which a minimum 50% for IP and a minimum 30% for STREP;
b): EUR 20 million;
c): EUR 10 million (Any remaining funds following the selection of an ERANET-Plus action will be transferred to the target outcome a));
d): EUR 3 million;
e): EUR 5 million

Calls:

b), e): ICT Call 7
a), c), d): ICT Call 8

Objective ICT-2011.3.6 Flexible, Organic and Large Area Electronics and Photonics

Target outcomes

a) **OLAE**[13] **technology and components**

Development of advanced OLAE technology, device concepts, processes and materials, considering the full value chain. Addressing technology barriers whilst considering the manufacturing implications[14], component performance, improving materials parameters, and flexible/conformable devices. Improved encapsulation and/or alternative conductors, especially in the areas of OPV (Organic Photovoltaics) and OLED (Organic Light Emitting Diodes). Organic/printed logic and memory components; transparent electronic components; power supplies; polymer-based sensors and actuators; adaptable optical elements for electronics and lighting applications; large area energy scavengers & sensors. Modelling and circuit design, including the combination of OLEDs with CMOS technology, may also be addressed.

- Technology for low-cost production processes for OLEDs, improving external quantum efficiency, reliability and lifetime with targets > 100 lm/W at brightness levels in the order of 5.000 cd/m^2, stable over 10.000 hours lifetime.
- Technology for mass production processes for low-cost OPVs aiming at costs of ~0.7€/Wp, increased device efficiency of 8-10% on module level, improved in-coupling efficiency and a significant lifetime increase of up to 20 years.
- Technology for flexible, tileable and sizeable low-cost colour emissive and reflective displays with good image quality displays even in direct sunlight: for *emissive displays*, focus is on materials and process development; for *reflective displays*, focus is on video-rate performance front- and backplanes, and solid state device integration enabling homogeneous system integration.
- Circuitry with increased functionality and performance, i.e.: complexity up to 10,000 transistors; mobility in organic semiconductors beyond 1 cm^2/Vs; drive voltages down to 3V; circuit frequency up to 25 KHz; integration of analogue building blocks such as A/D converters and rectifiers; and addressing organic and inorganic integration, process

[13] The abbreviation OLAE as used in this description should be understood to also cover organic photonics technologies such as OLEDs (Organic Light-Emitting Diode) or OPVs (Organic Photovoltaics). It also includes smart textiles based on conformable and stretchable electronics.
[14] The focus here is on the technology development, whilst Objective "PPP manufacturing solutions for new ICT products" under Challenge 7 (the Factories of the Future PPP) will concentrate on demonstrating the feasibility of industrial manufacturing processes.

variations and process tolerant design, stability, interconnects, multilayers, packaging and encapsulation, modelling, simulation, and novel device and circuit design for OLAE.

- For smart textiles, interdisciplinary work addressing fibre components, heterogeneous integration of multiple functions (such as sensing, actuation, energy scavenging, power management, data processing and communication) and interconnection, device and materials reliability, packaging and encapsulation, washability and durability.

b) **OLAE systems and applications**

Advanced technology development and integration of components through new or improved systems and devices targeting wider applications to facilitate rapid and extensive exploitation, particularly:

- Lighting systems with high quality white CRI (Colour Rendering Index) > 90, stable over a 10 year lifetime with reasonable costs;
- OPV modules with costs of ~0.7€/Wp, external efficiency of 8-10% and a lifetime of up to 20 years for mobile and fixed applications;
- High quality emissive and reflective colour displays and signage;
- Flex/foil-based organic and printed electronics for mass market/low cost applications;
- Integrated Smart Systems for a range of applications including health monitoring and diagnostics, large area sensing, smart labels and packaging. Smart textiles in higher added value products and applications, particularly for health.

Actions under a) and b), IPs but also STREPs as far as possible, should address the full value chain, from material to devices and from researchers to component manufacturers.

c) **ERA-NET Plus action** A joint call for proposals on an OLAE topic of strategic interest, to be funded through an ERA-NET Plus action between national and regional programmes.

d) **Coordination and Support Actions**

- Coordination of OLAE research policy and strategy between competence centres. Manufacturing, roadmaps and (pre)standardisation may also be addressed.
- Access to OLAE technology and facilities for industry, especially SMEs, and researchers.
- Targeted international cooperation activities particularly with Japan, South Korea, Taiwan and the USA, aiming at the identification and development of "win-win" cooperation.
- Focused education and training actions aiming at keeping industry (in particular SMEs) abreast of OLAE state-of-the-art knowledge and tools, and promoting entrepreneurship.
- An ERA-NET action for the coordination of related regional, national and EU-wide R&D programmes/activities and cooperation between the relevant authorities[15].

These coordination and support actions should involve the key stakeholders in OLAE.

Expected impact

- Actions under *OLAE technology and components* should yield increased European competitiveness through having OLAE and smart textiles expertise and manufacturing capability in Europe, covering the full technology value chain as far as possible.
- Actions under *OLAE systems and applications* should yield greater expertise and capability over the full value chain and the accelerated emergence of new devices,

[15] If an ERA-NET action is intended to address both Objectives 3.5 and 3.6, it should be submitted to Objective 3.5.

products and applications, leading to increased market share of European players in each of the key applications and/or the creation of new markets. Innovative systems and products for high value-added applications should establish or reinforce EU lead markets.

- The ERA-NET and/or ERA-NET Plus Actions should foster cooperation and alignment between participating states'/regions' research activities in topics of joint interest.
- Improved coordination of the OLAE competence centres, creating synergies, common strategies, and pooling of resources. Access actions should foster broader take-up of OLAE technology, and transfer OLAE expertise across Europe. International cooperation activities in OLAE should lead to greater cooperation between European players and their counterparts elsewhere on common goals for mutual benefit which will further European interests whilst safeguarding European Intellectual Property. Education and training actions should increase knowledge and expertise across Europe in OLAE.

Funding schemes

a), b): STREP, IP; c): ERA-NET Plus; d): CSA

Indicative budget distribution

- IP/STREP: EUR 40 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs

- ERA-NET Plus: EUR 6 million (Any remaining funds following the selection of an ERA-NET Plus action will be transferred to target outcomes a) or b))

- CSA: EUR 4 million

Call:

ICT call 7

6.4 Challenge 4: Technologies for Digital Content and Languages

Digital content is the foundation of a knowledge based society; it is in digital content that knowledge is stored and from digital content that knowledge is extracted and exploited by individuals and organisations across modalities and languages. This makes it crucial for this resource to be readily and reliably accessible over time to European citizens and enterprises and for every step in its lifecycle to be adequately supported and enhanced in response to changes in the technology landscape.

Challenge 4 focuses on:

- easing and speeding up the creation of added value, in particular by SMEs, using resources that are today too burdensome to acquire or complex to use; putting the ability to create quality content and innovative services within the reach of individuals and small organisations by lowering skill and cost barriers,
- allowing people to access and use online content and services across language barriers, in their preferred language,
- ensuring complete reliability of retrieval and use of digital resources across applications and platforms over time, and design digital content natively engineered for obsolescence avoidance,
- scaling up data analysis to keep pace with the rate of growth of data streams and collections and enable novel forms of real time intelligence that only become possible on extremely large data volumes.

Objective ICT-2011.4.1 - SME initiative on Digital Content and Languages

SMEs have ideas that sometimes cannot be implemented because they depend on the availability of data resources or specialised tools that are too expensive to obtain and maintain. In some areas, data pooling, sharing and reuse are further complicated by Europe's many languages. Actions under this objective aim to make it easier for innovative players, especially SMEs, to exploit and contribute to large digital resource pools. User-centred experimentation will be supported as well, with the aim of demonstrating the integration of data-intensive technologies within innovative solutions and processes.

Target outcomes

a) Bootstrapping a data economy: the target is to lower the barrier to entry in providing advanced services over linked digital resources, including both data analytics and reuse of creative content. Projects shall develop (or reuse and recombine where appropriate) practical and automated tools for the finding, matching, screening, validation, conversion, pooling, editing of data and content. The main objectives are:

- To maximise reuse of digital content resources by making them easy to find, evaluate and integrate.
- To foster reuse of digital content resources by providing guarantees and fair incentives for their creators and maintainers. This includes the creation of data exchanges or commons whose quality (breadth, timeliness, temporal qualification, ..) and value increases with the number of users and the feedback and validation they contribute. It also includes mechanisms for aggregating demand, thus stimulating the creation of additional resources and services.

- To develop robust and highly usable new services demanded by citizens and businesses (especially SMEs) and create value by correlating independently produced datasets or extracting valuable information not foreseen by the original data producer. Usability is of paramount importance, particularly when the science underlying such services (statistics, machine learning, data mining, ..) is non-trivial.

Consortia shall consist of a limited number of innovative, fast-moving actors, in particular SMEs, able to identify and address real market needs or opportunities and with a clear stake in the exploitation of results.

b) Community building and best practices: Produce rigorous studies on the actual or projected economic impact of digital resources pooling as a function of well defined parameters such as the size of resources, user populations, socio-economic sectors, and software stacks adopted. Use the results of such studies to set up data exchange facilities, disseminate best practices and increase awareness of short term existing opportunities. Develop educational curricula designed to train data analysis professionals, expert in the maintenance and exploitation of data commons.

c) Sharing language resources: Projects are expected to make a fresh use of digital pools of language data, metadata and tools to develop advanced technologies and services. They shall address multiple EU languages[16] and where relevant the languages of major EU trade partners. The main objectives and outcomes are:

- To make more effective the acquisition of language resources exploiting automated and/or collaborative means; in many cases existing resources will need to be cleaned and documented, upgraded to widely-accepted technical or linguistic standards, linked across sources or aligned across languages, etc., before they can be used and shared.
- To contribute to an open exchange place based upon the concerted pooling of resources having a significant potential for reuse. This electronic trading place must offer clear incentives and simple and yet robust mechanisms for both providers and users to contribute, maintain, share and exploit resources while ensuring that intellectual property rights and agreed access/reuse conditions are respected.
- To show the concrete impact of using, combining or repurposing the above resources in a given use context, in terms of improved functionality, maintainability, scalability and portability of new systems and technologies.

Consortia shall include players from the demand and supply sides, in particular SMEs, who have a clear stake in the exploitation of results. All projects shall encompass the "sharing" element.

d) Building consensus and common services: Commercial and research organisations must be brought together to define how the intended exchange place can be populated and operated, and evolve over time. Actions under this heading must help establish mechanisms, forums and support services to (i) coordinate efforts, reach consensus, mobilise the community at large, and (ii) set up and manage the planned electronic trading facilities.

Expected impact

- Improved European competitive position in a multilingual digital market through the provision of better services to citizens and businesses.

[16] Emphasis is placed on the EU official working languages and on the official languages of the other countries participating in the Framework Programme.

- Novel forms of partnership between new programme entrants and established players, reduced development costs and shorter time-to-market, thus stimulating innovation and expanding markets.
- Result-driven knowledge transfer between research centres (and their spin-offs) and progressive technology providers (especially SMEs), data brokers/aggregators and content providers.

Funding scheme

a), c): STREP

b), d): CSA

Indicative budget distribution

- STREP: EUR 26 million
- CSA: EUR 5 Million for outcome b) and EUR 4 Million for outcome d)

Calls

Call SME-DCL 2011

Two step evaluation process with specific eligibility and evaluation criteria.

Objective ICT-2011.4.2 – Language Technologies

There is a growing need for effective multilingual solutions that support business and inter-personal communication and enable people to make sense of online content and services in Europe's many languages. Projects shall address multiple languages[17] and cater for written and/or spoken language as appropriate. Technologies must be adaptive, they must handle language in its various uses, cope efficiently with massive volumes, and be embedded within information flows. Contextualisation is a common requirement and so is personalisation.

Target outcomes

a) Multilingual content processing: Projects will address the digital content lifecycle in online environments, exploiting language-encoded knowledge embedded in documents, social media, web and audiovisual objects. They are expected to (i) advance the current state of the art in the machine translation field, and (ii) improve the usability, performance and cost effectiveness of emerging technologies by means of field testing and embedding within complex processes.

- *Advancing machine translation* is geared towards automation and calls for approaches that can significantly improve the quality and suitability of the translation output, drawing where necessary from other disciplines. Expected innovations include the ability to cope with everyday language as found in e.g. social networks; to autonomously learn from use and adapt to new situations with high scalability and portability across languages and domains; to compile translation resources from the web, open sources or enterprise repositories, efficiently and accurately.
- Projects under *integration of language-enabled content technologies* shall address a meaningful combination of content authoring, management, translation and publishing tasks and tools within typical production processes and translation/localisation workflows, in real-life multilingual settings. Projects will optimise and integrate promising but untried

[17] Emphasis is placed on the EU official working languages and the official languages of the other countries participating in the Framework Programme.

technologies within demanding application environments, assess their suitability and increase their potential. Field trials will be an integral element of the projects together with user-related and economic (e.g. cost-benefit) analyses.

b) Information access and mining: The main thrust under this heading is to couple language processing and extra-linguistic semantic analysis to capture knowledge encoded in human language. Projects shall aim to achieve accurate and efficient deep analysis with broad coverage in any suitable mix of the following domains: (i) cross-lingual information search and retrieval; (ii) audio and video mining by means of linguistic cues; (iii) text mining and information extraction from multilingual collections. The key innovation is the ability to capture and represent concepts and facts, find connections and similarities, extract relations between entities, reason over facts while interpreting time and space, etc., well beyond what is possible with existing techniques. Emphasis is on cross-disciplinary approaches and generic technologies that will be evaluated in selected domains and tasks.

c) Natural spoken interaction: Spontaneous human-machine interaction is a major challenge for the next generation of voice-based interactive services. Projects shall develop either complete proof-of-concept systems or component technologies that support a much richer and robust interaction between humans and computer systems. The outcome is conversational social agents that can recognize and synthesize conversational speech; adapt to new conditions without manual intervention and react proactively to new communicative situations; learn from interaction and exhibit graceful degradation; recognize, interpret and generate social cues. Technologies should be portable across domains, tasks and acoustic environments. They should enable non-intrusive interaction, exhibit real-time performance and feature multi- and where relevant cross-lingual capabilities. Focus is on speech interaction, although other modalities may be justified in specific cases.

d) Developing joint plans, methods and services: The target community consists of two main constituencies (speech technology and natural language processing) and a wide range of research and commercial organisations which must be brought together along the following lines:

- Establish and pursue widely supported technology roadmaps; stimulate academia/industry partnerships and co-operation with national actors; ease technology transfer by means of demand-oriented analyses, themed workshops and portal services.
- Measure progress and performance of different approaches by means of community-driven evaluation methods, metrics and challenges for technology-, system- and application-oriented tasks.
- Develop methods, guidelines and standards to enhance the quality, (re)usability and inter-operability of language datasets and processing tools; promote and support open repositories of research results and development/training resources of general interest.

Expected impact

- Improved European competitive position in a multilingual digital market through the provision of better products and services to citizens and businesses.
- Scientific and technological leadership as a result of a widely accepted vision and roadmap encompassing presently fragmented communities.
- Cooperation and exchanges between European and national efforts, closer dialogue and partnership between research and industry, better understanding of user requirements, thus stimulating innovation and technology uptake.

Funding scheme

a), c): IP, STREP

b): STREP

d): CSA

Indicative budget distribution

- IP/STREP: EUR 42 million of which a minimum of 30% to IPs and a minimum of 50% to STREPs

- CSA: EUR 8 million

Calls

ICT Call 7

Objective ICT-2011.4.3 Digital Preservation

Digital preservation research focuses on developing technologies, systems and tools for safeguarding digital content. The objective is to preserve digital content in a more effective and cost-efficient manner while protecting its authenticity and integrity, significantly reducing the loss of irreplaceable information, and ensuring it may be reused in the future.

Target outcomes [18]

a) **More reliable and secure preservation technologies and methods.** Research should cover techniques and tools for recovering loss and for repairing damaged digital objects as well as solutions guaranteeing the long term availability of newly created resources including 3D objects and models, and conceptual frameworks for quality assurance. Research should also analyse which currently available or emerging methods and technologies are most efficient and in which use context or for which kind of resources. Solutions proposed can go beyond digital objects, and target as well the long-term functionality of system for creation, management and storage of digital resources. This work should be underpinned by research aiming at a deeper understanding of how loss and damage occur and which degree of integrity is required for keeping resources useable.

b) **Technologies and systems for intelligent management of preservation.** Technologies to support the long term usability of digital resources (including high volume, heterogeneous and volatile content) through a life cycle approach to its preservation. Research should help to support human appraisal and selection processes through innovative technologies that embed reasoning and intelligence in the content itself. Keeping resources usable, i.e. meaningful and understandable overtime, includes taking account of and developing a conceptual understanding of evolving semantics, use contexts, and interpretations. Activities may cover solutions to identify and erase obsolete information.

c) **Interdisciplinary research networks** bridging technological domains and scientific disciplines concerned with information, and expertise in end-user needs.

d) **Promotion schemes for the uptake of digital preservation research outcomes** including outreach to new stakeholders and road mapping activities.

[18] To be confirmed in light of the results of Call 6.

Expected impacts:

- Reduced information loss through better recovery and repair techniques and through deeper understanding of the reasons and implications of digital decay and other forms of data loss.
- Sustainable access to information: keeping resources not only available but also meaningful and usable.
- More efficient and effective selection of resources to be preserved and of appropriate preservation processes, methods and technologies.
- Wider adoption of research results by supply-industry and by end-users.

Funding schemes:

a) STREP; b)IP; c) NoE d) CSA

Indicative budget distribution:

STREP: EUR 23 million of which a minimum of 50% to IPs and a minimum of 30% to STREPs

- NoE/CSA: 7 MEURO

Call

ICT Call 9

Objective ICT-2011.4.4 Intelligent Information Management

Target outcomes

a) **Reactive algorithms, infrastructures and methodologies** (parallelisation, approximation, online processing, compression) for scaling data intensive techniques (including but not limited to machine learning, inference, statistical analysis) up to extremely large data volumes and real time performance. Implementations must be rigorously tested on extremely large and realistically complex data sets coming from diverse resources contributed by organisations with a clear stake in the solution and a clear path to deploying it if effective.

b) **Intelligent integrated systems** that directly support decision making by dynamically integrating, correlating and analysing extremely large volumes of disparate data resources and streams. This includes (but is not restricted to) recognising complex events and patterns that are today difficult or impossible to detect, aggregating and mediating opinions or predictions, offering alternative conceptualisations, guaranteeing timeliness, completeness and correctness, integrating categorical and statistical analyses. Visual Analytics should equally integrate data analysis and visualization. The effectiveness of such solutions will be evaluated against the concrete requirements of relevant professionals and communities and tested on appropriately- sized user groups and extremely large data resources form the respective domains (including, but not limited to, finance, engineering, government, geospace, transport, urban management).

c) **Framework and tools for benchmarking and exploring information management diversity** and comparing and optimising the performance of non mainstream data management architectures and computing paradigms, novel data structures and algorithms on extremely large volumes of data. While methodological rigour and scientific quality and novelty are the main criteria for success, preference will be given to proposals that

address a clearly identified industrial, scientific or societal concern or opportunity and/or bring together hitherto unrelated scientific or software engineering communities.

d) **Targeted competition framework speeding up progress towards large scale information management systems of global relevance**. The framework will be required to: identify a well justified industrial, scientific or societal objective that cannot be attained with the best performing current information management solutions; define detailed experimental conditions under which quantitative progress towards the objective can be reliably observed; implement a fair testing framework inclusive of data resources realistic in size and nature and capable of supporting large numbers of entrants; broadly advertise the competition; administer several testing rounds and publish the outcome of the competition with an appropriate analysis of performance issues and trends.

e) **Community building networks** and other initiatives designed to link technology suppliers, integrators and leading user organisations. These actions will disseminate results and best practices and address barriers hindering a wider deployment of research results, work towards establishing or advancing widely recognised standards and benchmarks and increase awareness of the potential of the technologies within broader audiences.

Expected Impact

- Reinforced ability for a wide range of innovators to tap data infrastructures and to add value beyond the original purpose of the data through data analysis.
- Reinforced ability to find, reuse and exploit data resources (collections, software components) created in one environment in very different, distant and unforeseen contexts.
- Value creation through extensive data collection and analysis.
- Increased economic value of data resources or data analysis services through standards for validation, provenance, accountability, access and privacy control.
- New scientific investigations enabled by large, interconnected data resources and attending infrastructure.
- Increased efficiency of organisations and better management of societal challenges (emergencies, planning, ..) through more timely and better decision making..

Funding schemes

a) STREP
b) IP, STREP
c) STREP
d) SA
e) CA

Indicative budget distribution

IP/STREP: EUR 43 million of which a minimum of 30% to IPs and a minimum of 50% to STREPs

CSA: EUR 7 million

Calls

ICT Call 8

6.5 Challenge 5 – ICT for Health, Ageing Well, Inclusion and Governance

This challenge addresses advanced ICT research for sustainable high-quality healthcare, demographic ageing, social and economic inclusion, and the governance of our societies. The Challenge covers the following:

- PHS research that aims for disease management and also targets rehabilitation and treatment at the point of need with a focus on specific diseases.
- VPH research focused on more elaborate and reusable multi-scale models and a VPH information infrastructure of larger repositories. Preparatory actions will aim at a grand challenge on a "Digital Patient", being the integration of patient-specific models for better prediction and treatment of diseases.
- Patient Guidance Services (PGS) to enable patients' active participation in care processes. A special emphasis will be given to semantic interoperability to enable integration of patient information from multiple sources and locations and to ubiquitous and secure access to these personal health records.
- Research on ICT for Ageing Well focused on developing service and social robotics and highly intelligent environments in support of the ageing population. This is complementary to the AAL programme (applied research, focused on smaller-scale projects with 2-3 years to the market).
- Research on ICT for smart and personalised inclusion addressing advanced solutions to improve social and economic inclusion by means of inclusive design, accessible, personalisable and human-ICT interfaces, social computing and advanced solutions for learning and skills acquisition as well as Brain-Neural Computer Interfaces (BNCI).
- Research into ICT solutions for governance and policy modelling addressing ICT tools for trusted governance and policy impact analysis. This research should help deal with future scenarios involving even greater complexity and citizens' involvement, in particular addressing the needs of the younger generation.

Objective ICT-2011.5.1: Personal Health Systems (PHS)

Target Outcomes

a) **Personal Health Systems for remote management of diseases, treatment and rehabilitation,** outside hospitals and care centres. Research will support innovations at system level and at component level if required. Solutions will be based on closed-loop approaches and will integrate components into wearable, portable or implantable devices coupled with appropriate platforms and services. Emphasis will be placed on: (i) auto-adaptive, self-calibrating and energy-efficient modules with multi-sensing, advanced on-board processing, communication and actuation capabilities; (ii) accuracy of measurements as well as remote control and reliable operation of the devices/systems; (iii) context-aware, multi-parametric monitoring of health parameters, activity, lifestyle, ambient environment and operational parameters of the devices; (iv) analysis, interpretation and use of the multi-parametric data, in conjunction with established or newly created medical knowledge, for shared patient-doctor decision support systems; (v) clinical workflows, guidelines and patient pathways to support remote applications; and (vi) education and motivation of users.

Each project shall undertake high risk research addressing only one of the domains below.

a1) Neurodegenerative diseases: focusing on remote management and treatment of patients at the point of need, addressing also the needs of their carers. Heterogeneous data (e.g., genetic data, images, movement recordings, interaction and behavioural data) will be used for assessment of patients' health status. Depending on the disease addressed, proposed approaches may employ neural recording, neurostimulation and/or drug delivery systems.

a2) Rehabilitation of stroke and neurological conditions: providing patient services at home, with telesupervision by health professionals as and when required. Solutions may build on robotic and haptic technologies, wearable systems, implants, human-computer interfaces, web services or virtual reality environments to facilitate continuity of personalised cognitive and functional rehabilitation. Heterogeneous data (e.g., biofeedback, monitoring of limb movements, behavioural monitoring and analysis) and predictive models will be used to assess patient status and progress, monitor risk factors and predict new episodes.

a3) Liver failure: ICT-enabled artificial liver to facilitate detoxification as remote transient therapy at the point of need, offering continuous care from hospital to home settings.

