THEMES

1. Health

Objective

Improving the health of European citizens ~~and increasing the competitiveness of European health-related industries and businesses~~, while addressing global health issues including emerging epidemics, neglected diseases in developing countries and environmental and social health factors.

;Research will aim both at optimising the prevention of diseases and the development of treatments and drugs of high quality while ensuring people's equal access to results of public research. Emphasis will be put on translational research

(translation of basic discoveries in clinical applications), the development and validation of new therapies, methods for health promotion and prevention, diagnostic tools and technologies, environmental health as well as sustainable and efficient healthcare systems.

Rationale

~~The sequencing of the human genome and the recent advances in post-genomics have revolutionised research into human health and diseases.~~

Decades of focusing on biomolecular curative approaches could not satisfactorily reduce the health burden neither in Europe (e.g. cancer burden, respiratory diseases, diabetes and obesity) nor in the less developed countries. Therefore traditional molecular, genomic and clinical approaches have to be complemented by a new effort on emerging research domains investigating the complex relations between environment, health and genome, such as epidemiology (including social epidemiology), toxicology and toxicogenomics, expology and genecology. Improving the understanding of causes (e. g.socio-economic causes, low-dose/long term/multifactor environmental and occupational factors) will help improving the prevention and treatment of diseases.

Integrating the vast amounts of data produced in biology and medicine and understanding underlying biological processes requires bringing together critical masses of various expertises and resources that are not available at a national level. Significant advances in translational health research, which is essential to ensure that biomedical research provides practical benefits, also requires multidisciplinary and pan-European approaches involving different stakeholders. Such approaches allow Europe to contribute more effectively to international efforts to combat diseases of global importance.

Clinical research on many diseases (e.g. cancer, cardiovascular diseases, mental and neurological diseases, ~~in particular those linked with ageing, such as Alzheimer and Parkinson diseases~~) relies on international multi-centre trials to achieve the required number of patients in a short time-frame. Epidemiological research requires a large diversity of populations and international networks to achieve significant conclusions. Developing new diagnostics and treatments for rare disorders also require multi-country approaches to increase the number of patients for each study. And performing health policy-driven research at the European level enables comparisons of the models, systems, public health programs, data, and patient material held in national databases and biobanks.

A strong EU-based biomedical research will help strengthen ~~the competitiveness of the European healthcare biotechnology, medical technology and pharmaceutical industries.~~ the public health system and setting positive signs for improving the situation in poor countries outside the European Union. Aimed at strengthening public health, biomedical research constitutes a public good that should not be left to the rules of market. The EU ~~also~~ has to play an active role in creating an environment conducive to socially useful innovation in the pharmaceutical sector, in particular to maximise the success of clinical research. In the public interest, EU supported clinical research must be conducted with full public responsibility and transparency (publication of both positive and negative results). ~~Researchbased~~ ~~EU research will also contribute to the development of new norms and standards to set up an appropriate legislative framework for new medical technologies (e.g. regenerative medicine).~~~~SMEs are the main economic drivers of the~~

~~healthcare biotechnology and medical technology industries. Although Europe now has more Biotechnology companies than US, most of them are small and less mature than their competitors. Public-private research efforts at the EU level will facilitate their development.~~

The activities that will be addressed, which include research essential to policy requirements, are set out below. ~~Two~~ Three strategic issues, child health, ~~and~~ the health of the ageing population and the environmental and social factors of health will be addressed across activities. Research agendas established by European Technology Platforms, and non for profit civil society organisations~~uch as the one on innovative medicines,s~~ will be supported where relevant. To complement these and respond to new policy needs, additional actions may be supported for example in the areas of health policy issues and occupational health and safety.

The situation faced with neglected diseases today requires that additional priority be given to North-South research partnerships on treatment.