All projects will adopt scenario-based design and will develop novel service models to support transferability of healthcare outside hospitals and care centres. The target group is only patients with diagnosed conditions (not healthy individuals). In addition to strong involvement of clinical users, projects will also engage experts in regulatory approval. Projects will address user acceptance, patient compliance, patient data security and confidentiality. They will also address interoperability issues related to heterogeneous data sources, devices and links with electronic health records; the use of standards and of any suitable open software platform is recommended. Validation will aim to demonstrate the proof of concept, efficiency gains and, if possible, cost effectiveness of the proposed solution. Validation should include comparison versus currently accepted gold standards and include quantitative indicators of the added value and potential impact of the proposed solutions.

b) **Intelligent systems for the analysis of multi-parametric data**. Projects will focus exclusively on analysing multi-parametric data in the context of Personal Health Systems used for prevention or remote management of clearly targeted diseases or co-morbidities. Multi-parametric data may include physiological measurements, genetic data, medical images, laboratory examinations and other measurements related to a person's activity, lifestyle and surrounding environment. The developed systems will process and interpret such data for accurate alerting and signalling of risks and for supporting healthcare professionals in their decision making. This may be either by (i) correlating the multi-parametric data with established biomedical knowledge to derive clinically relevant indicators and/or (ii) creating new medical knowledge for diagnosing worsening of conditions and prompting early intervention. Projects may use patient data already available in databases or from other research projects or pilots. Creation of new patient data with the use of previously developed and tested monitoring systems is also possible. Adaptation of existing monitoring systems is eligible, but the development of new monitoring systems is not in scope. Projects will pay attention to security and protection of patient data. Validation will aim to demonstrate, with quantitative indicators, the effectiveness and the medical and economic benefits.

c) **One Coordination and Support Action** to deliver roadmaps for research and support to wide use of mobile eHealth (mHealth) solutions for lifestyle and disease management. The roadmaps will address elements such as: technology options for applications and services; any need for dedicated radio frequency bands for continuous provision of care; risk management, user acceptance, security and privacy; any need for update of medical guidelines, including methodology to deliver new knowledge to medical professionals and patients; business cases; reimbursement; and mapping of future mHealth applications to the regulatory framework of medical devices. Relevant experiences in developing countries will be considered.

Expected Impact

For target outcomes a) and b):

- Reduced hospitalisation rate and improved disease management, treatment or rehabilitation at the point of need, through more precise assessment of health status.
- Strengthened evidence base on medical outcomes, economic benefits and effectiveness of the use of Personal Health Systems in evolved care models.
- Reinforced medical knowledge with respect to efficient management of diseases.
- Contribution to a more sustainable European healthcare system through provision of high quality, personalised care, with better use of the available healthcare resources.
- Reinforced leadership and innovation capability of the industry in the area of Personal Health Systems, medical devices and services through introduction of new business models, creation of spin-offs and better exploitation of intellectual property contributing to products, standards and regulation.

For target outcomes a) and c):

- Accelerated establishment of interoperability standards and of secure, seamless communication of health data between all involved partners, including patients.

For target outcome a) only:

- Participation of essential stakeholders in the production of end-to-end solutions for personalised care. Reinforced national or regional commitment in deployment of innovative services following participation in R&D projects.
- Improved links and interaction between patients and doctors facilitating more active participation of patients in care processes.

For target outcome c) only:

- Improved understanding of the technology options, business and regulatory aspects for both private sector-driven and publicly-funded mobile solutions for healthcare services.

Funding schemes

a): IP/STREP; b) STREP only; c): CSA

Indicative budget distribution

IP/STREP: EUR 59.5 million with the objective to support at least 2 IPs under a) in addition to STREPs [19] ; and up to 2 STREPs under b).

CSA: EUR 0.5 million (Up to one CSA will be selected with maximum duration of 24 months).

Call

ICT call 7

[19] Area coverage has priority in the selection of proposals in a). Hence, selection will initially be made among the proposals which are ranked first in the three areas of a1), a2) and a3), in terms of their relative scores. Further selection from the remaining ranked proposals is in terms of their relative scores, respecting the minimum number of IPs for a).

Objective ICT-2011.5.2 Virtual Physiological Human

Target outcomes

a) **Patient-specific predictive computer-based models and simulation** of major diseases integrating medical, biological and environmental data. Preference will be given to proposals that manage to explore the interaction and integration of environmental factors with medical and biological factors enabling the development of predictive models and simulation for understanding the evolution and progression of major diseases. These predictive models will allow bio-medical researchers to investigate the influence of environmental factors on major diseases and their interactions with other health factors. The use and benefits of the resulting models must be demonstrated for a specific clinical need covering the onset and the evolution of the disease. All major diseases could be targeted as clinical application.

b) **Development of ICT tools, services and infrastructure to obtain more elaborate and reusable multi-scale models** (e.g. models of diseases, organs) **and larger repositories** to show benefits of having both the data and models readily available. Projects should address at least one of the following activities: i) the robustness and reproducibility which are essential to allow models to be re-used when a model representing a physiological function is incorporated into a more comprehensive model. Standards for models and data, tools and repositories should be developed to achieve a high level of robustness and reproducibility of models for re-use; ii) the development of VPH Infostructure including a sustainable VPH model and data repositories. Appropriate tools (e.g. version control, archiving, upgrades…) and attributes such as usability and accessibility should be particularly addressed to ensure VPH community acceptance. The use of open environments and open-source software is expected to improve the accessibly and evolution of the repositories.

c) **One Coordination and Support Action** to develop an RTD roadmap preparing the ground for a future grand challenge on a "Digital Patient". The "Digital Patient" is a digital representation of the integration of the different patients-specific models for better prediction and treatment of diseases in order to provide patients with an affordable, personalised and predictive care. A road-map should be developed i) to consolidate the research so far, ii) to capture and quantify the needs and iii) to develop a vision and a sound ICT research agenda around the "Digital Patient

d) **Early demonstrators and proof of concept of digital representations of health status** of patients integrating different patient-specific data and models of organs into a more coherent representation of a "Digital Patient". Innovative digital representations of the health status of patients based on relevant data and models (medical, anatomical, physiological and genetic, etc) , are visualised and represented in 4D models and usable for care, personalized prevention and research.

Expected Impact

- More predictive, individualised, effective and safer healthcare.
- Reinforced leadership of European industry and strengthened multidisciplinary research excellence in supporting innovative medical care.

For a)

- Accelerated developments of medical knowledge discovery and management in particular through the exploration of environmental factors in predictive models of diseases.

For b)

- Improved interoperability of biomedical information and knowledge.

- Increased acceptance and use of realistic and validated models that allow researchers from different disciplines to exploit, share resources and develop new knowledge.
- Accessibility to existing knowledge by bio-medical researchers through the VPH repositories linking data with models will prove the large scale benefits of having both the data and models readily available.

For c)

- Availability of a common strategic research agenda on the "Digital Patient" between all relevant stakeholders.

For d)

- Proven concepts of digital representations of patient health status.

Funding schemes

a-b): IP/STREP; c) CSA d): STREP

Indicative budget distribution

IP/STREP in a) and b): EUR 58 million with a minimum of 50% to IPs and 30% to STREPs[20]

CSA: EUR 1.5 million. Up to one CSA will be selected.

STREP in d): EUR 8.5 million

A maximum of EUR 3 million will be reserved for third country participants from USA, Japan, Canada, Australia, New Zealand, China, and Russia.

Call

c) in Call 7;
a), b) and d) in Call 9

Objective ICT-2011.5.3 Patient Guidance Services (PGS), safety and healthcare record information reuse

Target outcomes

Projects are expected to address one of the following 2 application areas:

a) Patient guidance services (PGS) for personalised management of health status. The aim is to enhance the engagement of patients in care and disease prevention and improve health outcomes and patient satisfaction. The work focuses on semantic integration of patient health data into a personal health record system (PHR) that is ubiquitously and securely accessible by patients and their physicians and includes an environment for their cooperation. The users of the PGS will be primarily patients and the carers, and healthcare professionals they authorise. The services to be supported will be identified in close cooperation with clinicians, patients and their carers and social services. Examples of services include shared decision support to treatment compliance; safety alerts and reporting; evidence based information, and patient networking.

The PGS will interoperate using state-of-art wearable or portable, auto-adaptive, self-calibrating systems for health status monitoring and diagnosis. They take into account (i) the

[20] To be confirmed

operation and acquisition of physiological data in non-clinically controlled environments and (ii) the variability in the population by adjusting clinical parameters and their thresholds to the individual's conditions. They will incorporate available modelling and predictive algorithms to analyse patterns in behaviour or recorded data and to enable the shared patient-doctor decision support systems. The PGS will be capable of integrating the latest available medical knowledge and adapting to changes in it.

The personal health record systems will interoperate with heterogeneous and fragmented healthcare information systems. Security and privacy protection issues should be addressed.

b) Tools and environments enabling the re-use of electronic health records.
Development of an advanced environment for clinical research that enables seamless, secure and consistent integration or linking of clinical care information in electronic health records (EHR/PHR) with information in clinical trial systems. Results are expected to help health professionals to avoid double data entry, assist in identification of patients for clinical trials, and enable early detection of potential patient safety issues. Research will focus on the areas of improving semantic interoperability between EHR and clinical research systems. This will include the definition and validation of core data sets that enable scalable and standardised linking with EHR repositories. Proposals will address data protection and security needs and be fully compliant with all applicable legislation as well as best practice. Research results should be validated in use cases with a high potential for improving patient safety in the clinical research and epidemiology fields.

A significant part of proposals a) and b) will address semantic interoperability. Resources are to be targeted to use and complete the common shared info-structure (terminologies, health care record structures, and medical logic representations) that will be established by the PCP under the governance of the Network of Excellence described below**.**

c) A Network of Excellence on semantic interoperability and European Health Infostructure.
The aim is to engage leaders and organisations, including professional organisations, national competence centres, industrial associations and standards development organisations to define and implement a research agenda on the semantic interoperability of health information systems and particularly electronic health records. European and international organisations in the domains of medical terminology, record architecture, medical logic and workflow are expected to participate. The work will also include set up and a governance of a European virtual organisation for multilingual, multicultural adaptation of international classifications and terminology and propose means for the sustainability and governance of health information info-structure.

d) Pre-commercial Procurement (PCP) Actions will aim to implement a joint PCP call for tender in order to develop services for patients and health professionals based on mobile access to existing regional or national patient portals, personal health records systems or other systems and applications using patients' health information. It will support mobility of patients enabling secure and fast access anywhere in the EU to an individual's health data such as medication, emergency data and examinations using mobile devices.

Examples of services include communication between health services and patients at the point of need (e.g., scheduling appointments, alerts, emergency admissions, prescriptions abroad, interaction with pharmacists, feedback to carers about the changes in condition of the patient) as well as support to chronic disease management and lifestyle choices. Preference will be given to projects that include the display of patients' information on mobile or other devices in different languages so that patients can share their medical information with physicians in another country. Use of open standards and open source is encouraged. Applicable legislation,

specifically Medical Device legislation covering certification, will be complied with. PCP shall be implemented according to the conditions outlined in objective 11.1 and Appendix 8.

Expected Impact

For target outcome a), b), c) and d):

- Common platform for a wide range of ICT-based healthcare services.
- Improve sustainability of Healthcare services by enabling better use of resources.
- Increased international competitiveness of European Healthcare Information Services and Software industry.
- Guidance on healthcare information systems issues in "green field" member states.
- Accelerated establishment of interoperability standards and of secure, seamless communication of health data between all involved partners, including patients.
- Wide-scale epidemiology based on Europe-wide Healthcare information system.

For target outcome a), c) and d):

- Better medical expertise access in remote areas, via improved decision-support systems.
- Support for patient mobility and patient safety through PHR accessed throughout Europe.
- Improved disease management and treatment through provision of personalised services.
- Reinforced participation of patients in care processes and health management.

For target outcomes b), c) and d):

- Faster medication innovation and lower costs through a more efficient research process.

For target outcome d) only:

- Wider access for patients to public health information data portals using mobile platforms.
- Standards mobile solutions for future implementations of closed loop applications.

Funding schemes

a-b): IP/STREP; c): NoE; d): CP-CSA

Indicative budget distribution

IP/STREP: EUR 28 million with the objective to support at least one IP in a) and at least one IP in b)

NoE: EUR 3 million

CSA: 3 million

Call

Call 7

Objective ICT-2011.5.4 ICT for Ageing and Wellbeing

Target Outcomes

a) **Service and social robotics systems for "Ageing Well":** The work should focus on integration of advanced robotics systems and intelligent environments to provide solutions to key issues of relevance for improved independent living and quality of life of elderly people and efficiency of care. Major challenges to be addressed include: self-learning robotics solutions, which can: adapt to the user needs and share contextual information with other artefacts in the surroundings of the user; navigate in unstructured environments and perform precise manipulation of relevant objects; provide affective and empathetic user-robotic interaction, taking into account the acceptance by users. Development of basic robotics components is not called for.

b) **Smart and self-adaptive environments prolonging independent living**: Focus is on flexible ICT solutions able to provide early detection and adaptive support to changing individual needs related to ageing (e.g. increased risk of falls, depression, sleep deprivation, or cognitive decline), and support timely involvement of carers and family. The aim is to promote better prediction, prevention and support through long-term trend analysis of basic daily behavioural and physiological data, building on unobtrusive sensing and advanced reasoning with humans-in-the-loop. Major challenges to be addressed include: self-learning solutions building on open platforms, which can share contextual information with other artefacts in the surroundings of the user; low maintenance systems capable of graceful degradation in case of failure as well as affective and empathetic user interaction, taking into account the capabilities of elderly users.

c) **Coordination frameworks** to develop i) RTD roadmap and stakeholder coordination on ICT for "Ageing Well", as well as strengthening development of standards and international cooperation with North America and Asia. This should take into account work already started under the AALIANCE innovation platform (ref http://www.aaliance.eu). ii) RTD roadmap and stakeholder coordination on ICT for 'active ageing at work' establishing a sound ICT research analysis and exploration of possible ethical issues.

d) **Pre-commercial procurement** (PCP) actions aiming to implement a joint PCP call for tender to develop targeted services for extended independent living of elderly people and support for higher efficiency and quality of care work based on robotics solutions. Examples of services include support to daily tasks, mediated social interaction with carers and relatives as well as support to mobility. Key stakeholders in the value chain of service provision should be involved, such as care service providers, insurance companies, housing organisations, relevant industry partners and public bodies. Involvement of users will be an essential element as well as appropriate consideration of safety and ethical aspects. Use of open robotics platforms and contribution to standards is encouraged. PCP actions shall be implemented according to the conditions outlined in objective 11.1 and Appendix 8.

Proposals addressing either a) or b) should have ambitious objectives at the level of a complete system and aim at breakthroughs. The proposed R&D should cover all relevant aspects to allow for operational validation including relevant service models, business models (also those with an active role of the elderly person), safety and reliability as well as ethical aspects. Participation of industry and service providers is important and it is essential that the work builds on and actively contributes to standards. A multi-disciplinary research approach is required. The work shall ensure involvement of elderly people, carers and other users in

order to take account of the needs and acceptance of the target user groups and to ensure validation and impact analysis, by building on realistic test environments.

Expected impact

- Novel "ageing well" concepts providing convincing indication of substantial efficiency gains[21] for care provision and augmented independence and quality of life for the ageing population.
- Improved competitiveness of EU industry through proven feasibility and impact to move the results into downstream RTD or innovation.
- Strengthened potential for Europe to become a global leader in the field of ICT and "ageing well", including development of global interoperability standards in the field.

For objective 5.4.a)

- Strengthened global position of European industry in service robotics for "ageing well" as well as significantly advanced state of the art in the field.

For objective 5.4.b)

- Proven concepts for early detection of ageing-related risks, substantial reduction in costs through standardisation and increased quality of life.

For objective 5.4.c)

- Reinforced consensus, common strategic visions and RTD roadmaps shared by relevant key stakeholders in Europe and beyond in ICT for "ageing well" and ICT for "active ageing at work".

For objective 5.4.d)

Effective cooperation and longer-term research-deployment linkage securing the sustainable implementation in real-life of innovation in robotics solutions for ageing well, with substantial improvements in care productivity and elderly quality-of-life

Funding schemes

a): One IP and STREPS; b): STREPs; c): 2 CSAs; d) 1 CP-CSA

Indicative budget distribution:

EUR 37 million with indicative targets of a) EUR 18 million; b) EUR 13.5 million; c) EUR 1.5 million of which i) EUR 1 million, ii) EUR 0.5 million d) EUR 3 million.

Call:

Call 7

Objective ICT-2011.5.5 ICT for smart and personalised inclusion

Target Outcome

a) **ICT tools, infrastructures and devices for mainstream accessibility in daily life:** The objective is to support seamlessly accessible solutions and services for persons with

[21] User oriented research approach will validate socio-economic impacts in the concrete application areas. E.g. for robotics the measure is to demonstrate that robotics assistance can be a cost-effective alternative to institutionalised care while improving quality of life.

disabilities, in various and changing settings (e.g. home, workplace, public transport, shops, education or medical centres, other public spaces, both indoors and outdoors). The research projects should focus on one or more of: 1) Virtual reality and simulation approaches for developers to design daily life environments and explore potential user interactions building on previous work on 'virtual user'; and prototypes for ambient intelligence multimedia infrastructure (supported by networked sensors, terminals, etc) interacting with users' interoperable and portable IT devices; 2) Personalisable software-based assistive solutions supported through online/cloud-based platforms. This research should address generic and open solutions responsive to user physical, cognitive and mental capacities, preferences, and the ICT already available to the user. .

b) **Intelligent and social computing for social interaction, user empowerment and learning or skills acquisition for people at risk of exclusion**: Advanced ICT-enabled solutions -including social, affective and persuasive computing, and possibly serious games - for the empowerment of people with disabilities or people at risk of social exclusion, including people with low literacy, cognitively or mentally challenged, or with anti-social behaviour, which may include young people. This will aim at self-learning ICT solutions which take into consideration user profiling and feedback, in view to deliver personalised services and enhanced participation in work, education or training, social interaction, etc. Special attention will be paid to information representation, information appropriation and learning by users, and social dynamics, considering also intermediaries supporting final users.

c) **Brain-Neural Computer Interfaces** (BNCI) for assisting people with disabilities: Building on previous research, the BNCI foci now are: adapting BNCI sensor technology for out-of-the-lab use, fusion of BNCI into multi-sensor and multi-modal interfaces solutions, and data/pattern analysis for interaction with ICT-enabled devices and applications. Modularisation, interoperability, and smart processing of BNCI/sensor inputs for increased efficiency (e.g. through predictive approaches) are expected to be key aspects. Work on interoperability of BNCI devices, in particular, should consider potential contribution to standardisation. Research should also explore possible synergies with mainstream application domains, e.g. in gaming, virtual reality or alternative user-to-ICT input in complex multi-task settings.

d) **Coordination and Support Actions** to develop: i) a cooperation framework with Latin America on ICT for skills and empowerment of disadvantaged social groups and local communities, and on ICT for improving personal autonomy of people at risk of exclusion. ii) a cooperation framework at European or international level for promoting the development of accessibility guidance for advanced technologies, services and contents (including evaluation methodologies), with special focus on the internet, and for setting research agendas on e-accessibility.

In a), b) and c) it is essential to thoroughly address user requirements relating to issues such as privacy and other ethical aspects, safety, security and trust, and identity management. It is also very important to involve final and intermediary users at all stages of the research (from design to validation) while, especially for b), facilitating active user participation in any step of the innovation process.

Projects will consider viable business models and applications with high potential and measurable impact on individual quality of life and/or on society at large. Strong involvement of service providers (whether from commercial or public sectors) and other industry is expected. The projects should take account of existing standards and aim at their further development.

Projects should include comprehensive expertise while avoiding an excessive number of partners.

Expected impact

For a) and b)

- Significant progress on accessibility of ICT, advance human-machine interaction and intelligent computing by strong involvement of final and intermediary users.
- Increased user ability, notably of persons with disabilities, to carry out daily life activities and to interact with ICT.
- Improved competitiveness of Europe mainstream ICT industry, including through appropriate pre-standardisation.
- Higher levels of user empowerment and richer social interactions through personalised web-based assistive and social computing solutions.

For c)

- More advanced proof of concept of BNCI technologies and reinforced perspectives for mainstream exploitation.
- Augmented human capabilities through wider use of BNCI.

For objective 5.5.d)

- Reinforced international cooperation on ICT to support social inclusion and development.
- Common strategic visions and RTD roadmaps between relevant key stakeholders in ICT accessibility.

Funding schemes

a): IP (up to 3 IPs); b): IP/STREP (up to 1 IP and STREPs); c): IP/STREP (up to 1 IP and STREPs); d): At least one CSA for each area

Indicative budget distribution:

IP/STREP: EUR 33 million

CSA: EUR 2 million

Call

Call 7

Objective ICT-2011.5.6 ICT solutions for governance and policy modelling

Target Outcomes

a) ICT solutions for governance and policy modelling: Research will focus on the development of advanced ICT tools for policy modelling, prediction of policy impacts, development of new governance models and collaborative solving of complex societal problems.

This research will result in innovative ICT solutions (including open source solutions) that enable one or more of the following:

- Modelling new policy initiatives taking into account all relevant parameters.

- Performing societal simulations to forecast potential impacts of proposed policy measures.
- Development of tools that identify emerging societal trends as a result of the economic environment using innovative approaches such as non-classical economic modelling and reflexivity.
- Modelling and validating the next generation of public services as complex service systems, particularly taking into account the needs of the younger generation.

The work in this area should advance research in simulation and visualisation techniques, process modelling, gaming and mixed reality technologies while building on Web2.0/Web3.0, social networking, crowd-sourcing and dynamics methodology techniques. The resulting tools should exploit the vast reserves of Europe's public sector collective data and knowledge resources and should build on lessons learnt from complex systems modelling, including those at urban or regional scale..

Examples of fields of application can include, but are not limited to, urban planning policy, social and economic policies, life-long learning, mobility, demographics, etc, where the involvement of citizens through public consultations has been recognised as valuable. Stakeholders such as public administrations and policy institutes are expected to play a key role.

b) **Coordination and Support actions** should deliver: (i) an RTD roadmap to identify emerging technologies and potential applications at international level; (ii) an international network to promote cooperation of stakeholders working in these areas worldwide and encourage multidisciplinary constituency building. Expectations are to fund one CSA under (i) with an indicative duration of 12 months, and one CSA under (ii) with an indicative duration of 24-36 months.

Expected Impact

- Improved prediction of impacts of policy measures leading to more efficient implementation of government policies and better identification of the benefits and consequences for citizens and businesses.
- Increased engagement of citizens and wider use of ICT tools resulting in higher potential of innovation concerning interaction of citizens with the government.
- Improved transparency of information related to the impact of economic decisions on society; improved capacity to react to the main societal challenges and increased trust of stakeholders and the public at large in governance**.**
- Strengthened competitive position of European industry (including SMEs) in cooperation platforms, modelling, simulation and visualisation tools as well as increased potential for wider use of those tools beyond EU level.

Funding schemes

a): IP, STREP; b): CSA

Indicative budget distribution:

IP: EUR 7 million (*max one IP)*

STREPs: EUR 17 million

CSAs: EUR 1 million

Call: ICT Call 7

6.6 Challenge 6: ICT for a low carbon economy

This Challenge explores how ICT can be exploited to conserve our natural resources and in particular reduce our dependence on those natural resources which are non-renewable. It also addresses the use of advanced ICT to help meet the challenges of European Transport Policy, especially regarding decarbonisation of transport. The Challenge focuses on the following:

- The future electricity distribution network – work on the distribution grid itself calls for partnerships between ICT equipment providers, software companies and distribution network operators;
- Energy efficient design and decision support tools – work on ICT tools calls for partnerships between software companies and standards experts as well as specific user companies;
- Water management, including demand-side management, integrated water resource management frameworks and comprehensive decision support systems – work calls for partnerships between software companies and water authorities;
- Energy-efficient buildings, neighbourhoods and urban areas – work on the buildings construction cycle will require partnerships between software companies, ICT equipment providers, and buildings and construction companies; work on complex urban systems will require partnerships between software companies, RES providers, ICT equipment providers, buildings and construction companies, utilities companies and public authorities. This research will contribute to the Energy-Efficient Buildings Public-Private-Partnership launched in 2008 as part of the European Economic Recovery Plan;
- ICT for low-carbon multi-modal freight and logistics covering technologies and services for multi-modal freight and logistics as well as ICT for clean and efficient multi-modal mobility for further improving energy efficiency and reducing CO2 emissions in all modes of transport for passengers and goods;
- Cooperative Systems for low-carbon multi-modal mobility covering cooperative applications and services for energy efficiency and eco-friendly mobility as well as a European Wide Service Platform (EWSP) for services leveraging those cooperative systems;
- ICT for fully electric vehicles advancing the development and integration of major building blocks of the Full Electric Vehicle (FEV), and integrating the FEV with infrastructures. Projects supported under this objective will contribute to the European Green Cars Initiative, a Public-Private-Partnership launched in 2008 as part of the European Economic Recovery Plan.

Objective ICT-2011.6.1 Smart Energy Grids

The evolution of the electricity grid in Europe is a key challenge for Europe's electricity networks. The current distribution infrastructures do not enable a sufficient level of control, monitoring and management of the grid, in order to reach the objectives of resilience, sustainability and competitiveness. ICT can play a major role in reducing losses, increasing efficiency and managing ever increasing local energy sources. In this respect, the integration of renewable energies and local generation represents a key technical challenge. The successful combination of smart processes (e.g. demand side/response management, real-time consumption management) and smart technologies (e.g. smart meters, home energy management devices…) will enable to deliver the expected energy reduction.

Targeted Outcome:

Intelligent systems that can assist in the management of the electricity distribution networks in an optimized, controlled and secured manner.