Activities

Basic and applied research for environmental health

- *Genome-environment interaction.* To develop emerging post-genomic issues and technologies such as toxicogenomics and genecology.
- *Investigating social, occupational and environmental health factors.* With emphasis on low-dose, long term, multifactorial exposures (including endocrine disruptors) and socio-economic factors. To strengthen epidemiology (including social epidemiology), toxicology and expology.
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Biotechnology, generic tools and technologies for human health.

– *High-throughput research*. To catalyse experimental progress in biomedical research by enhancing data generation, standardisation, acquisition and analysis.

– *Detection, diagnosis and monitoring.* With emphasis on non-invasive or minimally invasive approaches.

– *Predicting suitability, safety and efficacy of therapies.* To develop and validate biological markers, in vivo and in vitro methods and models, including simulation, pharmacogenomics, targeting approaches and alternatives to animal testing.

– *Innovative therapeutic approaches and intervention*. To consolidate and ensure further developments in ~~advanced~~ therapies and technologies showing clear advantages over existing methods with potential application in many diseases and disorders.

Translating research for human health

– *Integrating biological data and processes: large-scale data gathering, systems biology.* To generate and analyse the vast amount of data needed to understand better the complex regulatory networks involving interactions between the environment and ~~of~~ thousands of genes and gene-products in controlling important biological processes.

– *Research on the brain and related diseases, human development and ageing.* To explore the process of healthy ageing and the way genes and environment interact with brain activity, under normal conditions as well as in brain diseases.

– *Translational research in infectious diseases.* To address anti-microbial drug resistance, the global threats of HIV/AIDS, malaria and tuberculosis as well as emerging epidemics (e.g. SARS and highly pathogenic influenza) and the neglected diseases of those in developing countries (e. g. sleeping sickness and chagas disease). Research in developing countries has to be improved by capacity building, transfer of knowledge and intensified international cooperation.

– *Translational research in major diseases: cancer, cardiovascular disease, diabetes/obesity; rare diseases; and other chronic diseases (e.g. osteoarthritis)*. To develop patient-oriented strategies from prevention to diagnosis and treatment including clinical research.

Optimising the delivery of health care to European citizens

– *Translating clinical outcome into clinical practice.* To understand clinical decision-making and how to translate outcomes of clinical research into clinical practice and especially addressing the specificities of children, women and elderly population. To ensure high standards, medical treatment has to be based on evidence. Education of medical staff has to be independent and free of commercial interests.

– *Quality, efficiency and solidarity of health systems including transitional health systems.* To translate effective interventions into management decisions, to ensure an adequate supply of human resources, to analyse factors influencing equity of access to high quality health care, including analyses of changes in population (e.g. ageing, mobility and migration, and the changing workplace).

– *Enhanced disease prevention and better use of medicines.* To develop efficient public health interventions addressing wider determinants of health (such as stress, poverty, diet or environmental factors). To identify successful interventions in different health care settings for improving the prescription of medicines and improving their use by patients (including pharmacovigilence aspects and no-tech approaches).

– *Appropriate use of new health therapies and technologies.* Long term safety aspects and monitoring of large scale use of new medical technologies (including devices) and advanced therapies ensuring a high level of protection for public health.

ESSF comment in general:

T~~t~~he proposals for Health focus on the strengthening of the competitivity of pharmaceutical firmes, on biotechnology and genetics instead of focusing on pressing public health problems such as the relation between environment and health (outdoor and indoor pollution, chemicals in food, social inequalities, living conditions, etc.), disease prevention, acces to health services and the global disease burden (e.g. neglected diseases) and of proposing more diverse curatives approaches (beyond biotech) to the treatment of diseases.

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2. Food and~~,~~ Agriculture ~~and Biotechnology~~

Objective

Building a European *Knowledge Based Bio-Economy*by bringing together science, industry, farmers and other food producers, consumers and other stakeholders, to exploit new and emerging research opportunities that address social, environmental and economic challenges: the growing demand for safer, healthier and higher quality food and origin labelled products, growing concern ~~and~~ for the environmental impacts of agriculture and for sustainable use and production of renewable bioresources; the increasing risk of epizootic and zoonotic diseases and food related disorders; threats to the sustainability and security of agricultural and fisheries production resulting in particular from human productive and extractive activities and from climate change; and the increasing demand for low-input agriculture, high quality food, taking into account animal welfare, biodiversity and rural contexts.