Key research challenges to be addressed:

a) Strengthening the distribution grid by providing the control systems, management and decision support tools that enable the integration of large scale local generation and renewable energy sources.

b) Developing automation and control systems that support decentralized electricity generation, enabling smaller scale electricity supply sources to contribute to the grid in a secure and reliable manner, incorporating the production from intermittent sources, protection of equipment, fault alert and self-healing.

c) High power electronics building blocks, featuring the protection of equipment, fault alert and self-healing.

d) Integrating heterogeneous communications infrastructure to allow electricity production and consumption to be measured, reported and controlled (and eventually credited or billed).

e) Home energy controlling hubs that will collect real time energy consumption data from smart household appliances and enable intelligent automation.

f) Building consensus on industry-driven open standards to ensure the interoperability of smart grids control and management systems.

Projects could focus on one or a combination of the following:

- Development of smart grid building blocks for the distribution network, e.g. distribution grid management systems, communication channels, distributed intelligence, power electronics, smart appliances…
- Integration of data and decision support systems to monitor and manage electricity distribution networks, including energy generation at customer premises / micro-grids
- Interoperable platforms integrated with home and building automation systems enabling global energy optimisation in residential and tertiary buildings

Consortia must be compact including partners with substantial contributions to avoid diluting the efforts among large number of partners contributing each very little. In all cases, projects shall include a significant validation in real use conditions.

Expected Impact:

- Reinforced collaboration between the European electricity suppliers and distributors, electricity equipment manufacturers of all sizes and the ICT sector.
- Connection and operation of distributed and intermittent generators of diverse technologies.
- Demand side and demand response management enabled by innovative decision support systems.
- Producers-consumers allowed to play a novel role in the management of their energy consumption.
- Quantifiable and feasible energy reductions in the electricity distribution grid, leading to reduction of the overall environmental impact of electricity grids.

- Enhanced levels of reliability and security of electricity supply.

Funding schemes

a), b), c) and d): IP/STREP
e): CSA

Indicative budget distribution:

- IP/STREP: EUR 29 million with a minimum of 50% to IPs and 30% to STREPs
- CSA: EUR 1 million

Call

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Objective ICT-2011.6.2 ICT systems for energy efficiency

ICT systems are becoming essential for energy-efficient design, decision support tools and systems to optimize the energy performance of operations (e.g. in enterprise management systems, in data centres…). New level of innovation and quantifiable benefits will require partnerships between software companies and standards experts as well as specific user companies.

Target Outcomes

a) Development of ICT components addressing energy efficiency and emissions reduction. Definition of patterns, profiles, energy consumption models and their interrelations resulting in building blocks to be incorporated in existing ICT services and systems.

b) Incorporation of these building blocks into one of the following types of systems:

- Systems to support development and planning. Examples are: simulation and design tools to assess the full life-cycle energy associated with new products and systems before their realisation: decision support systems for urban planning to provide an understanding of the systems implications – in terms of energy-performance and cost-effectiveness of different design and planning alternatives.

- Systems to optimise the energy-performance of operations. Examples are: enterprise management systems to implement energy savings and emissions trading across industries; system-oriented schemes for data-centre management that consider in addition to high efficiency power distribution architectures and ultra-high efficiency power supplies, also cooling, incorporation of renewable energy sources and connection with the electricity grid.

c) Validation of the resulting systems in real use conditions. Based on defined indicators, during this phase, projects should record evidence of energy savings and carbon reductions, total cost of operations versus potential benefits, user acceptance and replication potential and extract lessons that may be used in different settings.

d) To support the "Green Digital Charter"[22] based on the Commission Recommendation[23] on "mobilising ICT to facilitate the transition to an energy-efficient, low-carbon economy",

[22] http://www.eurocities.eu/content/climatechange.php
[23] C(2009) 7604

Coordination and Support Action to enlarge the number of signatory cities, to develop common approaches, as well as coordination with similar initiatives, dissemination and public events. It should also explore how best to link the Charter to other initiatives such as the Covenant of Mayors[24].

Consortia must be compact including partners with substantial contributions to avoid diluting the efforts among large number of partners contributing each very little. In addition to partners with expertise in ICT, consortia must include partners from the relevant application domain. The final users must be involved in the validation phase but not necessarily as consortium partners.

Expected Impact

- Transparent methods of measuring energy performance.
- Strengthened and consolidated European excellence in engineering at the intersection of control, computing, communications and energy.
- Reduction of energy consumption and CO2 emissions, through ICT.

Funding schemes

a) b) and c) IPs and STREPs
d) CSA

Indicative budget

a) b) and c) EUR 34 million with a minimum of 50% to IPs and 30% to STREPs
d) EUR 1 million

Call

ICT Call 7

Objective ICT-2011.6.3 ICT for efficient water resources management

Water management enabled by ICT is a new and promising area, which includes demand-side management, integrated water resource management frameworks and comprehensive decision support systems. The work to be done targets specific user communities and calls for partnerships between software companies and water authorities.

Targeted outcomes:

ICT-enabled solutions for integrated water resources management (IWRM), involving as key building blocks: innovative demand management systems, decision support systems and data management technologies.

The proposed ICT solutions should involve a well-justified set of technologies permitting a holistic approach towards IWRM, and possibly include new data management technologies with real-time predictive capability demand forecasting, advanced metering, real-time communication of consumption patterns, adaptive pricing, and/or combined energy and water management schemes.

[24] http://www.eumayors.eu/

Projects should cover (i) research into a set of innovative ICT technologies and systems, (ii) substantial validation of these in at least two real-life operational environments, and (iii) evaluation of their anticipated cost and benefits and market prospects.

Consortia must be compact including partners with substantial contributions to avoid diluting the efforts among large number of partners contributing each very little. Evidence of commitments from all project stakeholders and end users involved, such as authorities, utility providers, ICT suppliers, and infrastructure test-bed owners, should be provided.

Expected impact:

- Reinforced industrial collaboration between European water distributors, water management equipment suppliers and the ICT sector.
- Behavioural changes for water usage in agricultural, industrial and domestic processes, leading to quantifiable water consumption reduction.
- Enhanced supervision of water network leading to better management of supply and flows and improved control of water quality.

Funding schemes:

STREPs

Indicative budget distribution:

EUR 15 million

Call

ICT Call 8

EEB-ICT-2011.6.4 ICT for energy-efficient buildings and spaces of public use

Energy-efficient buildings, neighbourhoods and urban areas requires further work on the buildings construction cycle, supported by partnerships between software companies, ICT equipment providers, and buildings and construction companies. Advances in complex urban systems calls for partnerships between some or all of software companies, RES providers, ICT equipment providers, buildings and construction companies, utilities companies, public authorities (planners).

Target Outcomes

a) Building Energy Management Systems integrating in a single system different energy efficient production/consumption sub-systems, such as renewable energy sources, solid state lighting, heat exchange, blind control, phase change materials, energy harvesting facades or electric vehicles deployed in spaces of public use. These systems should be based on advanced control algorithms capable of learning from previous operations and situations and load-balancing in near-real time.

Interoperation of these systems with other ICT-based sub-systems (e.g. for security, safety, comfort) will be considered an asset.

The proposed system should cover in an integrated way the inside of buildings as well as the exterior and surrounding space. Examples of such spaces include: a motorway service area, a football stadium with its surrounding parking space, a university campus, a shopping mall.

In addition to systems integration, proposals should include a substantial validation phase focussing on the operation of the building(s) and surrounding space in real user conditions. During this phase, proposals should record evidence of energy savings, total cost of operation and benefits that accrue, and extract lessons for those planning to deploy and finance such

systems. Consortia must be compact including partners with substantial contributions to avoid diluting the efforts among large number of partners contributing each very little.

b) Coordination and Support Actions: Bringing together all relevant stakeholders including ICT software and equipment providers, RES (Renewable Energy Systems) providers, energy companies (including ESCOs-Energy Service Companies), building and construction sector and local and regional authorities, to:

- Extend the notion of energy-positive from homes and buildings to large areas including neighbourhoods and extended urban/rural communities in a holistic dimension;
- Identify the needs for bridging actions from research to actual procurement;
- Analyse the relationship between producers, distributors and consumers of energy, new business models, with special emphasis on the role of SMEs, and the transfer of knowledge, identifying best practices;
- Identify the ICT standards related to the building and construction domain and analyse their relevance and possible evolutions;
- Support the establishment of European-scale actions spanning research, innovation, standards setting and deployment of ICT Infrastructures for energy-positive neighbourhoods"[25].

The tasks should include editing and up-dating public documents, organising expert hearings and workshops, dissemination and networking events.

Expected Impact

- Contribution to the opening of a market for novel ICT-based customized solutions for buildings operation and maintenance integrating numerous products from different vendors.
- Establishment of a collaboration framework between the ICT and buildings and construction and energy sectors.
- Identification of areas where standardisation work is required.
- Reduction of energy consumption and CO2 emissions through ICT[26]

Funding schemes

a) STREP; b) CSA

Indicative budget

STREP: EUR 19 million

CSA: EUR 1 million

Call

PPP-EEB 2011

EEB-ICT-2012.6.5 ICT for energy-positive neighbourhoods

Target Outcomes

[25] http://ec.europa.eu/information_society/activities/sustainable_growth/docs/elsa/elsa_report/ELSA-EnergyPositive-Report1.pdf

[26] COM(2009)111

Projects supported under this objective shall contribute to the European Energy-Efficient Buildings Initiative by developing management and control systems and decision support systems addressing the dynamics of energy supply and demand in neighbourhoods and extended urban/rural communities. These systems should optimise the use of energy beyond the buildings (considering for instance street lighting, urban heat production, electrical vehicles), and they should include the integration of renewable energy sources and the connection to the energy grid in order to take advantage of variable tariffs and diversity of supply.

In addition to technical developments, projects should address the necessary convincing and reliable business models, how to split incentives, engage end users and the commitment of public authorities to the deployment of such systems.

Interoperation of these systems with other ICT-based systems (e.g. traffic management systems, Geographical Information Systems) that may be deployed in the area will be considered an asset.

In addition to systems integration, proposals should include a substantial validation phase. During this phase, projects should record evidence on the benefits and total cost of operation for use by those planning to deploy and finance such systems and draw lessons which can be replicated. Consortia must be compact including partners with substantial contributions to avoid diluting the efforts among large number of partners contributing each very little.

Expected Impact

- Contribution to the opening of a market for ICT-based district/community energy management systems.
- Establishment of a collaboration framework between the ICT and buildings and construction and energy sectors.
- Reduction of energy consumption and CO2 emissions through ICT.

Funding schemes

IP/STREP

Indicative budget

IP/STREP: EUR 30 million with a minimum of 50% to IPs and 30% to STREPs

Call

PPP-EEB 2012

Objective ICT-2011.6.6 Low carbon multi-modal mobility and freight transport

Target Outcome

a) ICT for low-carbon multi-modal freight and logistics covering technologies and services for multi-modal freight and logistics, and using new technologies such as RFID, wireless sensor networks and common platforms and architectures. The focus is on:

- Integration of different transport modes (road, rail, air and sea transport), following Europe's transport policy principle of co-modality, in particular between road transport and other modes
- Intermodal interoperable logistics management and tracking systems and Intelligent Cargo systems which support the decarbonisation of transport by providing real-time process and status information on cargo and its movements to users, for increased transport efficiency

and timeliness and the integration of the intelligent cargo systems into the multi-modal transport data infrastructures.

b) ICT for clean and efficient multi-modal mobility for further improving energy efficiency and reducing CO_2 emissions in all modes of transport for passengers and goods:

- New tools, systems and services supporting energy-efficient driving and driver behaviour adaptation
- Environmentally aware route and access planning, intelligent road infrastructures, definition of digital map attributes for eco-routing and advanced multi-modal travel and traffic advice and information systems for individual and collective transport
- Methodologies for assessing the impact of advanced ICT in energy efficiency and CO_2 reduction, and in instantaneous emission models which take into account driver behaviour.

c) **Coordination and Support Actions**

- In the framework of the Intelligent Car Initiative, support to the eSafety Forum activities such as stakeholder consultations, road mapping and organising events and dissemination.
- Support to research agendas for energy efficiency, international cooperation, user awareness raising and dissemination of research results, international standardisation and harmonisation.
- Support the establishment of European large scale actions spanning research, innovation and deployment of service infrastructures for sustainable mobility and transport.

The Coordination and Support Actions should include relevant stakeholders in the domain.

Expected Impact

- Strengthened position of Europe's logistics and freight industries in the marketplace for low-carbon products and services
- Significant improvements in efficiency and environmental friendliness of mobility and transport in Europe; target: 25% reduction in GHG emissions in transport
- Full integration of intelligent cargo items into the multi-modal transport infrastructure, with special emphasis on urban multi-modal logistics
- Widening the market for new ICT-based mobility and transport services in Europe and worldwide.

Funding Schemes

a) and b): IP, STREP; c): CSA

Indicative budget distribution

- IP, STREP: EUR 46 million, with a minimum of 50% to IPs and 30% to STREPs

- CSA: EUR 4 million

Call

ICT call 7

Objective ICT-2011.6.7 Cooperative Systems for energy efficient and sustainable mobility

Target Outcome

a) Cooperative Systems for low-carbon multi-modal mobility covering cooperative applications and services for energy efficiency and eco-friendly mobility based on the harmonised European Communications Architecture[27] and bidirectional vehicle-to-vehicle (V2V), road-to-vehicle (R2V) and vehicle-to-infrastructure (V2I) communication technologies:

- Design, development and testing of new cooperative and pro-active traffic and travel management and control strategies based on the availability of reliable real-time system-wide data, including handling of special events and recovery after incidents.
- Addressing the interaction between the driver, the vehicle and the infrastructure, user acceptance and deployment of cooperative energy efficiency services, taking into account the needs of Fully Electric Vehicles such as integration with charging networks.

Liability, privacy, reliability, security and Human Machine Interaction should be addressed as well. The focus should be on road transport, as this sector presents the largest challenges. Projects could also address all transport modes according to the principle of co-modality, and include smart urban mobility.

b) European Wide Service Platform (EWSP) for cooperative system enabled services, aiming at providing to the drivers and other users a large variety of energy efficiency, mobility, comfort and safety related services:

- Intelligent combination of wireless communication technologies, development of network and transport communication protocols and security and control mechanisms, and support to their standardisation.
- Development of the necessary EWSP subsystems for service development, discovery, provision and administrative operations
- Development of interoperable innovative services for the EWSP, based on Future Internet technologies and in coordination with activities under the Future Internet PPP of Challenge 1.

c) Coordination and support actions

- Dissemination of results, user awareness campaigns, assessments of socio-economic impact and training.
- In accordance with the specific cooperation agreements with Japan and the USA: active exchange of information and results, and international standardisation and harmonisation.

The coordination and support actions should include relevant stakeholders in the domain.

Expected Impact

- Decarbonisation of transport. Significant improvements in energy efficiency and environmental friendliness of transport and mobility in Europe

[27] Baseline European ITS communications architecture for cooperative systems developed under the EC funded specific support action COMeSafety, see http://www.comesafety.org/

- Improving the competitiveness of the European transport industry as a whole, and enabling them to continue to address global markets successfully. World leadership of Europe's automotive industry in the area of Cooperative Systems.
- Opening new markets for mobility, safety, energy efficiency and comfort services in Europe. Ensuring market leadership by Europe's industry in green products and services.

Funding Schemes

a) and b): IPs, STREPs; c): CSA

Indicative budget distribution

- IP, STREP: EUR 37 million, the objective is to support at least 1 IP under a) and 1 IP under b), in addition to STREPs

- CSA: EUR 3 million

Call

ICT Call 8

GC-ICT-2011.6.8 (GC-ICT-2012.6.8) ICT for fully electric vehicles

Full electric vehicles (FEV) means electrically propelled vehicles that provide significant driving range on pure battery based power. It includes vehicles having an on-board fuel based electrical generator (Range Extender based on Internal Combustion Engine or fuel cells).

Projects supported under this objective should advance the research, development and integration of major building blocks of the FEV, and integrate the FEV with infrastructures.

Target outcomes:

a) **Energy/Power Storage Systems**, targeting control system solutions for batteries only as well as batteries and super-capacitors integrated either at a pack-to-pack or at cell-to-cell level. Electronic architectures have to manage optimal charging and discharging rates of the cells in relation to their typology and operating temperatures. Sensors and networking capabilities should be developed for monitoring and controlling the energy/power storage system's efficiency, lifetime, reliability and safety, including monitoring and early warning of fault conditions environmental monitoring, temperature conditioning and shock protection/spark avoidance. Furthermore, high voltage switches and interconnects and system interfaces need to be developed. Electro-chemical material developments are excluded.

b) **Architectures for Energy, Communication and Thermal Management** Energy optimised systems are an essential element to ensure maximum FEV range. With a multiple voltage system, an optimised distribution of functions is necessary:: power-train, bilateral grid connection, on-board energy harvesting, heating and cooling conditioning systems, vehicle stability and comfort, lighting, driving assistance sensors, on board information and entertainment and other auxiliaries. Each layer requires its own optimisation and operated by real-time and fail-safe standard communication to assure the best compromise between safety, driving and comfort.

c) **Vehicle-to-grid Interface (V2G)**
Focus is on connection of the vehicle to the grid by enabling controlled flow of energy and power through safe, secure, energy efficient and convenient transfer of electricity and data. Related issues to consider include E/M compatibility, robustness, reliability, safety,

security and impact on health and grid stability. Solutions should be independent of a specific platform, be based on pan-European consensus and conform to interface standards for Smart Grids.

d) Vehicle Stability Control

Focus is on control architectures with 2, 3 or 4 electrical motors for stability of the electric power train thus providing safety, comfort and fun-to-drive. Vehicle dynamics simulation and robust E/M compatibility have also to be addressed as well as generic and standardized, safe and redundant bus-based solutions for communication and control. Regenerative breaking, system faults like maximum torque / oscillating torque at a single wheel /two wheels and issues like controlled shut down procedures in case of a crash should be taken into account.

e) Electric Drive and Electronic Components

Partitioned and highly efficient power electronics devices, converter and inverter and electrical interconnects that simplify packaging and cooling, EMI-EMC designs, the management of high voltages, currents and temperatures and hardware-in-the-loop technology for algorithm and component testing. Projects should target the level of integration between the drive and the motor while maximising the efficiency of the drive over a wide range of operation of the motor as well as in relation to temperature excursions and voltage variability and fail safe tested components.

f) Integration of the FEV in the cooperative transport infrastructure

ICT-based interaction between the driver, the vehicle and the transport and energy infrastructures, for FEV trip planning and optimization including energy use and charging. In order to compensate for the limited autonomy range, gains in energy efficiency, charging strategies and route optimisation by using of traffic information are needed to turn the FEV into a mass market product. Adaptive strategies, algorithms and operation modes are needed for the charge and discharge management of the FEV's that balance, predict the range and adapt to the energy needs of the user in respect of the properties of vehicle’s battery and the grid. Research should also address opportunities for improving energy efficiency provided by automated driving and driver training.

g) Functional Safety and Durability of the FEV

Electrical and electronic components affect vehicle dynamics, safety and durability. Fail-safe concepts are an essential element of the system. Requirements and standards related to electromagnetic compatibility and health impacts of electromagnetic fields should be developed. Continuous improvements are expected against low frequency electromagnetic fields as well as on local sensing of currents and electromagnetic fields, on safe and robust components and subsystems. Research will also address adaptation and improvement of in-vehicle active safety for FEVs, integrated driver-vehicle – infrastructure safety, protection of vulnerable road users, and FEV emergency handling procedures. Moreover, test methods will be required.

h) Coordination and Support Action “FEV made in Europe”

One action for the coordination of a FEV Strategic Research Agenda for ICT, components and systems, for the clustering of R&D projects in the field, and for training, education and dissemination activities. The agenda should also investigate new usages for the FEV (e.g. last mile delivery and mobility for the elderly and disabled); it should cover standardisation measures; it should propose measures for harmonisation of national research policy measures and programmes, and also propose actions for international collaboration. The action should involve relevant electrical vehicle stakeholders.

Expected impacts:

- Improved energy efficiency and extended driving range of the FEV
- Reduced costs of the electronic components and the overall FEV at increased performance
- Mitigated constrains for the user of the FEV versus the Internal Combustion Engine vehicle
- the FEV seamlessly implemented in the smart grids and existing infrastructure
- Significant improvement of FEV's safety, comfort and new information and comfort services for FEV users.
- Strengthened global competitiveness of the European automobile, ICT and battery sectors. Market penetration of key components of FEVs.

Funding Schemes:

a, b, c, d) STREP in 2011

e, f, g) STREP in 2012

h) CSA in 2012

Indicative Budget:

a,b,c, d) EUR30 million
e,f,g) EUR 29 million
h) EUR 1 million

Call

a,b,c,d) PPP-GC 2011

e,f,g,h) PPP-GC 2012

6.7 Challenge 7: ICT for the Enterprise and Manufacturing

The Factories of the Future (FoF) initiative is part of the European Economic Recovery Plan launched in November 2008 to respond to the global economic crisis. This Public-Private-Partnership (PPP) aims at helping EU manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by improving the technological base of manufacturing across a broad range of sectors. The ICT contribution to this initiative aims at improving the efficiency, adaptability and sustainability of manufacturing systems as well as their better integration within business processes in an increasingly globalised industrial context. Challenge 7 is fully dedicated to supporting the FoF PPP.

The Challenge includes the areas:

- 'Smart factories' including application experiments of control and sensor-based systems, laser systems and industrial robots.
- 'Manufacturing solutions for new ICT products' addressing manufacturing processes for Organic Large Area Electronics (OLAEs) and organic photonics.
- 'Virtual factories and enterprises' addressing end-to-end integrated ICT allowing for innovation and higher management efficiency in networked operations and supporting the emergence of 'smarter' virtual factories and enterprises.
- 'Digital manufacturing' including products life cycle management, modelling, design and optimisation.

FoF-ICT-2012.7.1 Smart Factories: Energy-aware, agile manufacturing and customisation

The capability to produce large varieties of sophisticated products requires manufacturing sites to be flexible, fast and reactive. Lean and easy-to-implement ICT enables those sites to be resource efficient, safe and cost effective.

Target outcomes:

a) **Demonstration and benchmarking of novel process automation and control (for discrete, continuous or batch industries):** Systems, strategies and tools for an integrated control and dynamic optimisation of factory assets. The challenge is to develop ICT driven approaches and scalable architectures (e.g. service-oriented architectures or other appropriate architectures) for next-generation production automation and control solutions with flexibility, autonomy, robustness and energy efficiency. Projects should address efficient aggregation of information across existing legacy systems[28] at all production levels, factory level optimisation of production processes, and include demonstrations in real industrial environments. The aim is to show the operational and economic benefits of new ICT-driven approaches in factories against today's process automation and control solutions. b) **Large-scale validation of advanced industrial robotics systems** through user-friendly methods of interaction with, and tasking of, intelligent cooperative robotic systems (including new programming paradigms and direct physical interaction) and through robotics-enabled production processes. Research shall focus on methods that allow workers to productively and safely deploy robots without specialised training. Cooperation between human-robot and between robot-robot should aim to provide easy-to-access

[28] e.g. ERP, MES, SCADA, DCS

and personalised support for skilled or heavy duty tasks on the shop floor. Real-world validation of R&D shall demonstrate its large-scale applicability to flexible, small batch and craft manufacturing. Results should contribute to future benchmarking standards.

c) **Applications based on factory-wide networks of intelligent sensors and new metrology tools and methods**, demonstrating management of manufacturing information in real time and under harsh conditions, including planning, scheduling and dispatching. R&D should in particular address modularity, reliability/accuracy, safety and energy efficiency aspects of quality control systems and automation/handling equipment supporting discrete manufacturing down to lot sizes of 1. Results should support international standardisation.

d) **Lasers and laser systems for manufacturing and materials processing** with the following focus: i) High-brilliance active fibre and diode lasers (laser arrays) with nearly diffraction limited beam quality: simultaneous targets are multi kW continuous wave output power, efficiency of 40% or more, coupling into small diameter fibres (100µm or less for fibre lasers and 300µm or less for diode lasers); ii) New wavelengths and on-line adaptation of beam properties: novel lasers and laser systems opening-up new process windows and/or contributing to optimised process efficiencies. This includes widely tuneable lasers, ultra-short pulse lasers, versatile frequency conversion systems and photonic components enabling the on-line adaptation of essential beam parameters in order to produce stable beams of sufficient power and quality for the intended process.

Projects are expected to be industry-driven and to contain a strong validation element with quantifiable targets.

Expected impact:

- Strengthened global position of European manufacturing industry through the introduction of advanced automation into mainstream manufacturing and contributions to international standardisation
- Larger European market for advanced technologies such as electronic devices, control systems, new assistive automation and robots.
- Intelligent management of manufacturing information for customisation and environmental friendliness.
- Reinforced European leadership and industrial competitiveness of laser component and system producers and users and substantial improvement of manufacturing processes.

Funding schemes:

a) and c): IP;

b) and d): STREP

Indicative budget distribution

- EUR 40 million with a minimum of 50% to IPs and 30% to STREPs

Calls:

PPP-FoF 2012

FoF-ICT-2012.7.2 Manufacturing solutions for new ICT products

Organic Large Area Electronics (OLAE)[29] is based on a combination of new materials and uses large area production processes to provide completely new applications and products that are generally thin, cheap, lightweight and flexible. Key to realising the potential is developing low cost, high volume and high throughput manufacturing technologies of electrical, electronic and photonic components. This objective aims at a "from lab to fab" approach i.e. bridging the gap between research prototypes and low-cost mass production methods. Applications range from OLED lighting, organic photovoltaics and printed batteries, to signage and displays, organic and large area sensor arrays, organic and printed electronics as well as flex/foil-based integrated smart systems.

Targeted outcomes

Feasibility demonstrators for industrial, low cost, high volume and high throughput manufacturing processes and production of organic and large area electronics and photonics products. Solutions should in particular make use of roll-to roll wet deposition, but could also address evaporation, hot-embossing, laser processing and other low-temperature processes. R&D will focus on addressing the main roadblocks such as patterning processes, resolution and registration accuracy, process stability, multilayer lamination, encapsulation, automation, in-line quality control, and architectures to cut production costs. Standardisation issues should be addressed as appropriate.

Projects are expected to be industry-driven and the proposed work should include strong quality control, testing and validation elements in order to demonstrate the feasibility of the manufacturing at an industrial scale.

Expected impact

- New market opportunities for European manufacturing industry in new low cost, high volume and high throughput manufacturing processes for OLAE products tailored to meet key societal and economic needs; and, extending the range of applications of "conventional" industries (e.g. printing and plastic), into the OLAE field.
- Availability of European-produced OLAE products tailored to meet key societal and economic needs.

Funding schemes

IP

Indicative budget distribution:

EUR 20 million

Call

PPP-FoF 2012

[29] OLAE covers organic electronics as well as organic photonics technologies.

FoF-ICT-2011.7.3 Virtual Factories and enterprises

This objective focuses on end-to-end integrated ICT solutions that enable innovation and higher management efficiency in networked enterprise operations.

Target outcomes

a) **Distributed, adaptive, and interoperable virtual enterprise environments** for business innovation, extensive monitoring, evaluation, forecasting, risk assessment and prevention, e.g. through collaborative business intelligence, productivity, knowledge management and/or mixed reality tools. R&D should aim at integrating novel management methods and ICT to help virtual factories and enterprises move beyond existing operational capability.

b) **Real-time management of volatile manufacturing assets:** ICT tools and applications to support end-to-end management of tangible and intangible assets (e.g. inventories, stakeholder relationships, product configurations, production knowledge, skills) across the entire value chain. Proposed solutions should be validated for scalability, interoperability, reliability, and security.

c) **Component-based tools and architectures enabling the innovative dynamic composition of services** for product operation (maintenance, reliability, upgrades), and end-of-life use (re-manufacturing, recycling, disposal). The proposed solutions should help achieve efficient and sustainable lifecycle management of products and services.

d) **Internet-based, user-centric collaboration, sharing and/or mixed reality tools** supporting the emerging networked enterprise concepts. They should enable new manufacturing business models and practices that enhance and sustain the value of products and services (including value-added, service-enhanced products) by involving all relevant stakeholders in the innovation process, from R&D and design phases to after-sales.

Projects are expected to be industry-driven and to contain a strong validation element with quantifiable targets.

Expected impact

- Higher management efficiency of networked and sustainable business operations.
- ICT tools enabling the participation of SMEs in virtual factory environments.
- New business models and innovation scenarios for a low-carbon economy.

Funding schemes:

IPs/STREPs

Indicative budget:

EUR 45 million, with a minimum of 50% to IPs and 30% to STREPs

Calls:

PPP-FoF 2011

FoF-ICT-2011.7.4 Digital factories: Manufacturing design and product lifecycle management

The work addresses the early stages of manufacturing and engineering through interoperable models, engineering platforms, computer-assisted product and process development and analysis, and virtual prototyping and testing environments to reduce the need for physical mock-ups.

Target outcomes:

a) **Comprehensive engineering platforms** that enable cross-disciplinary information sharing, workflow integration and the capture of product-relevant knowledge (e.g. manufacturing process knowledge embedded in the models and the engineering tools), supporting the re-use of knowledge across stakeholders and the product lifecycle (e.g. from use to design). Projects should also contribute to ongoing international cooperation activities (e.g. IMS) on sustainable engineering and on standardisation for long-term archiving of product information.

b) **User-intuitive tools for simulation and virtual prototyping with forward and backward compatibility** (e.g. from use to engineering) using finer digital models to increase accuracy and integrating aspects such as functionality, forming, painting and assembly. The work should also aim at interoperable models enabling the use of various aspects of design and engineering, model auto-generation and robustness (e.g. automated meshing and optimisation) as well as the use of CAD-, CAE-, VR-, volume-, fluid-, structure-, polygonal- and process models in the various engineering stages. The adaptation and scaling of engineering codes to next-generation high-performance multicore computing clusters should also be addressed.

c) **Tools for holistic modelling and simulation of full complex products and processes** using multi-physics and support for tolerance changes in the models. Digital modelling and simulation of product and process behaviour, e.g., regarding material properties from micro to macro scale (from the atomic level upwards) should also be considered.

Projects are expected to be industry-driven and to contain a strong validation element with quantifiable targets.

Expected impact:

- Reinforced European leadership in knowledge-driven platforms, tools, methodologies, product development and manufacturing.
- Accelerated product design and manufacturing, enabling new products to be realised with a considerably shorter time-to-production and time-to-market.
- Drastically improved accuracy, reliability and speed of simulation techniques for manufacturing processes and/or full complex products permitting design decisions earlier in the design process.

Funding schemes:

a) - b) IPs, STREPs

c) IPs, STREPs, CSA

Indicative budget

- IP, STREPs: EUR 33.5 million with a minimum of 50% to IPs and 30% to STREPs
- CSA: EUR 1.5 million

Calls

PPP-FoF 2011

6.8 Challenge 8: ICT for Learning and Access to Cultural Resources

The challenge addresses the need for flexible and efficient access to information and knowledge, for educational, training and cultural purposes. It focuses on advances in how we learn through ICT and on enhancing the meaning and experiences from digital cultural and scientific resources. It responds to societal (active and responsible learners) and economic needs of individuals and organisations (better skilled and creative workforce).

Research under this Challenge will fuel progress in a wide range of applications from schools to workplaces, museums, libraries and other cultural institutions. Individual personal spheres are being extended by advances in areas like pervasive network environments, social networking technology and mobile computing, rising the expectations of users and consumers of the digital learning and cultural resources in terms of level of interaction and engagement.

The aim is to exploit Europe's vast and exclusive cultural resources and learning traditions as a source of innovation and creativity, for businesses, researchers, educational organisations and the general public.

Objective ICT-2011.8.1 Technology-enhanced learning

Target outcomes

a) **Technology Enhanced Learning systems endowed with the capabilities of human tutors.** Research should advance systems' capabilities to react to learners' abilities and difficulties, and provide systematic feedback based on innovative ways of interpreting the user's responses - particularly in relation to deep/shallow reasoning and thinking. Research should advance systems' understanding and use of the appropriate triggers (praise, constructive comments, etc.) influencing learning. The systems shall improve learners' meta-cognitive skills, understand and exploit the underlying drivers of their learning behaviours. Solutions should exploit advances in natural language interaction techniques (dialogues), in rich and effective user interfaces and should have a pedagogically sound, smart and personalised instructional design (STREP).

b) **Educational technologies for science, technology and maths:** *(b1)* Supporting students to understand and construct their personal conceptual knowledge and meaning of scientific, technological and/or mathematical subjects. Technological solutions should take the learners through the complexity of a subject, activating and feeding curiosity and reasoning, and support the creative applications of the theory. (STREP; NoE) *(b2)* Supporting European-wide federation and use of remote laboratories and virtual experimentations for learning and teaching purposes. The service shall enable online interactive experimentations by accessing and controlling real instruments, or using simulated solutions. Open interfacing components for easy plug-and-play of remote and virtual labs should be made available to stimulate the growth of the network of labs. Research shall include work on the user interfaces that mediate the complexities of creation and usability of experiments, for specific pedagogical contexts in primary and secondary schools and higher education. This part of the target outcome should be pursued by IPs that include large scale pilots.

c) **Advanced solutions for fast and flexible deployment of learning opportunities at the workplace (targeting, in particular, SMEs)**: enable faster, situated, just-in-time up-/re-skilling, and lower the costs/efforts of developing and maintaining quality instructional

material to be used in continuing education and training processes. Solutions should aim at creating a networking environment that fosters cross-organisational learning and that will help SMEs to adopt and sustain effective learning attitudes. Proposals must include research on novel business training models, and on how to overcome organisational, inter-organisational and individual barriers to widespread adoption of the developed technologies. This target outcome focuses specifically on the needs of SMEs in sectors without an established tradition in the adoption of learning solutions and facing innovation and competitiveness challenges deriving from efficiency needs or new processes/products development. Proposals should include SMEs and relevant professional associations. SMEs shall also be the final users of the solutions, and be actively involved in clearly justified, representative and sizeable pilots. (IP)

d) **Computational tools fostering creativity in learning processes**: innovative tools encouraging nonlinear, nonstandard thinking and problem-solving, as well as the exploration and generation of new knowledge, ideas and concepts, or new associations between existing ideas or concepts. The aim is to support people's learning as well as the formation and evolution of creative teams by developing technological solutions that facilitate questioning and challenging, foster imaginative thinking, widen the perspectives and make purposeful connections with people and their ideas. (STREP)

e) **Exploratory activities** for fundamentally new forms of learning through ICT; establishment of a pan-European network of living schools for validations, demonstrations and showcases. (CSA)

For all target outcomes, projects should include a scientifically sound evaluation component.

Expected impact

- Unlock the potential of the individual by a stronger and smarter adaptation and personalization of educational technologies.
- Significantly higher level of effective, personalised, ICT-based tutoring, leading to its wide-spread penetration in schools and at home.
- Higher level of engagement of youngsters in science, technology and maths, through novel educational software and opening up opportunities to access and use of laboratory equipments and virtual experiments.
- Faster, more timely and more cost-effective up/re-skilling through learning technologies and their sustained adoption by SMEs.
- Emergence of new learning models, including models invoking creativity

Funding schemes

a) STREP; b) STREP/NoE (b1) and IP (b2); c) IP; d) STREP; e) CSA

Indicative budget allocation

IP/STREP: EUR 53 million with a minimum of 40% to IPs and 30% to STREPs
NoE/CSA: EUR 7 million

Call Call 8

Objective ICT-2011.8.2 ICT for access to cultural resources

Target outcomes[30]

a) **Technologies for creating personalised and engaging digital cultural experiences:** research should address adaptability of systems for personalised interaction with users. Research should investigate technologies that add value and new meaning to cultural digital artefacts and improve user engagement with cultural resources, for example through smart, context-aware artefacts and enhanced interfaces with the support of features like story-telling, gaming and learning features.

b) **Open and extendable platforms for building services that support use of cultural resources for research and education:** research should explore seamless and universal, but also customisable access to digital cultural resources across a wide range of technical formats (sound, image, 3D, text), including cultural resources/objects with diverse characteristics (e.g. languages, temporal, spatial). Usability should be demonstrated through large scale pilots and specific contextual use cases (e.g. functionalities that support active research, creation of new knowledge, meaning extraction...).

c) **Improved and affordable technologies for the digitisation of specialised forms of cultural resources, including tools for virtual reconstructions:** the focus is on innovative approaches for capturing, imaging, 3D (including movement) modelling, resulting in enriched virtual surrogates which convey and embed knowledge beyond the original object.

d) **Awareness raising of research results** through road mapping and support to validation and take up of such results in practical settings.

Expected impact

- Affordability and widespread availability of tools and services for releasing the economic potential of cultural heritage in digital form and for adding value to cultural content in educational, scientific and leisure contexts;
- Wider range of users of cultural resources in diverse real and virtual contexts and considerably altered ways to experience culture in more personalised and adaptive interactive settings;

Funding schemes

a) STREP/IP b) IP c) STREP d) CSAs

Indicative Budget allocation:

IP/STREP: EUR 35 million with a minimum of 40% to IPs and 30% to STREPs
CSA: EUR 5 million

Call

Call 9

[30] Subject to results of call 6.

6.9 Future and Emerging Technologies

Future and Emerging Technologies (FET) fosters exploratory research to open up new avenues across the full breadth of future information and communication technologies. It supports new and alternative ideas, concepts or paradigms of risky or non-conventional nature. FET aims to go beyond the conventional boundaries of ICT and ventures into uncharted areas, often inspired by and in close collaboration with other scientific disciplines.

Radical breakthroughs in ICT increasingly rely on deep synergies with other disciplines (for instance, biology, chemistry, nanoscience, neuro- and cognitive science, ethology, social science, economics) and with the arts and humanities. This requires new attitudes and novel collaborations between a broad diversity of actors in research. In this respect, FET is the home for transformative research that can lead not only to a range of exceptional and unprecedented outcomes in science and technology, but can also create new practices, paradigms and reshape disciplines.

The FET Communication "Moving the frontiers of ICT – a strategy for research on future and emerging technologies in Europe"[31] sets out new lines of action for FET**.** Accordingly, this Work Programme extends the scope and ambition of the two complementary FET schemes, FET Open and FET Proactive.

FET Open scheme: challenging current thinking and attracting future potential

FET-Open is a **light, topic-agnostic and deadline free** scheme specifically designed to be open and continuously responsive to novel and fragile ideas that challenge current thinking, whenever they arise and wherever they come from. It aims at foundational breakthroughs that can open radically new directions for information and communication technologies in the future.

Although FET is open to broad participation, two new objectives specifically aim to give leadership to young researchers and high-tech research-intensive SMEs. As **young researchers** will be the future leaders in science, technology and innovation, FET aims to empower them to jointly explore radical directions that may not fit within current academic research agendas. Likewise, **high-tech, research-intensive SMEs** are instrumental for pushing forward alternative visions and for turning novel research results into a competitive advantage for creating new markets. FET aims to increase their role in cooperative research to further enhance their disruptive innovation potential and to unlock longer-term scientific and industrial leadership. This work programme devotes at least 20% of the FET Open scheme budget to support collaborative projects empowering young researchers and high-tech, research-intensive SMEs.

Because of its foundational nature, FET research is especially well placed for **global collaboration**. This work programme provides opportunities to extend on-going FET projects through new collaboration components involving the best researchers worldwide, so as to create global interest and raise the level of ambition around research avenues incepted within FET.

FET Proactive scheme: tackling targeted transformative research and exploring new large-scale scientific challenges and cooperation models

[31] Com(2009)184

FET Proactive provides **targeted support** to selected promising domains where **critical mass** needs to be built up, aligned with economic and social challenges and priorities that call for long-term foundational and transformative research. This work programme sets out a number of Proactive Initiatives in key areas, in some cases also embedding the drive for a global research agenda.

Foundational ICT research in Europe today remains fragmented in most domains, leading to duplication of effort, diverging priorities and untapped potential. FET fosters the networking of research activities conducted at national or regional level, including the development of joint research agendas and a shared vision for foundational research among Member States and associated countries, through **ERA-NET** and **ERA-NET Plus** actions.

Going beyond this, **FET Flagship Initiatives** are visionary, science-driven, goal-oriented, large-scale, multidisciplinary research initiatives nucleated from ICT future and emerging technologies. They are envisioned to be long term programmes on a scale much beyond current FET Proactive Initiatives. Activities in this work programme target Coordination and Support Actions to prepare for such FET Flagship Initiatives.

Special Initiatives

A special initiative on exascale software and systems with a significant international cooperation dimension, a long term perspective and the engagement of industry is foreseen under this Work Programme.

A Joint Call ICT/SSH (ICT / Socio-economic Sciences and Humanities) on 'Science of Global Systems' will aim at progressing research on global systems dynamics to better understand the interactions between ecological and socio-economic systems and to improve their ability to respond to global environmental changes.

FET Open scheme

Radically new ideas can come anytime, from anybody and from anywhere. They obviously do not necessarily fit within predefined topical calls, nor are they comfortable with strict submission deadlines. FET-Open is specifically designed to be open and responsive to such fresh courageous thinking. It aims to give promising but still fragile ideas the opportunity to mature into a credible and well-founded new direction of research.

What is common to all objectives under FET-Open is that they seek proposals on radically new concepts and visions of the nature and use of information and information technologies, grounded in scientifically plausible and often inter-disciplinary ideas on how to achieve them. In spite of the high risk of failure, FET-Open projects can be the first step on the way towards future European scientific and industrial leadership in areas that today simply do not exist yet.

The FET-Open scheme is unique in that it applies a two step submission process[32] in which short proposals of maximum 5 pages can be submitted at anytime. Only proposers of the most promising ideas are then invited to submit a full proposal. This design makes the scheme highly responsive while the overhead for the proposing consortium in case of failure to pass the evaluation is minimized.

In this work programme, the FET-Open scheme features the following objectives:

[32] The two step submission process applies for STREPS only and it does not apply to the FET-Open objective ICT-2011.9.4 on International Cooperation in FET research.

- Objective ICT-2011.9.1: Challenging current Thinking
- Objective ICT-2011.9.2: High-Tech Research Intensive SMEs in FET research
- Objective ICT-2011.9.3: FET Young Explorers
- Objective ICT-2011.9.4: International cooperation on FET research

Together they aim at fostering and supporting the best ideas grounded in scientific and technological excellence, whenever, wherever and whoever they may come from.

All FET-Open objectives call for STREPs[33]. CSAs, which are accepted only under objective 2011.9.1, are submitted directly as full proposals and are evaluated in one step.

Objective ICT-2011.9.1: Challenging current Thinking

Target Outcome

This objective supports the exploration of new and alternative ideas that, because of their risky or non-conventional nature, would not be supported elsewhere in the ICT Work Programme. It seeks:

- foundational breakthroughs as crucial steps towards radically new forms and uses of information and information technologies within a clear long-term vision that is far beyond the state of the art;
- ambitious proof-of-concept and its supporting scientific foundation, where novelty comes from new, high-risk ideas rather than from the refinement of current ICT approaches;
- new inter-disciplinary collaborations, possibly with prominent and internationally recognized non-EU research teams where these can provide a significant added value.

This objective also supports Coordination and Support Actions for creating the best conditions within which FET research can flourish and achieve the transformative impacts that it aspires to. These activities may be, for example:

- actions, including networking and dissemination activities, aiming at the emergence of new research communities or collaborations involving a broad diversity of disciplines and actors into FET research;
- actions towards the increased active involvement of high-tech research intensive SMEs in exploratory research directions relevant to future ICT markets;
- actions that stimulate excellence and future leadership of pioneering teams of young researchers along new, exploratory research directions relevant to future ICT;
- actions aiming to strengthen the international dimension of FET.

Expected Impact

For STREP projects:

- Opening new avenues of research towards future ICT that may be radically different from present day ICT;
- Strengthening the future potential for high-risk / high-impact research and innovation;
- New research alliances in transformative research, exploiting synergies in the global science and technology scene for increased impact and excellence.

For CSA actions:

[33] With the exception of Objective ICT-2011.9.4 on International cooperation on FET research.

- Catalyse transformative effects on the communities and practices for high-risk and high-impact research and on the mechanisms to support the global nature of such research;
- New, engaged and risk-taking research communities prepared to develop new and non-conventional approaches for addressing future challenges in science and society.

Funding schemes

STREP, CSA

Indicative budget distribution

EUR 75 million[34], out of which a maximum of EUR 7,5 million for CSA.

Call

FET-Open continuous call.

Proposals are continuously receivable until 11 September 2012 (STREP) and 12 March 2013 (CSA). FET-Open applies a two-step submission scheme and FET-Open specific eligibility and evaluation criteria (see Appendix 5 of this document).

Objective ICT-2011.9.2: High-Tech Research Intensive SMEs in FET research

Target outcomes

This objective fosters the participation of high-tech, research intensive SMEs in a driving role in collaborative research projects targeting visionary, multi-disciplinary research. This will:

- link novel ideas, results or paradigms from science on the one hand, and marketable ideas on the other, that can lead to new, visionary and non-mainstream business opportunities and create future markets;
- generate a new scientific and technological asset base on which the SMEs can establish themselves firmly as future innovation players in areas with a high potential for future commercial or societal impact.

This objective does not seek short term commercial outcomes. It will therefore *not support*, for example, the incremental improvement of state-of-the-art technology, mainstream research aimed at short term product or service development, the incremental improvement of existing lines of business activity, research aimed to catch-up with the competition, forsighting or market studies, or the mere development of new business models or business plans.

The consortium will contain at least one research intensive high-tech SME[35] with an established and proven in-house research capacity and that will play a driving role in setting and executing the research agenda of the project. This objective is expected to be addressed by small STREPs proposals, each with a funding in the order of 1 M€, where the largest share of the resources is allocated to the participating SME(s).

Expected Impact

[34] Indicative budget which is expected to be committed for successful proposals from the cut-off dates 06/07/2010 up to and including 10/04/2012 (batch 9 to batch 13 included)

[35] An SME is an enterprise which has fewer than 250 employees, has an annual turnover not exceeding 50 million EUR, and/or has an annual balance-sheet total not exceeding 43 million EUR. Possible relationships with other enterprises must be taken into account when calculating these data of the enterprise. Research centres, research institutes, contract research organisations or consultancy firms are not eligible SMEs for the purpose of the Co-operative and Collective schemes.

- Opening new avenues of research towards future ICT that may be radically different from present day ICT;
- In-house research capacity and research eco-system of the SMEs secured and broadened, thus leading to sustainable future innovation potential;
- High-tech, research-intensive SMEs recognised as first-class players in FET research;
- Increased visibility, exposure and impact of FET research.

Funding scheme: STREP

Indicative budget distribution: EUR 9 million[36]

Call: FET-Open continuous call

Proposals are continuously receivable until 11 September 2012. Two-step submission and evaluation process with specific eligibility and evaluation criteria (see Appendix 5 of this document).

Objective ICT-2011.9.3: FET Young Explorers

Target outcomes

This objective aims at capturing the creative potential of young researchers by fostering their leadership and participation in collaborative research projects targeting first-ever and exploratory, multi-disciplinary research.

This exploration should be grounded in scientifically plausible ideas that can provide a novel basis for the development of radically new concepts and visions that extend the conventional boundaries of ICT. New multi-disciplinary approaches and unconventional methodologies are encouraged.

This objective is expected to be addressed by small STREP proposals, each requesting a grant in the order of 1M€. A project must be led by a young researcher, and the leadership by young researchers of all work packages is also required. No more than six years should have elapsed between the award of a Ph.D. (or equivalent) for each such young researcher and the date of submission of the short proposal.[37]

Expected Impact
- Opening new avenues of research towards future ICT that may be radically different from present day ICT;
- Empower the next generation of European science and technology leaders through their increased leadership of collaborative ICT research;
- Promote early independence of young high potential researchers.

Funding scheme: STREP

[36] Indicative budget which is expected to be committed for successful proposals from the cut-off dates of 17/05/2011 up to and including 10/04/2012 (batch 11 to batch 13 included)

[37] Proof must be submitted at step 2 of the evaluation, together with the full proposal. Extensions of this period may be allowed only in case of eligible career breaks which must be properly documented: maternity (18 months per child born after the PhD award) & paternity leave (accumulation of actual time off for children born after the PhD award) and leave taken for long-term illness, national service.

Indicative budget: EUR 6 million[38]

Call: FET-Open continuous call

Proposals are continuously receivable until 11 September 2012. FET-Open applies a two-step submission scheme and FET-Open specific eligibility and evaluation criteria (see Appendix 5 of this document).

Objective ICT-2011.9.4: International cooperation on FET research

Target outcomes

This objective aims to increase and accelerate the impact of FET research projects by cooperating with non-EU partners of excellent global standing. It targets the extension of ongoing FET projects with complementary research activities in which collaboration with non-EU research partners brings significant added value.

The research content is expected to focus on new activities that expand the research challenges and reinforce the impact of the ongoing project. The outcome of that research is expected to be made freely and openly available for the benefit of the research community.

Funding can be requested by the partners from the ongoing FET project and by the new non-EU research participants to cover the coordination and joint research activities necessary to complement the ongoing project.

Expected Impact

- Enhanced outcomes, global reach and impact of ongoing FET research projects through research collaboration with non-EU participants with complementary expertise;
- Research cooperation between world-class EU and non-EU researcher teams reinforced, thus facilitating the emergence of global alliances.

Funding scheme: Additional funding to existing grant for on-going FET[39] IP and STREP projects ending at least 18 months after the submission date of the proposal.

Indicative budget distribution: EUR 3 million[40]

Call: FET-Open continuous call

Proposals are continuously receivable until 12 March 2013. One-step submission and evaluation process and specific eligibility and evaluation criteria (see Appendix 5 of this document).

FET Proactive

FET Proactive spearheads transformative research, supports community building and enhances Europe's innovation potential around a number of fundamental long-term challenges in ICT.

[38] Indicative budget which is expected to be committed for successful proposals from the cut-off dates of 17/05/2011 up to and including 10/04/2012 (batch 11 to batch 13 included)

[39] Ongoing projects selected under any of the FET objectives of the FP7 ICT Work Programmes.

[40] Indicative budget which is expected to be committed for successful proposals from the cut-off dates of 17/05/2011 up to and including 10/04/2012 (batch 11 to batch 13 included)

- **Challenging Current Computing and Communicating:** Nature exhibits forms in which information can exist or be transferred that are qualitatively different from the principles used in ICT today. New paradigms based on inspiration from nature and physics will be investigated in *Quantum Information and Communication Technologies, Neuro-Bio Inspired Systems* and *Unconventional Computing.*
- **Complexity, Evolution and Adaptation**: Large systems are encountered in both nature and engineering: systems of a technical nature, of a techno-social, social or biological nature. The theory and fundamental insights needed to address the ICT challenges relating to such systems are explored in *Dynamics of Multi-Level Complex Systems* and *Fundamentals of Collective Adaptive Systems*.
- **Co-evolution of Society, Science and Technology**: When societal challenges such as energy consumption and efficiency, epidemics or policy impact assessment have an impact on science and technology, there is a need to seize the opportunity for finding radically different ICT technologies. Examples are *Minimising Energy Consumption of Computing to the Limit* and also *Dynamics of Multi-Level Complex Systems.*
- **Preparation for FET Flagships**: a call for Coordination and Support Actions will integrate fragmented research efforts around large-scale, visionary and goal-driven, multidisciplinary research initiatives.

Candidate topics for calls in Work Programme 2013 include new breakthroughs arising from the FET Proactive Initiatives launched in earlier calls of FP7, inter alia *Atomic Scale Technologies, Embodied Intelligence* and *Human Computer Confluence.*

FET Proactive Initiatives apply specific eligibility and evaluation criteria (see Appendix 5).

Objective ICT-2011.9.5: FET Flagship Initiative Preparatory Actions

FET Flagship Initiatives are science-driven, large-scale, multidisciplinary research initiatives oriented towards a unifying goal and nucleated from ICT future and emerging technologies. The goals of such initiatives should be visionary and highly ambitious, requiring cooperation among a range of scientific disciplines and research topics going beyond the ICT programme. FET Flagship Initiatives are envisioned to be long term programmes on a scale much beyond current FET Proactive Initiatives. The overarching nature and magnitude implies that they can only be realised through a federated effort of key stakeholders. . Specific aspects to consider are:

- **Ambition**: the goal should be a visionary breakthrough involving major challenges in science and technology, requiring a large federated effort, and justified via comparison with existing activities and state of the art
- **Impact**: a clear leverage effect, substantial progress and major innovation in science and technology; affecting competitiveness of European industry, society, governance and sustainability, considering potential ethical and legal implications
- **Integration:** an operational framework describing why and how relevant disciplines, stakeholders and resources will be brought together at European or larger scale, and how they can be coordinated in an efficient way
- **Plausibility**: the different areas of research should be at appropriate level to be assembled into a well-defined roadmap with reasonable milestones that mark valuable interim results

Target Outcome

a) Complete design and description of a consolidated candidate FET Flagship Initiative, including assessment of feasibility in scientific, technical and financial terms, i.e. with a well-defined goal thoroughly justified in terms of scientific advance and impact, an implementation roadmap, an operational framework, the identification of resources, maturity, capacity, and clear evidence of commitment from key stakeholders (in particular scientific communities, Member States and Associated Countries, funding agencies and global partners) to embark on a joint effort with adequate level of integration in place, including development of a unifying research agenda, to enable the launch of a FET Flagship by 2013. The objective is to support in the order of 5-6 projects, with a maximum duration of 12 months, addressing this target outcome.

b) Provide support to the setup of candidate FET Flagships by coordination of common issues, e.g. establishment of common platforms to tackle frequent tasks or shared interests, promoting networking and structuring of communities, organisation of joint events etc. The objective is to support 1 project, with a funding in the order of 1 M€, addressing this target outcome.

Expected Impact

- A goal-driven, federated effort towards a key scientific or technological breakthrough with strong potential for longer term technological innovation and economic exploitation.
- Engagement from key stakeholders.
- Launch of FET Flagship Initiatives that deliver through their implementation key benefits for science, technology, economy and society, and which will significantly contribute to the coordination of EU and national research programmes and initiatives.

Funding Scheme

CSA. The objective is to support in the order of 5-6 projects, with a maximum duration of 12 months, under target outcome a) and 1 project, with a funding in the order of 1 M€, under target outcome b).

Indicative Budget Distribution

EUR 10 million

Call

ICT call 7

Objective ICT-2011 9.6: FET Proactive: Unconventional Computation (UCOMP)

Nature (e.g. living cells), and our physical environment in general, show many unconventional ways of information processing, such as those based on (bio-)chemical, natural, wetware, DNA, molecular, amorphous, reversible, analogue computing, etc. These are generally very sophisticated, ingenious and highly effective for specific purposes, but sufficient knowledge (either from a theoretical or an engineering perspective) to properly exploit, mimic, or adapt these systems, is lacking.
The objective is to develop alternative approaches for situations or problems that are challenging or impossible to solve with conventional methods and models of computation (i.e. von Neumann, Turing). Typical examples include computing in vivo, and performing massively parallel computation.

The focus of this objective is beyond existing initiatives (e.g. *Quantum ICT*, *Neuro-IT* and *Brain-Inspired ICT*).

Target outcomes

Foundations for a radically new kind of information processing technology based on unconventional paradigms. The proposed concept should be developed within the framework of a broader, long-term vision on its potential implementation and impact.

Projects should:

- pursue information processing, respecting the link between computation and the physico-chemical properties of its embodiment.
- strengthen the theoretical foundations in the area, keeping a strong focus on their potential application in (future) systems and devices.
- demonstrate key steps towards physical information processing systems, including appropriate construction, organisation, adaptation and operation methodologies.
- develop an appropriate interface to conventional IT systems and devices, wherever relevant

Expected impact

- Foundations, approaches and proofs of concept for radically new kinds of computation.
- Possible contributions beyond the area of ICT (e.g. health, environment or security).
- Global international research cooperation in this area, in particular with participants from the USA, Canada, New Zealand and Japan.

Funding schemes

STREP

Indicative budget distribution

EUR 15 million

Call

ICT call 8

Objective ICT-2011.9.7: FET Proactive: Dynamics of Multi-Level Complex Systems (DyM-CS)

Many artificial and natural systems are characterized by a high level of differentiation in structure and organization; they exist in areas as diverse as the Internet, energy management, climate, financial markets, infrastructures (including ICT), biology, transport, epidemics, meteorology, urban planning, social simulation and policy impact assessment. In order to describe and control these systems there is a need to observe and reconstruct their dynamics and make sense of large amounts of heterogeneous data gathered on various scales. Most of these areas would benefit from an international effort in collecting and sharing data, models and from looking for a general, common theoretical approach. The science of complex systems (CSS) offers a framework for this theoretical approach.

The objective of this Initiative is to make steps towards a general theory on complex systems through contributions in the area of dynamics of multi-level systems.

Target outcomes:

a) New mathematical and computational formalisms on dynamics of multi-level systems developed and validated on real-world applications involving large and heterogeneous data sets. This could involve, for example, addressing emergence of and interactions between scales, combining the concepts of ‘programmability’ and ‘self-organisation’, or addressing 'out of equilibrium’ considerations. Priority application areas should present clearly defined challenges to ICT and/or have a relevant user/social/economic component. Through these areas, CSS should be able to provide solutions for current ICT systems or lay the foundations for new ICT paradigms. For the validation, appropriate organizational structures should be chosen, e.g. large socio-technological systems, complex biological organisms or large organizations. The latter can be validation partners, testing the theory on themselves.
b) World-class international research cooperation, global alliances in this research area, and links with similar actions outside Europe, in particular with participants from USA, Japan, New Zealand and China.

Expected impact

- Progress towards a general theory on complex systems
- New ICT-based methods and principles for the management of large scale systems, including ICT systems themselves.
- Better understanding of structural patterns (e.g. resilience, sensitivity to failure) of complex systems in socio-economic and technological areas.

Funding schemes

a): IP, STREP

b): CSA, including at least two partners from non-EU/non-AS countries.

Indicative budget distribution

- IP/STREP: EUR 22 million

- CSA: EUR 1 million

Call

ICT call 8

Objective ICT-2011.9.8: FET Proactive: Minimising Energy Consumption of Computing to the Limit (*MINECC*)

The energy consumption of computing technologies becomes more and more an obstacle to realizing new functionalities in, for instance, mobile or distributed applications, and limits performance. It also has an increasing impact on energy supply and environment. Since energy efficiency of today's technologies is orders of magnitude above the theoretical limits, disruptive solutions and radically new approaches are needed to close this gap.

Target outcomes:

Proposals should lay the foundations for radically new technologies for computation that strive for the theoretical limits in energy consumption while maintaining or even enhancing functionality and performance. At least one of the following outcomes should be addressed:

a) New elementary devices and inter-device-communication mechanisms operating at the limits of minimum energy consumption.

b) Novel computing paradigms with radically improved energy efficiency. Examples include approaches inspired by biology, post-Boolean logics and computing under uncertainty, randomness and unreliability as a result of low-energy device properties.

c) Software models and programming methodologies supporting the strive for the energetic limit (e. g. energy cost awareness or exploiting the trade-off between energy and performance/precision).

Proposals should aim for a proof of concept and investigate the viability of the approach. The expected energy gain should be indicated, and the proposal should foresee appropriate energy metrics or benchmarks for verification.

Expected impact

- Understanding of theoretical limits of energy efficiency in computation (e.g. energy dissipation, thermodynamic and quantum physics limits)
- Foundations of computing technologies with negligible energy consumption
- Reduction of the environmental impact caused by the energy consumption of ICT.

Funding schemes

STREP

Indicative budget distribution

EUR 15 million

Call

ICT call 8

Objective ICT-2011 9.9: FET Proactive: Quantum ICT (QICT) including ERA-NET-Plus

The objective is to conceive theoretically and develop experimentally novel and powerful technological applications of quantum coherence and entanglement. In particular, projects should develop a conceptual platform for potentially disruptive technologies, advance their scope and breadth and speed up the process of bringing them from the lab to the real world.

Target outcomes

The results obtained should push forward the boundaries of our knowledge and ensure a constant progress in the quantum ICT area, in particular by

a) Demonstration of quantum simulators capable to operate on quantum many-particle systems and to simulate technologically relevant systems (e.g., coupled systems in condensed matter, new materials and chemical compounds).

b) Demonstration of hybrid systems linking different quantum bit realizations (e.g., by bridging atomic/molecular and optical systems with condensed matter systems). Possible devices include those that interconnect different qubit memories and quantum information carriers, and quantum repeaters.

c) Novel quantum devices exploiting entanglement and quantum coherence as a resource, such as quantum sensing, imaging, measurement and communication.

d) Enabling methods and technologies to support aforementioned outcomes (e.g., the control of coherent operations with many quantum bits in the experimental domain, or the search for new algorithms and protocols in the theoretical domain).

e) A joint call for proposals on QICT, to be funded through an ERA-NET-Plus action between national and/or regional grant programmes.

STREPs should address at least one of the research foci a)-d), IPs should address two or more.

Expected impact

- Significant technological achievements with higher performance and superior energy efficiency such as entanglement assisted sensors and metrology

- Better understanding of the dynamics of complex systems and phenomena and design of novel artificial materials with tailored properties through quantum simulators and computers

- Extending the distance of secure quantum links through quantum repeaters

- Closer cooperation and greater alignment between the participating national/regional research programmes through an ERA-NET-Plus action

Funding schemes

a)-d): STREP, IP; e): ERA-NET-Plus

Indicative budget distribution

a)-d): EUR 15 million

e): EUR 7 million (Any funds remaining following the selection of an ERA-NET-Plus action will be transferred to IP/STREP actions under this Objective)

Call

ICT call 9

Objective ICT-2011 9.10: FET Proactive: Fundamentals of Collective Adaptive Systems (FOCAS)

The socio-technical fabric of our society more and more depends on systems that are constructed as a collective of heterogeneous components and that are tightly entangled with humans and social structures. Their components increasingly need to be able to evolve, collaborate and function as a part of an artificial society.

A key feature of Collective Adaptive Systems (CASs) is that they comprise many units/nodes, which have their own individual properties, objectives and actions. Decision-making is distributed and possibly highly dispersed, and interaction between the units may lead to the emergence of unexpected phenomena. They are open, in that nodes may enter or leave the collective at any time, and boundaries between CASs are fluid. The units can be highly heterogeneous (computers, robots, agents, devices, biological entities, etc), each operating at different temporal and spatial scales, and having different (potentially conflicting) objectives and goals. The objective is to establish a foundational framework for CASs.

Target outcomes

a) **Operating Principles**: principles by which CASs can operate. These should go beyond existing control and optimisation theories, taking into account the diversity of objectives within the system, conflicts resultion, long term stability, and the need to reason in the presence of partial, noisy, out-of-date and inaccurate information
b) **Design Principles**: principles necessary to build and manage CASs, such as enabling the emergence of behaviour and facilitating prediction and control of those behaviours. These principles should exploit the inherent concurrency and include methods for system validation.
c) **Evolutionary Properties**: properties concerning the evolutionary nature of CASs, e.g. open-ended (unbounded) evolutionary systems, the trade-off and interaction between learning and evolution, and the effect of evolution on operating and design principles.

IPs should address all three target outcomes. STREPs should have a main focus.

Expected impact

- New functionalities for adaptive ICT systems enabled through novel principles, methods and technologies for designing and operating collective adaptive systems.
- New insights into the general properties of large scale distributed systems.

Funding schemes

IP, STREP

Indicative budget distribution

EUR 23 million

Call

ICT call 9

Objective ICT-2011 9.11: FET Proactive: Neuro-Bio-Inspired Systems (NBIS)

Brains are remarkable computing systems which clearly outperform conventional architectures in many real-world tasks. Computational neuroscience has made tremendous progress in uncovering the key principles by which neural systems process information, and ICT has advanced to a point where it is possible to integrate a comparable number of transistors in a VLSI system as neurons in a mammalian brain. Yet we are still unable to build artificial systems with basic "thinking" abilities comparable with even simple insect brains.

In particular, this objective addresses the need to:

- learn more about the relationship between structure, dynamics and function in neuronal circuits and assemblies, and how information is represented or “coded” in a brain.
- develop deeper and more comprehensive theories of neural processing, possibly building on results obtained in the domains of dynamic and complex systems.
- close the gap between neuroscience and engineering by motivating interdisciplinary work that ties data with theories, novel computing paradigms, models and implementations.

Target outcome

a) Developing and applying radically new neural recording, imaging or interfacing concepts and designs for a deeper understanding of neural information processing.

b) New multi-scale dynamical theories of neural representation for the development of neuro-bio-ICT systems that can perform high-level tasks (e.g. robust object recognition, or classification), going beyond purely sensory-driven information processing.
c) Development and prototyping of modular brain-like computing architectures that combine neural processing primitives to give a better understanding of brain function and facilitate the design of more complex processing systems for real-time and optimized performance.
d) World-class global research cooperation and alliances in this area, and links with similar actions outside Europe, in particular with participants from USA and Japan.

IP/STREP proposals should address at least 2 of a), b) or c). CSA proposal should address d).

Expected impact

- New computing paradigms leading to advanced bio-inspired sensing and processing systems, which are naturally able to learn and adapt
- New concepts leading to new brain-computer interface technologies
- New collaborations between researchers in multiple disciplines spanning engineering, physical and life science domains.
- World-class international research cooperation, global alliances in this area, and links with similar actions outside Europe, in particular with USA, Japan and BRIC.

Funding schemes

a-c): IP, STREP

d): CSA

Indicative budget distribution

- IP/STREP: EUR 22 million

- CSA: EUR 1 million

Call

ICT call 9

Objective ICT-2011.9.12: Coordinating Communities, Identifying new research topics for FET Proactive initiatives and Fostering Networking of National and Regional Research Programmes:

Target Outcome

a) Actions supporting the coordination and cooperation of the targeted research communities, assessing the impact and proposing measures to increase the visibility of the initiative to the scientific community, to targeted industries and to the public at large. These actions should also foster the consolidation of research agendas.

b) Actions supporting and promoting cooperation with non-EU research teams in foundational research on FET topics, with a balanced participation from partners in the EU and from target countries.

c) Short duration actions (typically 6-12 Months) to organise consultations of multi-disciplinary communities to formulate novel FET research topics, focussing on new emerging research areas. The main objective should be to identify and motivate one or more new research avenues from a global perspective, the associated fundamental challenges, and to analyse the expected impact on science, technology and society.

d) Actions to organise conferences and workshops which should foster dialogue between science, policy and society on the role and challenges of interdisciplinary ICT related long-term research, increasing Europe's creativity and innovation base and bridging diverse European research communities and disciplines.

e) ERA-NET actions fostering the networking of future and emerging research activities conducted at national or regional level, facilitating the mutual opening of national and regional research programmes where appropriate. These actions should involve national and/or regional research programme owners.

Proposals should focus exclusively on one of the target outcomes.

Expected impact

- Reinforced coordination of research projects in FET Proactive Initiatives in current or previous calls, strengthening research excellence and co-operation with partners from outside Europe.
- Early identification and increased awareness of new trends emerging on a global scale in support of future proactive initiatives
- Novel widely supported and well motivated research topics to be considered as inputs for future ICT work programmes.
- Increased visibility of the FET community and links between European research communities
- Structuring and integrating effects through ERA-NET actions

Funding Scheme

CSA

Indicative Budget Distribution

EUR 3 million in call 7 of which 2,5 million will be reserved for CSA under focus e)

EUR 3 million in call 8

EUR 2,5 million in call 9

Calls

ICT call 7 (foci c, d and e)

ICT call 8 (foci a, b, c and d)

ICT call 9 (foci a, b, c and d)

Special initiatives

Objective ICT-2011.9.13 Exa-scale computing, software and simulation

Target outcomes:

a) Exascale computing

The target is to develop a small number of advanced computing platforms with potential for extreme performance (100 petaflop/s in 2014 with potential for exascale by 2020), as well as optimised application codes driven by the computational needs of science and engineering and of today's grand challenges such as climate change, energy, industrial design and

manufacturing, systems biology. These platforms should rely on vendors' proprietary hardware or on COTS.

Proposals should address major challenges of extreme parallelism with millions of cores in the areas of programming models, compilers, runtime support, operating systems, algorithms, memory access, interconnects, power consumption and system resilience). All software should be developed as open source.

Each project should bring together (a) one or more supercomputing centres with a leading role in system software development; (b) technology and system suppliers, whether these are academic centres or private companies, including system vendor(s) in case of targeting particular vendors' machines; and (c) industrial or academic centres to co-develop a small number of exa-scaled application codes. Each project should split the effort roughly 40/60 in applications and simulation vs. systems development.

Proposals should demonstrate synergies with efforts under the Capacities programme on the deployment of leadership-class HPC (High Performance Computing) systems. Proposals may include international cooperation components that are complementary to European expertise and essential to address the exa-scale grand challenge.

Two to three projects are expected to be selected. This selection will attempt a balance between application domains and exascale computing approaches.

b) Coordination of international cooperation
Supporting a common European strategy and a driving role for European stakeholders in international efforts on the development of future extreme-scale HPC systems.

Expected impact:

- Europe in the frontline of international efforts for the development of HPC system software and tools;
- Strengthened European industry supplying and operating HPC systems; preparing European industry and research organisations to achieve world-leadership in this area.
- European excellence in exascale level simulation codes for the benefit of society, industrial competitiveness and policy making; emergence of EU top-class simulation centres for exa-scale systems.
- Reinforced cooperation in international endeavours on exascale software and systems.

Funding schemes:

a): IP, b) CSA

Indicative budget distribution:

- IP: EUR 24 million
- CSA: EUR 1 million

Call:

ICT Call 7

Objective ICT-2011.9.14 Joint Call ICT-SSH on 'Science of Global Systems'

Progress in global systems dynamics is required to better understand the interactions between ecological and socio-economic systems and to better respond to global environmental change. Global coordination requires new developments in science based on global system models that span the whole range from local regional to global multi-national decision making. A science of global systems must pay special attention to the interface with policy and society to

better ground the scientific tools. IT will support the massive needs in computing and data handling and help establishing new links between science, policy and society.

Target outcomes:

- Improve use of data and knowledge from the past to choose between options for the future: Tools to represent uncertainty and to construct chains of causality (narratives) from models and data to outcomes for use in socio-political decision processes.
- ICT tools for better use- and user centred modelling techniques, data collection and user-model interaction. Methods to address use of system models in a policy decision context.
- Understanding of distributed multilevel policy decision processes. Identify system patterns relevant for properties like resilience, vulnerability, and regime shift tendencies.
- Use and develop formal languages, constructive type theory and domain specific languages to make policy interfaces of models more adaptable to changing contexts.

Expected impact:

- Better links between modellers and stakeholders facilitated by new policy-relevant concepts in modelling of global systems;
- overcome fragmentation in research in various policy-relevant models resulting in a better uptake of modelling results for global coordination of policies;
- policy uptake in targeted areas: socio-ecological system and climate change impacts, innovation as a global system, dynamics of the financial system and new models for economy.

Funding scheme: STREP

Indicative budget distribution: EUR 2.5 million (ICT contribution)

Call: Joint call ICT/SSH (~July/Sep 2010)

6.10 International Cooperation

Objective ICT-2011.10.1 EU-Brazil Research and Development cooperation

[text still under development – to be significantly shortened]

Brazil's unique demand in areas such as agriculture, environment, energy and health call for a widespread use of advanced technologies in order to efficiently tackle its continental scale challenges. For the rest of the world the solution for such challenges sets paradigms as to how they can be tackled anywhere else.

At the same time, Brazil is quickly building an impressive research and development environment in microelectronics and microsystems, already reaching in many areas a degree of excellence comparable to Europe and elsewhere.

Historically there have been various successful examples of collaborative efforts between Brazil and European countries, albeit on a limited scale and on an *ad hoc* basis. Very importantly, in recent years various European research institutions have been establishing offices in Brazil for more formal and long-lasting ties.

Therefore, beyond collaborative efforts founded on application opportunities there is a strong, demonstrated potential for building alliances between the Brazilian and European R&D communities.

Topic 1: Microelectronics/Microsystems

Target Outcomes

1. Methodology, design blocks and specific design tools that complement and go beyond the capabilities of commercially available software in the areas of: design of integrated multi-technology systems, ultra low power design, RF design, design of energy efficient systems, methodology and tools for system in package and 3D integration;

2. Heterogeneous Microsystems integration and packaging technologies. Sensor technology, integrated solutions encompassing all aspects for technological uptake, from sensor networks and RFIDs to standardisation including energy scavenging.

The focus of this effort should be on the technology development and the build-up of technology infrastructure rather than exclusively on applications.

Specifically encouraged applications areas to be used as proof of concept and demonstration vehicles are: monitoring, tracking and traceability in areas that include environment, food quality, agriculture, logistics and public transport. Supporting technologies for solar energy exploration such as converters and energy storage; Electric power trains in vehicles; telemedicine solutions and tools for the early diagnostics of endemic and epidemic diseases.

Expected Impact

- Closer cooperation between materials, equipment and component suppliers, integrators, manufacturing plants and institutes on both sides of the Atlantic. Strong involvement of industry participants interacting closely with research organisations and users.
- Increased knowledge and skills at the frontier of smart component and smart systems integration, increased efficiency and effectiveness of smart components and smart systems engineering contributing to the competitiveness of the European industry involved, increased attractiveness to investments and putting research organisations in leading positions

- Contributing to environment protection through smart solutions for energy management and distribution, smart control of electrical drives, smart logistics or energy-efficient facility management

Topic 2: Control Systems

Target Outcomes

Engineering of Networked Monitoring and Control Systems, emphasising the engineering challenges associated with networked cooperative embedded and control elements, including WSNs-Wireless Sensor Networks, for monitoring and control of complex large-scale systems with a view to improve system efficiency in terms of energy and raw materials.

Challenges to be addressed include, but are not limited to, scalability, self-configuration, availability, self-healing, context awareness, including location awareness, reconfigurability, adaptability, networking in harsh environments, mix of real-time, quasi-real-time and non-real-time constraints and optimisation taking into consideration price signals, plus associated programming development as well as operations and management tools and platforms.

Expected Impact

- Closer cooperation between materials, equipment and component suppliers, integrators, manufacturing plants and institutes on both sides of the Atlantic. Strong involvement of industry participants interacting closely with research organisations and users.
- Increased knowledge and skills at the frontier of smart component and smart systems integration, increased efficiency and effectiveness of smart components and smart systems engineering contributing to the competitiveness of the European industry involved, increased attractiveness to investments and putting research organisations in leading positions
- Contributing to environment protection through smart solutions for energy management and distribution, smart control of electrical drives, smart logistics or energy-efficient facility management

Topic 3: Future Internet - experimental facilities

Target Outcomes

A shared experimental communication infrastructure, at large scale, supporting access to mobile and/or wireless technologies, interconnected or federated with existing FIRE/Future Internet infrastructures. These flexible network experimental facilities can be based on the integration of a large-scale optical transport network with a variety of access technologies, including wireless. The testing of the interconnection and interoperability may include, as experience pilots, the development and test of concrete advanced applications and services of public utility, in target areas such as: education, telemedicine, environmental and climate monitoring, applications supporting biodiversity.

The underlying emerging technologies and research areas to be considered and investigated should be the most suitable for this kind of developments, e.g. network virtualization, delay-tolerant networks, opportunistic communications, people-centred and content-centred routing / naming / addressing schemes.

The developments should be based on open standards with open Application Programming Interfaces, such as Openflow or InterCloud communications, and consider existing activities (e.g. Onelab, Federica, Panlab, ORBIT-OMF).

Expected Impact

Creating a large-scale experimental facility for Future Internet research in Brazil, involving the Brazilian network research community and associated industry, federated with similar facilities in Europe, to lower entry barriers and promote competition in the development and experimental validation of proposals for new network architectures, services and applications of public utility.

Topic 4: Future Internet - security

Security and trust are important conditions for ensuring the wider use of ICT and countering the "Digital Divide". There are two complementary and timely initiatives taking place in Europe and Brazil: The Future Internet Assembly and the provision of broadband access to digital information, which aim to maximise uptake of valued trustworthy services for citizens the Information Society.

Target Outcomes

In order to deliver an environment that can guarantee digital inclusion for all citizens, independent of their educational, cultural and economic environment, the following challenges must be addressed in an integrated manner:

1. The development of trusted communications infrastructures providing consistent user access to services independent of cost, location, service type, access device. Addressing control and security of personal data, device independent access, user profile management, ensure same quality of experience irrespective of chosen access device, quality of service and accessibility are import element of this challenge.
2. The development of application service environment(s) providing secure and consistent access to functionality irrespective of access device, access network and service provider network. Issues associated with citizen data management and handling such as access, storage, protection and accountability are key elements of this challenge
3. Personalisation, usability and accessibility regardless of educational and technical background is key to citizen empowerment. Addressing the issues of trust and security up front are necessary for the successful acceptance and uptake of the digital inclusion environments. Citizens will benefit from these environments; however, in order to use them, they will need to trust them without undue technical burdens and they must satisfy citizens needs and circumstances.

The wrapping of these key research topics with the required Trust and Security is one of the most important challenges of this new communications environment. The level of engagement within this environment will be highly dependant on the level of security provided.

Expected Impact

Creating an environment for digital inclusion with globally relevant solutions that are trusted by citizens and that incorporate technological, social and legal requirements.

Topic 5: Future Internet - e-Infrastructures

Target Outcomes

An e-Infrastructure enabling collaboration on taxonomy and virtual & remote instrumentation, with particular emphasis on biodiversity and climatology. More specifically, R&D should address:

- Open Source platforms and organisational structures in support of geographically dispersed scientific communities cooperating on biodiversity informatics and taxonomy. This should

allow the creation of Open Source Taxonomy platforms both as enablers of biodiversity collaborative research and as educational environments.

- Remote operation of scientific instruments and virtual observatories that take advantage of Brazil's geographical position and climatic conditions (e.g. in astronomy and climate research). Integrated and easy to use interfaces should be created to provide scientists with seamless access to the infrastructure (e.g. to data pools, electronic publication of the biodiversity-taxonomic data, data curation tools, networking collaboration tools, etc.).

- Simulation and visualization tools and storage of results for later reuse.

Expected Impact

The creation of a state of the art e-Infrastructure which exploits the computational and data resources on both sides, enabling the EU and Brazil to address grand challenges in science and society. Bringing together the taxonomy and Open Source communities will facilitate the former to progress towards Open Science, Access and management in various scientific fields.

Funding schemes

STREP

Indicative budget distribution

EUR 5 million

Call:

ICT Call 7

Objective ICT-2009.10.2 EU-Russia Research and Development cooperation

[text still under development]

Target outcomes

(a) Programming Models and Runtime Support

Programming models to address programmability and portability issues for multicore and accelerator based systems. Work should focus on developing or selecting specifications of generic and portable programming models (e.g. via languages, directives or library APIs) and provide implementations (compilers and runtime support libraries) on heterogeneous multicore and accelerator based nodes. The models should address the integration issues between system level and node level models in hybrid programming styles as well as compatibility between different low level devices (GPUs, FPGAs,...). This includes flexible and efficient mechanisms for synchronization and locality handling. Efforts to evaluate the developed environments in comparison to other alternatives would be desirable.

(b) Performance Analysis Tools for High-Performance Computing

Portable and efficient performance measurement, analysis, and modeling tools to support hybrid programming (e.g., mixed MPI/OpenMP/Accelerator) both on homogeneous and heterogeneous multicore hardware architectures and accelerators including GPUs and FPGAs. Tools should be targeted towards abstract characterisations of the performance of applications

hiding the user from the specifics of a given hardware platform from the whole system down to the level of separate low-level units.

(c) Optimisation, Scalability and Porting of Codes

Optimisation and scaling of application codes to thousands of cores including porting of codes to new (heterogeneous or homogeneous) multicore hardware architectures, using advanced methods, technologies, and tools. Examples include: use of new methods for mesh generation, new solver parallelisation, various forms of task and data parallelisation, utilization of specific accelerators, including GPU and FPGA. Scientific computing domains and application domains are focused on, but not limited to: CFD, molecular dynamics, electromagnetic, biology, seismic signal processing and remote sensing.

Expected impact

- For (a):
    - Improved understanding of the advantages/disadvantages/applicability of programming models.
    - Improved programmability of parallel computing systems.
- For (b):
    - The state-of-the-art in hybrid parallel programming methodologies should be significantly advanced.
    - Development of tools to support mixed-mode programming and programming of heterogeneous architectures.
- For (c):
    - The state-of-the-art in optimisation and scalability methodologies should be significantly advanced. Effective measurements of improved performance and comparison between various types of parallelisation will be valuable.
    - Porting of codes to bigger number of cores
- For (a), (b) and (c): Increased cooperation between EU and Russian organisations.

Funding Schemes

STREP (1 project per topic)

Indicative budget breakdown

EUR 4 million

Call: INCO Russia

Objective ICT-2011.10.3 : International partnership building and support to dialogues

Target outcome

a) Support to dialogues with strategic partner countries[41] and regions[42], to create cooperative research links between European organisations and partners in third countries

The aim is to support dialogues between the European Commission and strategic partner countries and regions, and to increase cooperation with strategic third countries and third country organisations in collaborative ICT R&D both within FP7 and under third country programmes. This could include in particular:

- the identification and analysis of ICT research priorities in third countries, and the provision of recommendations for future co-operation initiatives, including e.g. coordinated calls, and the facilitation of access of European organisations to third country programmes,
- the organisation of events synchronised with dialogue meetings, providing input and follow-up for example on common R&D priorities, opportunities and challenges,
- the strengthening of cooperative research links between European organisations and relevant organisations in third countries, with the aim of establishing strategic partnerships,

Targeted countries/regions: ACP, Asia, Eastern Europe and Central Asia, High Income Countries, Latin America, Mediterranean Partner Countries and West Balkan Countries.

b) Enable Partnership building in low and middle income countries

The aim is to leapfrog from traditional promotion support action projects and launch a set of targeted research projects (STREP/SICAs) addressing at the same time technology and business model innovations. Specific technological targets could include for example low-cost technologies, intuitive user interfaces and local content provisioning.

Targeted countries: Low and middle income countries[43]., including Africa

Expected impact

- Reinforcement of strategic partnerships with selected countries and regions in areas of mutual interest and added value in jointly addressing important issues.

- Reinforced international dimension of the EU ICT research programme and higher level of international cooperation with low and middle income countries in ICT R&D with a focus on areas where the EU has a comparative advantage and where there are new leadership opportunities for Europe.

Activities under this objective should be covered in balanced partnership with relevant third country organisations. Consortia are strongly encouraged to include, as appropriate, leading research centres/universities, relevant industry representation, third country multipliers (e.g. national research authorities/agencies), communication specialists and/or experienced market research organisations.

[41] Information Society Dialogues with USA, Japan, BRIC countries. and Meetings under S&T Agreements with third countries.

[42] Namely within the context of Regional Fora such as ASEM, EUROMED and EU-LAC.

[43] See World Bank country classification.

Funding schemes

Part a) CSA (Support Actions)

Part b) STREP/SICA

Indicative budget distribution

Total 6 M€, of which 4 M€ for part a) in ICT Call 7; 2 M€ for part b) in ICT Call 9.

Calls

ICT Call 7; ICT Call 9

6.11 Horizontal Actions

Objective ICT-2011.11.1 Pre-Commercial Procurement Coordination Actions

The objective is to strengthen networking and cooperation of public bodies in Europe active in the implementation of Pre-Commercial Procurement[44] (PCP), in view of establishing joint PCP calls for tender on topics of common European interest.

The minimum number of participants is three independent legal entities which are public bodies preparing for or already experienced in the implementation of PCP. Each of these must be established in a different Member or Associated States.

Eligible public bodies are:

- Public purchasers, i.e. contracting agencies in the meaning of the public procurement Directives[45] at all levels (local, regional, national and supra-national) that plan to incorporate PCP in their public procurement programmes
- Public authorities (e.g. those managing research and innovation programmes) that have plans to co-organise and/or co-finance with, or to provide financial incentives to, public purchasers to undertake PCP.

Other stakeholders in the implementation of PCP may participate in addition, if their participation is well justified an adds value to the action.

Consortia shall demonstrate that they represent the necessary critical mass of public purchasers to trigger wide implementation of the solutions that will be specified and/or developed during the action with clear financial commitments. Actions shall cover the full PCP life cycle of solution design, prototyping, and original development of a limited volume of products/services in the form of a test series. In order to have a lasting impact, the co-operation developed during the actions should also provide reliable indications that it could continue beyond the EU funding.

This Objective complements the support to PCP actions under the Objectives 5.3, 5.4 and 3.5 and is open to all areas that correspond to public sector needs: for example for new ICT solutions in healthcare, inclusion, e-government, transport, energy, environment, security.

Target outcome

Actions shall cover one or more of the following levels of cooperation:

[44] See COM(2007)799 and SEC(2007)1668.
[45] 2004/18/EC and 2004/17/EC.

(1) Networking and coordination activities

This may include activities required to prepare for a PCP strategy as well as activities to coordinate the implementation of a transnational PCP, such as :

- Awareness raising and exchange of experiences on PCP
- Definition of mid-to-long term procurement plans and identification of elements thereof requiring new R&D that could be procured in cooperation through PCP
- Definition of an action plan, which sets out common strategic issues and prepares for concrete implementation of joint PCP activities
- Allocation and training of additional resources in public bodies to develop a PCP implementation strategy
- Building cooperation with other stakeholders (e.g. other public purchasers, bodies responsible for R&D and innovation programmes etc)

Actions are encouraged to try to develop and implement, from an early stage, common, joint, strategic PCP activities – even if in a pilot form - such as:

- Definition of joint specifications for a joint PCP call for tender and joint contribution to standardisation bodies (based on joint solution requirements)
- Establishing and implementing good practice procedures for multinational PCP evaluation and monitoring (common evaluation criteria and implementation methods)
- Development of personnel exchange and joint training activities on PCP to help support a wider cooperation between public purchasers across Europe
- Specific cooperation agreements or arrangements between participants to prepare the ground for further trans-national PCP projects or programmes and ensure that potential legal obstacles are removed

(2) Implementation of joint PCP call for tenders

- Financing and implementation of a joint trans-national PCP pilot action or programme

  Different constellations for joint procurement[46] are allowed, such as common procurement entity[47] and lead authority[48] constellations. A common mechanism, including a common set of selection/award criteria, for evaluating the offers submitted to the joint PCP call for tender shall be foreseen. Detailed rules for companies to participate in the financed projects shall be defined by the public purchasers. The call organisers shall organise the PCP while respecting the Treaty principles and the specific requirements in Appendix 8.

  Actions that cover financing and implementation of a joint trans-national PCP pilot action or programme involve the award of PCP contracts to third parties participating in the PCP call for tender of the joint PCP Action. For these cases, a financial incentive is provided, i.e. the EU contribution shall take the form of a grant that will combine the reimbursement of eligible costs for the activities linked to the preparation and coordination of the joint PCP call for tender (activities under target outcome (1)) plus a reimbursement of maximum 50% of costs related to the financing of the R&D to be performed by selected tenderers participating in the PCP (for activities under target outcome (2)).

[46] "Joint procurement" means combining the procurement actions of two or more contracting authorities. The key defining characteristic is that there should be only one tender published on behalf of all participating authorities.

[47] The "common procurement entity" constellation is an arrangement for joint procurement where all involved public purchasing authorities commonly establish or designate one external legal entity to conduct the joint procurement with a joint mandate and joint resources of all public purchasing authorities.

[48] The "lead authority" constellation is an arrangement for joint procurement where a group of public purchasing authorities collaborate through their existing purchasing departments in such a way that one public purchasing authority of the group is designated as lead authority to take responsibility for sourcing markets, tendering and arranging contractual documentation for specific procurements, all in consultation with other purchasing authorities involved in the joint procurement.

Expected Impact

- More forward-looking, concerted, public sector approach to societal challenges
- Cooperation between stakeholders across public sector departmental boundaries to develop common answers to societal challenges faced by the public sector across a number of EU Member or Associated States
- Reduced fragmentation of public sector demand by enabling public bodies to collectively implement PCP strategies in areas, which due to their nature are better addressed jointly, or which they would not have been able to tackle independently.
- Increased opportunities for wide market uptake and economies of scale for the supply side by forming critical mass on the public demand side, wide publication of results of cross border PCP activities and contribution to standardisation of jointly defined public sector PCP solution requirements specifications.

Funding Scheme

CSA (for actions covering only target outcome (1))
CP-CSA (for actions covering target outcome (1) and (2))

Indicative budget distribution

EUR 5 million

Call

ICT Call TBC

Objective ICT-2011.11.2 Trans-national co-operation among National Contact Points

Target outcome

Reinforcing the network of National Contact Points (NCP) for ICT under FP7 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 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/coordinated 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 or enable the active participation of all NCPs 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. Proposals from other organisations in the EU and Associated States 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 (CA only)

Indicative budget distribution

EUR 4 million

Call

FP7-ICT-2011-7

Objective ICT-2011.11.3: Supplements to Strengthen Cooperation in ICT R&D in an Enlarged European Union

Target outcome

The target is to reinforce the cooperation across the enlarged European Union and to strengthen the integration of the European Research Area in ICT.

Integration is characterized by the level of collaboration between relevant organizations within the Member and Associated States and by the appropriate Community dimension brought into the proposed research results and solutions.

In view of reaching the above target, support will go to the participation of additional partners in on-going FP7/ICT projects with the aim to increase the level of expertise, broaden the scope and/or speed up developments.

Proposals must be presented by the coordinator of the on-going project. In order to ensure the widest impact across the Member and Associated States and European Research Area, the additional partners must be located in countries not already present in the existing consortium. The funding requested should represent a reasonable extension of the on-going project to achieve the goals of the objective; not exceeding 30% of the Commission funding of the existing project or EUR 1 million, whichever is the lower.

Expected Impact

- Reinforced cooperation and better exploitation of ICT R&D synergies across the enlarged European Union.
- Wider participation in Community-supported ICT research projects across all Member States.

- Paving the way for strategic partnerships in view of gaining access to knowledge, developing standards and interoperable solutions and strengthening European competitiveness.

Funding scheme

Additional funding to on-going FP7 ICT IP and STREP projects ending after XX.

Indicative budget distribution

EUR 10 million

Call

FP7-ICT-2011-7

7 Implementation of calls

	WP 11-12	PPP 2011 (FI, GC, EEB, FoF)+ JC Br/Ru	Call 7 + 4.1 SME + FET/SSH*	Call 8 + PPP 2012 (GC, EEB, FoF)	Call 9	PPP 2012 (FI)	FET Open
1. Pervasive and Trusted Network and Service Infrastructure	**625**						
1.1 Future Networks	**160**			160			
1.2 Cloud Computing, Internet of Services and Advanced Software Engineering	**70**			70			
1.3 Internet-connected Objects	**30**		30				
1.4 Trustworthy ICT	**80**			80			
1.5 Networked Media & Search Systems	**70**		70				
1.6 Future Internet Research and Experimentation (FIRE)	**45**		20	25			
1.7 PPP FI: Technology foundation - Future Internet Core Platform	**40**	40					
1.8 PPP FI: Use Case scenarios and pilots	**105**	40				65	
1.9 PPP FI: Capacity Building and Infrastructure Support	**15**	3				12	
1.10 PPP FI: Programme Management and Support	**10**	10					
2. Cognitive Systems and Robotics	**155**						
2.1 Cognitive Systems and Robotics	**155**		73		82		
3. Alternative Paths to Components and Systems	**401,5**						
3.1 Very advanced nanoelectronic components: design, engineering, technology and manufacturability	**60**			60			
3.2 Smart components and smart systems integration	**80**		41	39			
3.3 New paradigms for embedded systems, monitoring and control towards complex systems engineering	**50**		50				
3.4 Computing Systems	**45**		45				
3.5 Core and disruptive photonic technologies	**116.5**		25	91.5			
3.6 Flexible, Organic and Large Area Electronics and Photonics	**50**		50				
4. Technologies for Digital Content and Languages	**165**						
4.1 SME initiative on Digital Content and Languages	**35**		35				
4.2 Language Technologies	**50**		50				
4.3 Digital Preservation	**30**				30		
4.4 Intelligent Information Management	**50**			50			

5. ICT for Health, Ageing Well, Inclusion and Governance	**259**						
5.1 Personal Health Systems	**60**		60				
5.2 Virtual Physiological Human	**68**		1.5		66.5		
5.3 Patient Guidance Services (PGS), safety and healthcare record information reuse	**34,5**		34				
5.4 ICT for Ageing and Wellbeing	**36,5**		36				
5.5 ICT for smart and personalised inclusion	**35**		35				
5.6 ICT Solutions for governance and policy modelling	**25**		25				
6. ICT for a Low Carbon Economy	**280**						
6.1 Smart energy grids	**30**			30			
6.2 ICT systems for Energy Efficiency	**35**		35				
6.3 ICT for efficient water resources management	**15**			15			
6.4 PPP EEB: ICT for energy-efficient buildings and spaces of public use	**20**	20					
6.5: PPP EEB: ICT for energy-positive neighbourhoods	**30**			30			
6.6 Low-carbon multi-modal mobility and freight transport	**50**		50				
6.7 Cooperative systems for energy efficient and sustainable mobility	**40**			40			
6.8 PPP GC: ICT for fully electric vehicles	**60**	30		30			
7. ICT for the Enterprise and Manufacturing	**140**						
7.1 PPP FoF: Smart factories: energy-aware, agile manufacturing and customisation	**40**			40			
7.2 PPP FoF: Manufacturing Solutions for new ICT products	**20**			20			
7.3 PPP FoF: Virtual factories and enterprises	**45**	45					
7.4 PPP FoF: Digital factories: Manufacturing design and product lifecycle management	**35**	35					
8. ICT for Learning and Access to Cultural Resources	**100**						
8.1 Technology-Enhanced Learning	**60**			60			
8.2 ICT for access to cultural resources	**40**				40		
9. Future and Emerging Technologies	**260**						
FET-Open	**93**						
9.1 Challenging current Thinking	**75**						75
9.2 High-Tech Research Intensive SMEs in FET research	**9**						9
9.3 FET Young Explorers	**6**						6
9.4 International cooperation on FET research	**3**						3
FET-Proactive	**167**						
9.5 FET Flagship Initiative Preparatory Actions	**10**		10				
9.6 FET Proactive: Unconventional Computation (UCOMP)	**15**			15			
9.7 FET Proactive: Dynamics of Multy-Level Complex Systems	**23**			23			
9.8 FET Proactive: Minimising Energy Consumption of Computing to the Limit (MINCON)	**15**			15			
9.9 FET Proactive: Quantum ICT (QICT) including ERA-NET-Plus	**22**				22		
9.10 FET Proactive: Fundamentals of Collective Adaptive Systems (FOCAS)	**23**				23		
9.11 FET Proactive: Neuro-Bio-Inspired Systems (NBIS)	**23**				23		
9.12 Coordinating Communities, Identifying new research topics for FET Proactive initiatives and Fostering Networking of National and Regional Research Programmes	**8,5**		3	3	2.5		
9.13 Exa-scale computing, software and simulation	**25**		25				
9.14 Joint Call ICT-SSH on 'Science of Global Systems'	**2,5**		2.5				
10. International Cooperation	**15**						
10.1 EU-Brazil Research and Development Cooperation	**5**	5					
10.2 EU-Russia Research and Development Cooperation	**4**	4					
10.3 International Partnership building and support to dialogues	**6**		4		2		
11. Horizontal Actions	**19**						
11.1 Pre-Commercial Procurement Coordination Actions	**5**		5				
11.2 National Contact Points	**4**		4				

11.3 Strengthening Cooperation in ICT R&D in an Enlarged Europe	**10**		10				
Total	**2418,5**	232	829	896,5	291	77	93

***** *Objective 4.1 and Joint Call SSH called on XXX*

Other expenditures

TBC

The International Human Frontier Science Programme Organisation

TBC

IMS Secretariat

TBC

ICT Contribution to General FP7 Activities

TBC

Other contributions

TBC

Call title: ICT call 7

- Call identifier: FP7-ICT-2011-7
- Date of publication: 28 September 2010
- Deadline: 18 January 2011, at 17:00.00 Brussels local time
- Indicative budget: EUR 812.5 million

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Challenge	Objectives	Funding schemes
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	ICT 2011.1.3 Internet-connected Objects	IP/STREP, CSA
	ICT 2011.1.5 Networked Media and Search Systems	IP, STREP, CSA
	ICT 20011.1.6 Future Internet Research and Experimentation (FIRE) (a),(d)	IP, NoE
Challenge 2: Cognitive systems	ICT 2011.2.1 Cognitive	IP/STREP, CSA

and robotics	Systems and Robotics (a), (d)	
Challenge 3: Alternative Paths to Components and Systems	ICT 2011.3.2 Smart components and smart systems integration (a), (c)	IP/STREP, CSA
	ICT 2011.3.3 New paradigms for embedded systems, monitoring and control towards complex systems engineering	IP/STREP, CSA
	ICT 2011.3.4 Computing Systems	STREP, NoE, CSA
	ICT 2011.3.5 Core and disruptive photonic technologies (b), (e)	STREP, CSA
	ICT 2011.3.6 Flexible, Organic and Large Area Electronics and Photonics	IP/STREP, ERA-NET Plus, CSA
Challenge 4: Technologies for Digital Content and Languages	ICT 2011.4.2 Language Technologies	IP/STREP, CSA
Challenge 5: ICT for Health, Ageing Well, Inclusion and Governance	ICT 2011.5.1 Personal Health Systems	IP/STREP, CSA
	ICT 2011.5.2 Virtual Physiological Human (c)	CSA
	ICT 2011.5.3: Patient Guidance Services (PGS), safety and healthcare record information reuse	IP/STREP, NoE, CP-CSA
	ICT 2011.5.4 ICT for Ageing and Wellbeing	IP/STREP, CSA, CP-CSA
	ICT 2011.5.5 ICT for smart and personalised inclusion	IP/STREP, CSA
	ICT 2011.5.6 ICT Solutions for governance and policy modelling	IP/STREP, CSA
Challenge 6: ICT for a Low Carbon Economy	ICT 2011.6.2 ICT systems for Energy Efficiency	IP/STREP, CSA
	ICT 2011.6.6 Low-carbon multi-modal mobility and freight transport	IP/STREP, CSA
Challenge 9: Future and Emerging Technologies	ICT 2011.9.5 FET Flagship Initiative Preparatory Actions	CSA
	ICT 2011.9.12 Coordinating Communities, Identifying new research topics for FET Proactive initiatives and Fostering Networking of National and Regional Research Programmes (c), (d), (e)	CSA

	ICT 2011.9.13 Exa-scale computing, software and simulation	IP, CSA
Challenge 10: International Cooperation	ICT 2011.10.3 International Partnership building and support to dialogues (a)	CSA
Challenge 11: Horizontal Actions	ICT 2011.11.1 Pre-Commercial Procurement Coordination Actions	CSA-CSA
	ICT 2011.11.2 Trans-national co-operation among National Contact Points	CSA
	ICT 2011.11.3 Supplements to Strengthen Cooperation in ICT R&D in an Enlarged European Union	IP, STREP

- Eligibility conditions:

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

  The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country. .

- Evaluation procedure:
  - A one-stage submission procedure will be followed.
  - The evaluation criteria and sub-criteria (including weights and thresholds), together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to the Cooperation work programme.

  Proposal submission must be made by means of the European Commission's Electronic Proposal Submission Service (EPSS) on or before the published deadline. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- Indicative evaluation and contractual timetable: It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.
- Consortia agreements: Participants in all actions resulting from this call are required to conclude a consortium agreement.
- The forms of grant which will be offered are specified in Annex 3 to the Cooperation work programme.

Call title: ICT call 8

- Call identifier: FP7-ICT-2011-8
- Date of publication: 26 July 2011
- Deadline: 17 January 2012, at 17:00.00 Brussels local time
- Indicative budget: EUR 906,5 million

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Challenge	Objectives	Funding schemes
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	ICT 2011.1.1 Future Networks	IP/STREP, NOE, CSA
	ICT 20011.1.2 Cloud Computing, Internet of Services and Advanced Software Engineering	IP/STREP, CSA
	ICT 20011.1.4 Trustworthy ICT	IP/STREP, NoE, CSA
	ICT 20011.1.6 Future Internet Research and Experimentation (FIRE) (b), (c), (e)	IP, NOE
Challenge 3: Alternative Paths to Components and Systems	ICT 2011.3.1 Very advanced nanoelectronic components: design, engineering, technology and manufacturability	IP/STREP, CSA
	ICT 2011.3.2 Smart components and smart systems integration (b)	IP/STREP
	ICT 2011.3.5 Core and disruptive photonic technologies (a), (c), (d)	IP, STREP, ERA-NET Plus, CP-CSA
Challenge 4: Technologies for Digital Content and Languages	ICT 2011.4.4 Intelligent Information Management	IP/STREP, CSA
Challenge 6: ICT for a Low Carbon Economy	ICT 2011.6.1 Smart energy grids	IP/STREP, CSA
	ICT 2011.6.3 ICT for efficient water resources management	STREP
	ICT 2011.6.5 ICT for energy-positive neighbourhoods	IP/STREP
	ICT 2011.6.7 Cooperative systems for energy efficient and sustainable	IP/STREP, CSA

	mobility	
	ICT 2011.6.8 ICT for fully electric vehicles	STREP
Challenge 7: ICT for the Enterprise an Manufacturing	ICT 2011.7.2 Manufacturing Solutions for new ICT products	IP
Challenge 8: ICT for Learning and Ac to Cultural Resources	ICT 2011.8.1 Technology-Enhanced Learning	IP/STREP, NoE/CSA
Challenge 9: Future and Emerging Technologies	ICT 2011.9.6 FET Proactive: Unconventional Computation (UCOMP)	STREP
	ICT 2011.9.7 FET Proactive: Dynamics of Multy-Level Complex Systems	IP/STREP, CSA
	ICT 2011.9.8 FET Proactive: Minimising Energy Consumption of Computing to the Limit (MINCON)	STREP
	ICT 2011.9.12 Coordinating Communities, Identifying new research topics for FET Proactive initiatives and Fostering Networking of National and Regional Research Programmes (a), (b), (c), (d)	CSA

- Eligibility conditions:

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

  The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country. .

- Evaluation procedure:
  - A one-stage submission procedure will be followed.

– The evaluation criteria and sub-criteria (including weights and thresholds), together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to the Cooperation work programme.

Proposal submission must be made by means of the European Commission's Electronic Proposal Submission Service (EPSS) on or before the published deadline. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- Indicative evaluation and contractual timetable: It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.
- Consortia agreements: Participants in all actions resulting from this call are required to conclude a consortium agreement.
- The forms of grant which will be offered are specified in Annex 3 to the Cooperation work programme.

Call title: ICT call 9

- Call identifier: FP7-ICT-2011-9
- Date of publication: 18 November 2011
- Deadline: 17 April 2012, at 17:00.00 Brussels local time
- Indicative budget: EUR 291 million

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Challenge	Objectives	Funding schemes
Challenge 2: Cognitive systems and robotics	ICT 2011.2.1 Cognitive Systems and Robotics (b), (c), (e)	IP/STREP, CSA
Challenge 4: Technologies for Digital Content and Languages	ICT 2011.4.3 Digital Preservation	IP/STREP, NoE, CSA
	ICT 2011.4.4 Intelligent Information Management	IP/STREP, CSA
Challenge 5: ICT for Health, Ageing Well, Inclusion and Governance	ICT 2011.5.2 Virtual Physiological Human (a), (b), (d)	IP/STREP
Challenge 8: ICT for Learning and Access to Cultural Resources	ICT 2011.8.2 ICT for access to cultural resources	IP/STREP, CSA
Challenge 9: Future and Emerging Technologies	ICT 2011.9.9 FET Proactive: Quantum ICT (QICT) including ERA-NET-Plus	IP/STREP, ERA-NET Plus
	ICT 2011.9.10 FET Proactive: Fundamentals of Collective Adaptive Systems (FOCAS	IP,STREP

	ICT 2011.9.11 FET Proactive: Neuro-Bio-Inspired Systems (NBIS)	IP/STREP, CSA
	ICT 2011.9.12 Coordinating Communities, Identifying new research topics for FET Proactive initiatives and Fostering Networking of National and Regional Research Programmes (a), (b), (c), (d)	CSA
Challenge 10: International Cooperation	ICT 2011.10.3 International Partnership building and support to dialogues (b)	STREP/SICA

- Eligibility conditions:

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

  The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country. .

- Evaluation procedure:
  - A one-stage submission procedure will be followed.
  - The evaluation criteria and sub-criteria (including weights and thresholds), together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to the Cooperation work programme.

  Proposal submission must be made by means of the European Commission's Electronic Proposal Submission Service (EPSS) on or before the published deadline. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- Indicative evaluation and contractual timetable: It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.
- Consortia agreements: Participants in all actions resulting from this call are required to conclude a consortium agreement.
- The forms of grant which will be offered are specified in Annex 3 to the Cooperation work programme.

Public-Private Partnership "Factories of the Future" - Cross thematic cooperation between NMP and ICT

Call title: "Factories of the Future"-2011

Draft to be finalised

- Call identifier: FP7-2011-NMP-ICT-FoF
- Date of publication: 30 July 2010[49]
- Deadline: 2 December 2010[50] at 17.00.00 (Brussels local time).
- Indicative budget[51] [52]: EUR XX million from the 2011 budget of which:

  - EUR XX million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies

  - EUR 80 million from Theme 3 – Information and Communication Technologies (ICT)

- **Topics called:**

Each Theme will remain responsible for its own budget and for the implementation of the respective call topics. This includes drawing up ranking lists and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

Activity/ Area	Topics called	Funding Schemes	Budget
NMP – Nanosciences, nanotechnologies, Materials and new Production			
TBC			
ICT – Information and Communication Technologies			
FoF.ICT.2011.7-3	PPP FoF: Virtual factories and enterprises	IP, STREP	45

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

[50] The Director-General responsible may delay this deadline by up to two months

[51] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

[52] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority

FoF.ICT.2011.7-4	PPP FoF: Digital factories: Manufacturing design and product lifecycle management	IP, STREP, CSA	35

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and support actions : the minimum conditions shall be :

- Coordination and support actions - ***coordinating actions:*** at least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same Member State or Associated Country;

- Coordination and support actions **–** ***supporting actions:*** at least 1 independent legal entity.

For topic FoF.ICT.2010.10-1, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects, where applicable; CA or SA for Coordination and support actions). See Appendix 2 of the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

See also Annex 2: Eligibility, Evaluation criteria for proposals and priority order for proposals with the same score[53].

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable**:

Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs**[54]:

For topics FoF.NMP.2010-1, FoF.NMP.2010-2, FoF.NMP.2010-3 and in accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under *'Guidance documents/Flat rates for daily allowances*'.

Public-Private Partnership "Factories of the Future" - Cross thematic cooperation between NMP and ICT

Call title: "Factories of the Future"-2012

Draft to be finalised

- Call identifier: FP7-2012-NMP-ICT-FoF
- Date of publication: 30 July 2011[55]

[53] For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

[54] Not applicable to ICT Theme

- Deadline: 2 December 2011[56] at 17.00.00 (Brussels local time).
- Indicative budget[57] [58]: EUR XX million from the 2012 budget of which:

  - EUR XX million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies

  - EUR 60 million from Theme 3 – Information and Communication Technologies (ICT)

- **Topics called:**

Each Theme will remain responsible for its own budget and for the implementation of the respective call topics. This includes drawing up ranking lists and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

Activity/ Area	Topics called	Funding Schemes	Budget
NMP – Nanosciences, nanotechnologies, Materials and new Production			
TBC			
ICT – Information and Communication Technologies			
FoF.ICT.2012.7-1	**Smart factories: energy-aware, agile manufacturing and customisation**	IP, STREP	40
FoF.ICT.2012.7-2	**Manufacturing Solutions for new ICT products**	IP	20

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

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

[56] The Director-General responsible may delay this deadline by up to two months

[57] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

[58] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and support actions : the minimum conditions shall be :

- Coordination and support actions - ***coordinating actions:*** at least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same Member State or Associated Country;

- Coordination and support actions **–** ***supporting actions:*** at least 1 independent legal entity.

For topic FoF.ICT.2010.10-1, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects, where applicable; CA or SA for Coordination and support actions). See Appendix 2 of the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

See also Annex 2: Eligibility, Evaluation criteria for proposals and priority order for proposals with the same score[59].

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

[59] For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable**:

Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs**[60]:

For topics FoF.NMP.2010-1, FoF.NMP.2010-2, FoF.NMP.2010-3 and in accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under *'Guidance documents/Flat rates for daily allowances*'.

Public-Private Partnership "Energy-efficient Buildings" - Cross thematic cooperation between NMP, ICT, ENERGY, ENVIRONMENT (including climate change)

Call title: "Energy-efficient Buildings"-2011

Draft to be finalised

- Call identifier: FP7-2011-NMP-ENV-ENERGY-ICT-EeB
- Date of publication: 30 July 2010[61]
- Deadline: 2 December 2010[62] at 17.00.00 (Brussels local time).
- Indicative budget[63] [64]: EUR XX million from the 2011 budget of which:

  - EUR XX million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies

[60] Not applicable to ICT Theme
[61] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication
[62] The Director-General responsible may delay this deadline by up to two months
[63] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

[64] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority

- EUR 20 million from Theme 3 – Information and Communication Technologies (ICT)
- EUR XX million from Theme 5 – Energy
- EUR XX million from Theme 6 – Environment (including Climate Change)

- **Topics called:**

Each Theme will remain responsible for its own budget and for the implementation. of the respective call topics. This includes drawing up ranking lists and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

Activity/ Area	Topics called	Funding scheme	Budget
NMP – Nanosciences, nanotechnologies, Materials and new Production			
TBC			
Environment (including Climate Change)			
TBC			
Energy			
TBC			
ICT – Information and Communication Technologies			
EeB.ICT.2011.6-4	PPP EEB: ICT for energy-efficient buildings and spaces of public use	STREP, CSA	20

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and support actions, the minimum conditions shall be:

- Coordination and support actions - ***coordinating actions:*** at least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same MS or AC;

- Coordination and support actions **–** ***supporting actions:*** at least 1 independent legal entity.

For topic EeB.ENV.2010.3.2.4-1, the requested Community contribution must not be greater than EUR 5 000 000.

For topic EeB.ICT.2010.6-4, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects, where applicable; CA or SA for Coordination and support actions). See Appendix 2 of the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

See also Annex 2: Eligibility and evaluation criteria for proposals and priority order for proposals with the same score[65].

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

[65] For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Indicative evaluation and contractual timetable**:

Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

For topic EeB.ENERGY.2010.8.1-2, the following applies:

- Successful proposals will be asked to follow a common monitoring data structure, using a common methodology, in order to feed the relevant Commission data bases (e.g. CONCERTO data base).
- The form of grant applied in area 8.1.2. 'Energy efficiency in Buildings' is based on additional energy efficiency measures in buildings. The grant will be composed of a combination of:
- the typical reimbursement of eligible costs, and
- flat rate financing determined on the basis of scale of unit costs only for the demonstration part of the buildings.
- The scale of unit cost of Community financial contribution is fixed to EUR 100 /m² eligible costs and thus EUR 50 /m² Community contribution.
- The eligible cost per building used in the projects are fixed costs.
- The total of Community financial contribution based on scale of unit costs may not exceed EUR 6 million for one demonstration site.
- The evaluation of the proposals will also take into account the degree of excellence and innovation of the technology used and the most cost effective practices (euros/efficiency gain; euros/CO_2 reduction, kWh/m²/year saved). For this reason, the above figures should be indicated in the proposal.

- **Use of flat rates for subsistence costs**[66]:

For topics EeB.NMP.2010-1, EeB.NMP.2010-2, EeB.ENV.2010.3.2.4-1, EeB.ENERGY.2010.8.1-2 and in accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under *'Guidance documents/Flat rates for daily allowances*'.

Public-Private Partnership "Energy-efficient Buildings" - Cross thematic cooperation between NMP, ICT, ENERGY, ENVIRONMENT (including climate change)

[66] Not applicable to ICT Theme

Call title: "Energy-efficient Buildings"-2012

Draft to be finalised

- Call identifier: FP7-2012-NMP-ENV-ENERGY-ICT-EeB
- Date of publication: 30 July 2011[67]
- Deadline: 2 December 2011[68] at 17.00.00 (Brussels local time).
- Indicative budget[69] [70]: EUR XX million from the 2012 budget of which:

  - EUR XX million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies

  - EUR 30 million from Theme 3 – Information and Communication Technologies (ICT)

  - EUR XX million from Theme 5 – Energy

  - EUR XX million from Theme 6 – Environment (including Climate Change)

- **Topics called:**

Each Theme will remain responsible for its own budget and for the implementation. of the respective call topics. This includes drawing up ranking lists and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

Activity/ Area	Topics called	Funding scheme	Budget
NMP – Nanosciences, nanotechnologies, Materials and new Production			
TBC			
Environment (including Climate Change)			
TBC			

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

[68] The Director-General responsible may delay this deadline by up to two months

[69] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

[70] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority

Energy			
TBC			
ICT – Information and Communication Technologies			
EeB.ICT.2012.6-5	ICT for energy-positive neighbourhoods	IP, STREP	30

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and support actions, the minimum conditions shall be:

- Coordination and support actions - ***coordinating actions:*** at least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same MS or AC;

- Coordination and support actions **–** ***supporting actions:*** at least 1 independent legal entity.

For topic EeB.ENV.2010.3.2.4-1, the requested Community contribution must not be greater than EUR 5 000 000.

For topic EeB.ICT.2010.6-4, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects, where applicable; CA or SA for Coordination and support actions). See Appendix 2 of the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the

possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

See also Annex 2: Eligibility and evaluation criteria for proposals and priority order for proposals with the same score[71].

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable**:

Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

For topic EeB.ENERGY.2010.8.1-2, the following applies:

- Successful proposals will be asked to follow a common monitoring data structure, using a common methodology, in order to feed the relevant Commission data bases (e.g. CONCERTO data base).
- The form of grant applied in area 8.1.2. 'Energy efficiency in Buildings' is based on additional energy efficiency measures in buildings. The grant will be composed of a combination of:
- the typical reimbursement of eligible costs, and
- flat rate financing determined on the basis of scale of unit costs only for the demonstration part of the buildings.
- The scale of unit cost of Community financial contribution is fixed to EUR 100 /m² eligible costs and thus EUR 50 /m² Community contribution.
- The eligible cost per building used in the projects are fixed costs.

[71] For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- The total of Community financial contribution based on scale of unit costs may not exceed EUR 6 million for one demonstration site.
- The evaluation of the proposals will also take into account the degree of excellence and innovation of the technology used and the most cost effective practices (euros/efficiency gain; euros/CO_2 reduction, kWh/m²/year saved). For this reason, the above figures should be indicated in the proposal.

- **Use of flat rates for subsistence costs**[72]:

  For topics EeB.NMP.2010-1, EeB.NMP.2010-2, EeB.ENV.2010.3.2.4-1, EeB.ENERGY.2010.8.1-2 and in accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under *'Guidance documents/Flat rates for daily allowances*'.

Public-Private Partnership "Green Cars": Cross-Thematic cooperation between NMP, Energy, Environment, Transport and ICT Themes

Call title: "ICT for Green Cars"-2011

Draft to be finalised

Call identifier: FP7-2011-ICT-GC

- Date of publication[73]: 30 July 2010
- Deadline[74]: 2 December 2010 at 17.00.00 (Brussels local time)
- Indicative budget[75,76]: EUR 30 million

  See indicative budget breakdown in Section 5 of the ICT work programme.

- **Topics called:**

Activity/ Area	Objectives	Funding schemes[77]	Budget
ICT – Information and Communication Technologies			
GC.ICT.2010.6-8	PPP GC: ICT for fully electric vehicles (a,b,c,d)	STREP, CSA	30

[72] Not applicable to ICT Theme
[73] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[74] The Director-General responsible may delay this deadline by up to two months
[75] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

[76] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority
[77] Each proposal must indicate the type of funding scheme used (IP or STREP for CP, where applicable; CA or SA for CSA, where applicable – see Appendix 2)

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

  The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

- **Evaluation procedure:**

  A one-stage submission procedure will be followed.

  Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

  For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

  See also Annex 2: Eligibility and evaluation criteria for proposals and priority order for proposals with the same score.

  In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

  Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

  Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

  Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

  As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

  The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

Public-Private Partnership "Green Cars": Cross-Thematic cooperation between NMP, Energy, Environment, Transport and ICT Themes

Call title: "ICT for Green Cars"-2012

Draft to be finalised

Call identifier: FP7-2012-ICT-GC

- Date of publication[78]: 30 July 2011
- Deadline[79]: 2 December 2011 at 17.00.00 (Brussels local time)
- Indicative budget[80,81]: EUR 30 million

  See indicative budget breakdown in Section 5 of the ICT work programme.

- **Topics called:**

Activity/ Area	Objectives	Funding schemes[82]	Budget
ICT – Information and Communication Technologies			
GC.ICT.2010.6-8	PPP GC: ICT for fully electric vehicles (e,f,g,h)	STREP, CSA	30

An overview of all PPP-related topics is provided in Annex 5.

- **Eligibility conditions:**

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

[78] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[79] The Director-General responsible may delay this deadline by up to two months
[80] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

[81] Under the condition that the preliminary draft budget for 2010 is adopted without modification by the budgetary authority
[82] Each proposal must indicate the type of funding scheme used (IP or STREP for CP, where applicable; CA or SA for CSA, where applicable – see Appendix 2)

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

See also Annex 2: Eligibility and evaluation criteria for proposals and priority order for proposals with the same score.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

Evaluation of proposals: December 2009. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of January/February 2010.

- **Consortia agreements:**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

Public-Private Partnership "Future Internet"

Call title: "Future Internet"-2011

To be finalised

- Call identifier: FP7-2011-ICT-FI
- Date of publication[83]: 30 July 2010
- Deadline[84]: 19 October 2010 at 17.00.00 (Brussels local time)
- Indicative budget[85,86]: EUR 93 million

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Challenge	Objectives	Funding schemes
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	FI.ICT-2011.1.7 Technology foundation: Future Internet Core Platform	IP
	FI.ICT-2011.1.8 Use Case scenarios and experimentation	IP
	FI.ICT-2011.1.9 Capacity Building and Infrastructure Support	CSA
	FI.ICT-2011.1.10 Programme Management and Support	CSA

- Eligibility conditions:

…

- Evaluation procedure:

[83] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[84] The Director-General responsible may delay this deadline by up to two months
[85] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

[86] Under the condition that the preliminary draft budget for 2011 is adopted without modification by the budgetary authority

…

Public-Private Partnership "Future Internet"

Call title: "Future Internet"-2012

To be finalised

- Call identifier: FP7-2012-ICT-FI
- Date of publication[87]: 30 July 2011
- Deadline[88]: 2 December 2011 at 17.00.00 (Brussels local time)
- Indicative budget[89,90]: EUR 77 million

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Challenge	Objectives	Funding schemes
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	FI.ICT-2011.1.8 Use Case scenarios and experimentation	IP
	FI.ICT-2011.1.9 Capacity Building and Infrastructure Support	IP

- Eligibility conditions:

…

- Evaluation procedure:

…

[87] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[88] The Director-General responsible may delay this deadline by up to two months
[89] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

[90] Under the condition that the preliminary draft budget for 2011 is adopted without modification by the budgetary authority

Call title: FET Open

To be finalised

- Call identifier: FP7-ICT-2011-C
- Date of publication[91]: 30 July 2010

  Date from which proposals are receivable: XX.
- Deadline[92]: 31 December 2012, at 17:00.00, Brussels, local time[93]
- Indicative budget[94]: EUR 93 million, which is expected to be committed for successful proposals from the cut-off dates up to and including XX (batch 5 to batch 8). A minimum of EUR XX million and a maximum of EUR XX million will be allocated per batch.
- Topics called:

Challenge	Objectives	Funding schemes[95]
Future and emerging technologies	ICT-2011.9.1 FET-Open: Challenging current thinking	CP (STREP only), CSA
	ICT-2011.9.2 High_Tech Research Intensive SMEs in FET research	CP (STREP only)
	ICT-2011.9.3 FET Young Explorers	CP (STREP only)
	ICT-2011.9.4 International Cooperation in FET research	Additional funding to existing grants (IP/STREP)

- Eligibility conditions:

Eligibility, evaluation, selection and award criteria: see Appendix 5 of the work programme for specific eligibility and 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 (excluding a title page) 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 31/12/2012 – see footnote[93]). They are evaluated anonymously as they come in with the help of remote evaluators;

[91] The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.
[92] The Director-General responsible may delay this deadline by up to two months
[93] It is planned that the call will subsequently be extended beyond 31/12/2012
[94] The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:
- The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call; and
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

[95] Each proposal should indicate the type of funding scheme used (IP or STREP for CP, where applicable; CA or SA for CSA, where applicable)

- 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;
- *full* proposals are evaluated through a combination of remote evaluation and panels of experts that convene in Brussels; they are not evaluated anonymously.
- proposals for CAs are submitted in one stage and are not evaluated anonymously.

Batch	Short STREP proposals start date submission period	Short STREP proposals end date submission period	full STREP and CSA cut-off date (at 17:00 Brussels time)
9	09/09/2009	12/01/2010	06/07/2010
10	13/01/2010	08/06/2010	07/12/2010
11	09/06/2010	30/11/2010	17/05/2011
12	01/12/2010	03/05/2011	25/10/2011
13	04/05/2011	25/10/2011	10/04/2012
14	26/10/2011	10/04/2012	25/09/2012
15	11/04/2012	11/09/2012	12/03/2013

FET-Open proposals submitted to batch 5 and FET-Open short STREP proposals submitted to batch 6 will be evaluated based on call text and eligibility, evaluation, selection and award criteria set-out in ICT work programme 2009/2010.

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.

- 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.

Call title: ICT – EU Brazil

- Call identifier: FP7-ICT-2011-EU-Brazil
- Date of publication: 30 July, 2010.
- Deadline: 12 October 2010 at 17.00.00 (Brussels local time) and for the coordinated projects funded by the Brazilian Authorities on XX October, 2010 at 18.00 (Brasilia local time). According to the respective requirements of the EU and the Brazilian Ministry of Science and Technology (MCT).
- Indicative budget: EUR 5 million (a similar budget for the call is expected from MTC and the National Council of State Research Foundations (CONFAP).

  See indicative budget breakdown in section 5 of the ICT work programme.
- Topics called:

Topic called	Topics	Funding Scheme

Objective ICT-2011.10.1 EU-Brazil Research and Development cooperation	**Topic 1: Microelectronics/Microsystems**	Small or medium scale focused research projects (STREPs)
	Topic 2: Control Systems	
	Topic 3: Future Internet - experimental facilities	
	Topic 4: Future Internet - security	
	Topic 5: Future Internet - e-Infrastructures	

- Eligibility conditions:

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

  The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

  Proposals which do not include coordination with a Brazilian project will be considered ineligible. Therefore, the EC project proposals must include detailed explanations about the proposal to be financed by the Brazilian Authorities. Proposals will only be evaluated on the condition that the proposal related to their coordinated Brazilian project has also been presented for funding to the Brazilian Authorities.

  In addition, for each Small or medium scale focused research project the maximum EC funding requested must not exceed **EUR 1.500.000.**

  Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- Evaluation procedure:
  - A one-stage submission procedure will be followed.
  - The evaluation criteria and sub-criteria (including weights and thresholds), together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to the Cooperation work programme.
  - The proposals will be evaluated by a panel including both European and Brazilian experts.

  Proposal submission must be made by means of the European Commission's Electronic Proposal Submission Service (EPSS) on or before the published deadline. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- Evaluation criteria and thresholds:

  The evaluation criteria and sub-criteria to be applied to this coordinated call are given in Annex 2 of this work programme.

  Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

  In order to ensure a more genuine EU-Brazil cooperation, a balanced effort between the two coordinated projects and a research plan properly involving coordinated research activities between Europe and Brazil, represent an added value to the activities and this will be reflected in the evaluation under the criteria 'Impact' and 'Implementation'.

  In terms of reciprocity, non confidential abstracts of EC retained proposals will be made available to the Brazilian Authorities.

  At Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- Additional selection criterion:

  Proposals will only be selected on the condition that their corresponding coordinated Brazilian project will be funded by the Brazilian Authorities.

  Only one proposal per topic may be funded under this call: That is one proposal for each one of the five topics implemented via Small or medium scale focused research projects (STREPs).

- Indicative evaluation and contractual timetable:

  Evaluation: October/November, 2010; Evaluation results: estimated to be available within 6-8 weeks after the closure date. A reserve list of projects may be established. Negotiations will be carried out in parallel by the EC and the Brazilian Authorities, in order to have a simultaneous start of the respective grant agreements. It is expected that the grant agreement negotiations for the short-listed proposals will start as of end November/beginning December, 2010 and that all projects will start work early in 2011.

- Consortia agreements:

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

- Coordination agreements:

  In addition, participants in the EC Collaborative Projects are required to conclude a coordination agreement with the participants in the coordinated project funded by the Brazilian Authorities. A final draft of these agreements has to be provided with the proposal.

- The forms of grant and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

Call title: ICT – EU Russia

- Call identifier: FP7-ICT-2011-EU-Russia
- Date of publication: 30 July, 2010.
- Deadline: 14 September 2010 at 17.00.00 (Brussels local time) and for the coordinated projects funded by the Ministry of Education and Science of Russia on 8 September, 2010 at XX.00 (Moscow local time) according to the respective requirements of the EC and the Ministry of Education and Science of Russia.
- Indicative budget: EUR 4 million. A budget of app. 2 M€ for the call is expected from the Ministry of Education and Science of Russia.

  See indicative budget breakdown in section 5 of the ICT work programme.

- Topics called:

Topic called	Topics	Funding Scheme
Objective ICT-2009.10.2 EU-Russia Research and Development cooperation	**(a) Programming Models and Runtime Support**	Small or medium scale focused research projects (STREPs)
	(b) Performance Analysis Tools for High-Performance Computing	
	(c) Optimisation, Scalability and Porting of Codes	

- Eligibility conditions:

  The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

  Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

Proposals which do not include coordination with a Russian project will be considered ineligible. Therefore, the EC project proposals must include detailed explanations about the proposal to be financed by the Ministry of Education and Science of Russia. Proposals will only be evaluated on the condition that the proposal related to their coordinated Russian project has also been presented for funding to the Ministry of Education and Science of Russia.

In addition, for each Small or medium scale focused research project, the project duration shall not exceed 24 months and the maximum EC funding requested must not exceed EUR 1.500.000.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

- Evaluation procedure:
  - The evaluation criteria and sub-criteria (including weights and thresholds), together with the eligibility, selection and award criteria, for the different funding schemes are set out in Annex 2 to the Cooperation work programme.
  - For this call the evaluation shall follow a single-stage evaluation procedure. The proposals will be evaluated by a panel including both European and Russian experts.

  Proposal submission must be made by means of the European Commission's Electronic Proposal Submission Service (EPSS) on or before the published deadline. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- Evaluation criteria and thresholds:

The evaluation criteria and sub-criteria to be applied to this coordinated call are given in Annex 2 of this work programme.

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	**3/5**
Implementation	**3/5**
Impact	**3/5**
Overall threshold required	**10/15**

In order to ensure a more genuine EU-Russia cooperation, a balanced effort between the two coordinated projects and a research plan properly involving coordinated research activities between Europe and Russia, represent an added value to the

activities and this will be reflected in the evaluation under the criteria 'Impact' and 'Implementation'.

In terms of reciprocity, non confidential abstracts of EC retained proposals will be made available to the Russian authority.

At Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- Additional selection criterion:

  Proposals will only be selected on the condition that their coordinated Russian project will be funded by the Ministry of Education and Science of Russia.

  Only one proposal per topic will be funded under this call: That is one proposal for each one of the three topics (A, B, C) implemented via Small or medium scale focused research projects (STREPs).

- Indicative evaluation and contractual timetable:

  Evaluation: Second half of September, 2010; Evaluation results: estimated to be available within 6 weeks after the closure date. A reserve list of projects may be established. Negotiations will be carried out in parallel by the EC and the Ministry of Education and Science of Russia, in order to have a simultaneous start of the respective grant agreements. It is expected that the grant agreement negotiations for the short-listed proposals will start as of October 2010 and that all projects will start work on 1 January 2011.

- Consortia agreements:

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

- Coordination agreements:

  In addition, participants in the EC Collaborative Projects are required to conclude a coordination agreement with the participants in the coordinated project funded by the Ministry of Education and Science of Russia. A final draft of these agreements has to be provided with the proposal.

- The forms of grant and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

Joint Call ICT-SSH on 'Science of Global Systems'

Details to be completed

	ICT 2011.9.14 Joint Call ICT-SSH on 'Science of Global Systems'	STREP

Call on 'SME initiative on Digital Content and Languages'

Details to be completed

	ICT 2011.4.1 SME initiative on Digital Content and Languages	STREP, CSA

8 Indicative priorities for future calls

For the next Work Programme, changes will take place within the scope of the Framework and Specific Programmes. They will take into account the experience from previous calls as well as technological developments, socio-economic evolutions and political priorities.

Appendix 1: Minimum number of participants

TBC

Appendix 2: Funding schemes

TBC

…

CP-CSA

CP-CSA involves a combination of the collaborative projects and coordination and support actions (CP-CSA) funding schemes which allows to support under the same grant agreement research, coordination and support activities.

CP-CSAs on Pre-Commercial Procurement should combine in this Work Programme, in a closely co-ordinated manner:
(i) Networking and coordination activities: related to preparing for a PCP strategy and coordinating the implementation of a transnational PCP call

(ii) Joint research activities: related to implementing a joint PCP call for tender

The two categories of activities are mandatory due to the synergistic effects between the two components.

Appendix 3: Coordination of national or regional research programmes

TBC

Appendix 4: Distribution of budget commitment

TBC

Appendix 5: FET eligibility, evaluation, selection and award criteria

This annex is still to be finalised

Eligible proposals under FET objectives will be evaluated according to three criteria - Scientific/Technological Quality, Implementation and Impact. A score will be awarded for each of these criteria, based on the considerations listed below.

In addition to the eligibility criteria set out in Annex 2, all FET-Open short proposals are subject to the following eligibility criteria:

1. The length of Part B should not exceed 5 A4 pages, excluding a title page.
2. Part B should be fully anonymous, meaning that none of the participants or contact points should be explicitly mentioned, or any of the authors be otherwise identifiable. Background references and a list of publications are also excluded (t.b.c.).

Proposals (short and full) submitted to FET-Open Objective ICT-2011.9.2: High-Tech Research Intensive SMEs in FET research are subject to the following additional eligibility criteria:

3. The consortium must contain at least one SME.[96]

Proposals (short and full) submitted to FET-Open Objective ICT-2011.9.3: FET Young Explorers are subject to the following additional eligibility criteria:

4. A project must be led by a young researcher, and the leadership by young researchers of all work packages is also required. No more than six years should have elapsed between the award of a Ph.D. (or equivalent) for each such young researcher and the date of submission of the short proposal.[97]

For short proposals and where applicable, eligibility criteria 3 and 4 require a declaration on the cover page of the proposal (see proposal template in Guide for Applicants).

	1. S/T quality (in relation to the topics addressed by the call)	***2. Implementation***	***3. Impact***

[96] An SME is an enterprise which has fewer than 250 employees, has an annual turnover not exceeding 50 million EUR, and/or has an annual balance-sheet total not exceeding 43 million EUR. Possible relationships with other enterprises must be taken into account when calculating these data of the enterprise. Research centres, research institutes, contract research organisations or consultancy firms are not eligible SMEs for the purpose of the Co-operative and Collective schemes.

[97] Extensions of this period may be allowed only in case of eligible career breaks which must be properly documented: maternity (18 months per child born after the PhD award) & paternity leave (accumulation of actual time off for children born after the PhD award) and leave taken for long-term illness, national service.

	(Award)	(Selection)	(Award)
***short* STREP (FET Open)**	• Clarity of targeted breakthrough and its relevance towards a long-term vision. • Novelty and foundational character. • Plausibility of the S/T approach, as outlined.	*(not applicable to short STREP)*	*(not applicable to short STREP)*
	Threshold: 3.5/5 (t.b.c.)		
STREP	• Clarity of targeted breakthrough and its relevance towards a long-term vision. • Novelty and foundational character. • Specific contribution to progress in science and technology. • Quality and effectiveness of the S/T methodology.	• Quality of workplan and management. • Quality and relevant experience of the individual participants. • Quality of the consortium as a whole (including complementarity, balance). • Appropriate allocation and justification of the resources to be committed (person-months, equipment, budget).	• Transformational impact of the results on science, technology and/or society. • Contribution at the European level towards the expected impacts listed in the work programme. • Appropriateness of measures envisaged for the dissemination and/or use of project results.
	Threshold: 3.5/5 (t.b.c.) **Weight:** ▪ **FET Open - 50%** ▪ **FET Proactive - 40%**	**Threshold: 3/5** **Weight: 20%**	**Threshold: 3.5/5** **Weight:** ▪ **FET Open - 30%** ▪ **FET Proactive - 40%**
IP (FET Pro-active)	• Clarity of objectives and their relevance towards the long-term vision of the proactive initiative. • Integration of research activities of appropriate multidisciplinary character. • Novelty and foundational character. • Specific contribution to progress in science and technology. • Quality and effectiveness of the S/T methodology.	• Quality of workplan and management. • Quality and relevant experience of the individual participants. • Quality of the consortium as a whole (including complementarity, balance). • Appropriate allocation and justification of the resources to be committed (person-months, equipment, budget).	• Contribution at the European level towards the expected impacts listed in the workprogramme under the objective. • Transformational impact of the results on science, technology and/or society. • Appropriateness of measures envisaged for the dissemination and/or use of project results, and management of intellectual property.
	Threshold: 3.5/5 **Weight: 40%**	**Threshold: 3.5/5** **Weight: 20%**	**Threshold: 3.5/5** **Weight: 40%**
Coordination and Support Actions	• Clarity of objectives. • Contribution to the co-ordination and/or support of high-risk and high-impact research, for new or	• Quality of workplan and management. • Quality and relevant experience of the individual participants. • Quality of the	• Transformational impact on the communities and/or practices for high-risk and high-impact research. • Appropriateness of

	emerging areas or horizontally. • Quality and effectiveness of the coordination and/or support activities.	consortium. • Appropriate management of the resources to be committed (person-months equipment, budget).	measures for spreading excellence, use of results, and dissemination of knowledge, including engagement with stakeholders.
	Threshold: 3/5 **Weight: 40%**	**Threshold: 3/5** **Weight: 20%**	**Threshold: 3/5** **Weight: 40%**

Thresholds are set for each criterion, as indicated in the tables above. In addition, an overall threshold may also be set, as indicated in the table below. A proposal failing to achieve any of these threshold scores will be rejected.

	Overall Threshold
***short* STREP (FET Open)**	None
STREP	10.5/15 (t.b.c.)
IP	None
Coordination and Support Actions	10.5/15

Appendix 6: Future Internet Public-Private Partnership (Objectives FI.ICT-2011.1.7, 1.8, 1.9 and 1.10) Evaluation Criteria for Proposals

For Integrated Projects (IPs) submitted to the following Objectives:
- FI.ICT-2011.1.7 Technology foundation: Future Internet Core Platform
- FI.ICT-2011.1.8 Use Case Scenarios and Experimentations
- FI.ICT-2011.1.9 Capacity Building and Infrastructure Support

1. Scientific and/or technological excellence (relevant to the topics addressed by the call) Criteria as set out in Annex 2: • *Soundness of concept, and quality of objectives* • *Quality and effectiveness of the S/T methodology and associated work plan* ***In addition:*** • ***Valorisation of earlier Future Internet research through integration within a complete system perspective*** • ***Reusability of technological elements for multiple use cases, where applicable***	**Score:** *(Threshold 3/5; Weight 0.8)*
2. Quality and efficiency of the implementation and the management Criteria as set out in Annex 2: • *Appropriateness of the management structure and procedures* • *Quality and relevant experience of the individual participants* • *Quality of the consortium as a whole (including complementarity, balance)* • *Appropriateness of the allocation and justification of the resources to be committed (budget, staff, equipment)* ***In addition:*** • ***Quality of proposed mechanism to ensuring collaboration with the other***	**Score:** *(Threshold 3/5; Weight 1)*

Future Internet PPP activities	
3. Potential impact through the development, dissemination and use of project results Criteria as set out in Annex 2: • *Contribution, at the European [and/or international] level, to the expected impacts listed in the work programme under relevant topic/activity* • *Appropriateness of measures for the dissemination and/or exploitation of project results, and management of intellectual property.* ***In addition:*** • ***Potential for exploitation through user driven innovation*** • ***Degree of openness and related approach for standards.***	**Score:** *(Threshold 3/5; Weight 1.2)*
	Overall score: *(Threshold 10/15)*

For Coordination and Support Actions (CSA) submitted to the following Objectives:

- FI.ICT-2011.1.9 Capacity Building and Infrastructure Support
- FI.ICT-2011.1.10 Programme Management and Support

1. Scientific and/or technological excellence (relevant to the topics addressed by the call) Criteria as set out in Annex 2: • *Soundness of concept, and quality of objectives* • *Contribution to the co-ordination of high quality research* • *Quality and effectiveness of the co-ordination/support mechanisms, and associated work plan* ***In addition:*** • ***Openness towards and commitment to serve all Future Internet PPP activities and the PPP as a whole***	**Score:** *(Threshold 3/5; Weight 1)*
2. Quality and efficiency of the implementation and the management Criteria as set out in Annex 2: • *Appropriateness of the management structure and procedures* • *Quality and relevant experience of the individual participants* • *Quality of the consortium as a whole (including complementarity, balance)* • *Appropriateness of the allocation and justification of the resources to be committed (staff, equipment)*	**Score:** *(Threshold 3/5; Weight 1)*
3. Potential impact through the development, dissemination and use of project results Criteria as set out in Annex 2: • *Contribution, at the European [and/or international] level, to the expected impacts listed in the work programme under relevant topic/activity* • *Appropriateness of measures for spreading excellence, exploiting results, and dissemination knowledge, through engagement with stakeholders, and the public at large.*	**Score:** *(Threshold 3/5; Weight 1)*
	Overall score: *(Threshold 10/15)*

Appendix 7: Future Internet Public-Private Partnership – Programme Logic

The Future Internet Public-Private Partnership aims to produce results within a medium term time perspective (~5 years). As such, it calls, in its final phases, for the deployment of a large scale test and validation infrastructure that is open to user driven innovation. The target infrastructure requires organising the work through two perspectives:

- A horizontal perspective, covering the research, design, development and implementation of the core open network and service platform supporting various use cases.
- A vertical perspective, deriving the platform requirements from the target use case scenarios; covering the research, design, development and implementation of domain-specific instantiations of the core platform expected to be built on a selection of core platform generic capabilities complemented by domain-specific capabilities; and taking into account that a use case scenario to be tested may involve requirements stemming from various "elementary" use cases ("mash-up" of use cases).

Tight co-ordination between these two perspectives is imperative to ensure success. In order to maximise the impact, it is mandatory that "vertical" type projects run in parallel to "horizontal" type projects. On the other hand, it is not expected that the actors involved in the horizontal system development are exactly the same as those involved in the vertical use case part. Vertical projects fuel the horizontal projects with system/platform requirements, whilst horizontal projects fuel the vertical projects with technological and system constraints and awareness.

Requirements of medium term impact and information flow across projects lead to:

- Projects to be selected not as a set of loosely coupled projects, but as a set of projects that can effectively exchange information among them, each one being as part of a consistent programme;
- Projects to be implemented as a consistent set of projects over time (across subsequent calls);
- The drive towards an experimental platform open to user driven innovation calls for the implementation of a limited set of interrelated projects, with critical mass;
- The need to conceive the initiative as a programme calls for a programme support action handling the various non R&D issues that the programme has to face. This accompanying measure has to have clean interfaces with the R&D projects.
- The need for an early identification of public infrastructures (local, regional, in cities..) that can be used in the context of the user driven use case experimentations.
- As the core platform is subject to user driven experiments in later phases, it is necessary to put in place an operational board taking care of managing the access to the platform resources, potentially building on the FIRE mechanisms and experiences.

The PPP is implemented in 3 subsequent phases, with each phase corresponding to an ICT call for proposals:

Phase 1 (this Work Programme 2011-12)

- Set the creation of the core platform and the development of the basic enablers in motion.
- Engage a limited set of Usage areas in progressing their requirements on the Future Internet and how their business processes may be supported. They must also define their test scenarios and negotiate with available infrastructures to support their functionality. In

addition they must begin preparing their domain specific functionality for their test and demonstration work.

- Establish a programme support/governance activity that ensures the integration of the project activities across the programme and addresses not-technical issues to enhance the usefulness of the technical results.
- Start the evaluation of test infrastructures and consider where investments need to be made to bring infrastructures to the level necessary to enable pilot implementations.
- Start development of components and functional prototypes for the core platform and for the usage area instantiations.

Phase 2 (this Work Programme 2011-12)

- Ensure the availability of the necessary test infrastructure.
- Final selection of a limited set of use case scenarios driving the implementation of the first pilots.
- Instantiate the platforms with the common enablers that would allow the tests/demonstrations to run.
- Start limited scale trials and validation pilots.
- Preparation of SME participation as application and service developers.
- Prepare for integration of the large scale test and trial infrastructure on a pan European scale.

Phase 3 (Work Programme 2013)

- Populate the test environments with a variety of applications to prove the feasibility of scale, use of common enablers and viability of the environments.
- Involvement of SME as developers of test applications;
- Increase the scope and functionality of common enablers and support the application work.
- maintenance of the test and demonstration infrastructure

Publication of results on interfaces, architectures and other reference points that can be used to support standardisation runs across the three phases.

b) Industry driven initiative

It is expected that the initiative will be driven by the European networking and services industries agreeing on a common specification of the Future Internet Core Platform to be developed. Research and academic organisations are expected to bring into the development their specific expertise, notably in terms of innovation and also piggybacking on earlier results/expertise achieved in relevant domains. An important contribution from outside the core ICT industry is also expected, especially for what concerns the "Use Case" projects.

c) Programme-level collaboration requirements

An efficient collaboration structure between all projects under all lines of activity, is a prerequisite for success and mandatory, including exchange of documents and concertation meetings. Open liaison and multiplier groups should be set-up and meet regularly in order to discuss and agree programme-level issues, to consolidate requirements and feedback from outside the consortium, and to pave the ground for broad acceptance and take-up of the European Future Internet community at large.

The table below tentatively outlines the collaboration requirements and flow of information across the various projects composing the initiative.

FROM T0	Use Case Projects	Core Platform	Infrastructure Support
Use Cases		Architectural model, common enablers, SDK/API's, interfacing requirements	Supported functionalities, Interface requirements, technological constraints, (+ virtualisation requirements to "Core Platform")
Core Platform	Scenarios,, functional specifications, enabler, requirements		
Infrastructure Support	Interface requirements	Architectural model, common enablers, SDK/API's, interfacing requirements	
Programme Management and Support	Scenarios, reference implementations, test case scenarios, operational usability constraints	Architectural model, common enablers, SDK/API's, interfacing requirements, usability "cookbook"	Supported functionalities, Interface requirements, operational usability constraints

d) Expenditure Profile

The following table outlines the proposed funding profile for Work Programme 2011-12:

Project	Number	Phase	Budget
Core Platform	1 IP	1+2	40 M€, 30% open
Use Cases - 1st part	Up to 8 IP @ 5M€	1	40 M€
Use Cases - 2nd part	Up to 5 IP @ 13 M€	2	65 M€, 10% open
Capacity building support	1 CSA @ 2 M€	1+2	3 M€
Infrastructure support	1 IP	2	12 M€

Programme management and support	1 SA	1+2	10 M€
TOTAL			170 M€

Appendix 8: Specific Requirements related to third party financing with EU funding through Pre-Commercial Procurement (PCP)

In accordance with the Decisions concerning the 7th Framework Programme[98] and the 'Cooperation' Specific Programme[99], the provisions of Article 120(1) of the Council Regulation on the Financial Regulation[100] and Article 184 (section on 'Implementation Contracts') of the Commission Regulation on the Implementing Rules of the FR[101] shall be applicable with regard to the financing provided by the beneficiaries of the Community grant (the participating public purchasers in the PCP Actions) to third parties (the tenderers participating in the pre-commercial procurement selected following PCP calls for tender launched under these actions).

In accordance with the above articles, the following requirements are applicable to PCP calls for tender launched under PCP Actions to ensure that the conditions for the Article 16f/24e exemption of the public procurement directives[102] are respected, that the risk-benefit sharing in PCP takes place according to market conditions and that the Treaty principles[103] are fully respected throughout the PCP process:

- The consortium of public purchasers should verify that the topic proposed for the joint PCP call for tender would **fit the scope of an R&D[104] services contract[105]**.
- **The practical set-up foreseen for the PCP** shall be clearly announced in the PCP contract notice. This shall include the intention to select multiple companies to start the pre-commercial procurement in parallel, as well as the number of phases and the expected duration of each phase.
- **Functional specifications** shall be used in order to formulate the object of the PCP tender as a problem to be solved without prescribing a specific solution approach to be followed.
- In view of triggering tenderers to send in innovative offers that include R&D that can bring breakthrough improvements to the quality and efficiency of public services, the

[98] OJ L 412, 30.12.2006
[99] OJ L 400, 30.12.2006
[100] Council Regulation No. 1605/2002 of 25.6.2002 on the Financial Regulation applicable to the general budget of the European Communities (OJ L248, 16.09.2002, p1), as amended by Council Regulation No 1995/2006 of 13 December 2006 (OJ L390, 30.12.2006, p1).
[101] Commission Regulation No, 2342/2002 of 23.12.2002 laying down detailed rules for the implementation ofCouncil Regulation No. 1605/2002 (OJ L357, 31.12.2002, p1) as last amended by Regulation No. 478/2007 of 23.04.2007 (OJ L111, 28.04.2007, p13).
[102] Directives 2004/18/EC and 2004/17/EC.
[103] In particular the fundamental Treaty principles on the free movement of goods, the free movement of workers, the freedom to provide services, the freedom of establishment and the free movement of capital, as well as the principles deriving there from, such as the principles of non-discrimination, transparency and equal treatment
[104] R&D can cover activities such as solution exploration and design, prototyping, up to the original development of a limited volume of first products or services in the form of a test series. Original development of a first product or service may include limited production or supply in order to incorporate the results of field testing and to demonstrate that the product or service is suitable for production or supply in quantity to acceptable quality standards. R&D does not include commercial development activities such as quantity production, supply to establish commercial viability or to recover R&D costs, integration, customisation, incremental adaptations and improvements to existing products or processes.
[105] Contracts providing more than only services are still considered a public service contract if the value of the services exceeds that of the products covered by the contract.

selection of offers shall not be based on lowest price only. The PCP contracts shall be awarded to the tenders offering **best value for money**, that is to say, to the tender offering the best price-quality ratio, while taking care to avoid any conflict of interests[106].

- In respect of the Treaty principles the public purchasers shall ensure **EU wide publication** for he PCP call for tender[107] in at least English and shall evaluate all offers according to the same objective criteria regardless of the geographic location of company head offices, company size or governance structure. The PCP process should be organised so as to stimulate companies to locate a relevant portion of the R&D and operational activities related to the PCP contract in the European Economic Area or a country having concluded a Stabilisation and Association Agreement with the EU.
- In PCP, the public purchaser does not reserve the R&D results exclusively for its own use. To ensure that such an arrangement is beneficial both for the public purchaser and for the companies involved in PCP, **R&D risks and benefits are shared** between them in such a way that both parties have an incentive to pursue wide commercialisation and take up of the new solutions. Therefore, for PCP Actions, ownership rights of **IPRs** generated by a company during the PCP contract should be assigned to that company. The public purchasers should be assigned a free licence to use the R&D results for internal use and they should be assigned the right to require participating companies to license IPRs to third parties under fair and reasonable market conditions.
- In order to enable the public purchasers to **establish the correct (best value for money) market price for the R&D service, in which case the presence of State aid can in principle be excluded** according to the definition contained in Art. 87 (1) of the Treaty, the distribution of rights and obligations between public purchasers and companies participating in the PCP, including the allocation of IPRs, shall be published upfront in the PCP call for tender documents and the PCP call for tender shall be carried out in a competitive and transparent way in line with the Treaty principles which leads to a price according to market conditions, and does not involve any indication of manipulation. The consortium of public purchasers should ensure that the PCP contracts with participating companies contain a financial compensation according to market conditions[108] compared to exclusive development price for assigning IPR ownership rights to participating companies, in order for the PCP call for tender not to involve State aid.
- The PCP contract that will be concluded with each selected organisation shall take the form of **one single framework contract covering all the PCP phases**, in which the distribution of rights and obligations of the parties is published upfront in the tender documents and which does not involve contract renegotiations on rights and obligations taking place after the choice of participating organisations. This framework contract shall contain an agreement on the future procedure for implementing the different phases (through specific contracts), including the format of the intermediate evaluations after the solution design and prototype development stages that progressively select organisations with the best competing solutions.

[106] For more info refer to Staff Working Document on PCP: SEC (1668) 2007

[107] Through the Official Journal of the European Union (OJEU), using the TED (Tenders Electronic Daily) web portal

[108] The financial compensation compared to exclusive development cost should reflect the market value of the benefits received and the risks assumed by the participating company. In case of IPR sharing in PCP, the market price of the benefits should reflect the commercialisation opportunities opened up by the IPRs to the company, the associated risks assumed by the company comprise for instance the cost carried by the company for maintaining the IPRs and commercialising the products.

Annex 2: Eligibility and Evaluation Criteria for Proposals

TBC..

	SCIENTIFIC AND/OR TECHNOLOGICAL EXCELLENCE	QUALITY AND EFFICIENCY OF THE IMPLEMENTATION AND MANAGEMENT	THE POTENTIAL IMPACT THROUGH THE DEVELOPMENT, DISSEMINATION AND USE OF PROJECT RESULTS
CP-CSA	ALL OF THE ABOVE CRITERIA FOR "ALL FUNDING SCHEMES", "COLLABORATIVE PROJECTS" AND "COORDINATION AND SUPPORT ACTIONS"		

…

Glossary

TBC