Rationale

~~In line with the European strategy on life sciences and biotechnology13, this will help increase the competitiveness of European biotechnology and food companies, in particular high tech SMEs, while improving social welfare and well-being.Innovations and advancement of knowledge in the sustainable management, production and use of biological resources (micro-organism, plants, animals), will provide the basis for new, sustainable, eco-efficient and competitive products for agriculture, fisheries, food, health, forest based and related industries.~~

In the context of higher quality and environmental concerns among European citizens, a transition towards new, sustainable and eco-efficient agriculture, fisheries, food and forest industry, constitutes a major EU policy goal. It implies to exploit new research opportunities and new forms of mobilising knowledge (including users knowledge and innovation). Innovations and advancement of knowledge emanating from academic, farmers' or citizens' research and consumers knowledge

Research into the safety of food and feed chains, diet related diseases, food choices and the impact of food and nutrition on health will help to fight food related disorders (e.g. cancers, obesity, allergies) and infectious diseases (e.g. transmissible spongiform encephalopathies, avian-flu, antibiotic multiresistant microorganisms),
while making important contributions to the implementation of existing and the formulation of future policies and regulations in the area of public, animal and plant health and consumer protection.

The diversity of the European industries in these areas, while being one of its strengths and an opportunity, leads to fragmented approaches to similar problems. These are better addressed by increased collaboration and sharing of expertise, for example on new methodologies, processes and standards that result from changing EU legislation, especially in relation to environmental, food safety and food quality standards.
~~Several European Technology Platforms contribute in setting common research priorities, in fields such as plant genomics and biotechnology, forestry and forest based industries, global animal health, farm animal breeding, food and industrial biotechnology.~~

Research agendas proposed by European Technology Platforms, farmers, consumers and environmental non for profit civil society organisations will be supported where relevant. Opportunities from genomics and biotechnology (accompanied by biosafety and coexistence research) will be exploited where they meet public acceptance, contribute to higher quality food and more sustainable agriculture, forestry and fisheries' production systems. .

The research will
also provide the knowledge base needed to support: the Common Agricultural Policy; agriculture and trade issues; food safety regulations; Community animal health, disease control and welfare standards; and the Common Fisheries Policy reform aiming to provide sustainable development of fishing and aquaculture. A flexible response to new policy needs is also foreseen, in particular with respect to new social or economic trends.

~~agriculture and trade issues; food safety regulations; Community animal health, disease control and welfare standards; and the Common Fisheries Policy reform aiming to provide sustainable development of fishing and aquaculture. A flexible response to new policy needs is also foreseen, in particular with respect to new social or economic trends.~~

A strong support will be given to research for low-input (reduced use of water, chemicals and fossil energy) and sustainable fisheries/aquacultures and farming, with emphasis on research for organic farming. New methodologies (such as ecological footprint and other indicators) to investigate the environmental impacts of agriculture and fisheries/aquacultures and farmland biodiversity.

Research should dialogue with and integrate local farming knowledge, including farmers' contribution to the on-farm conservation and utilization of crop and cattle genetic diversity.

Activities

Sustainable production and management of biological resources from land, forest, and aquatic environments: Enabling research for low input and sustainable farming systems; mobilizing science and innovation for -organic farming ~~Enabling research, including 'omics' technologies, such as genomics, proteomics, metabolomics, systems biology and converging technologies for micro-organisms, plants and animals, including exploitation of their biodiversity; improved crops and production systems~~, ~~organic farmingincluding~~, quality production schemes and GMO environmental, agronomic, economic, health and social impacts; ~~ultifunctional agriculturesustainable, competitive and m~~Origin Labelled Products and local food production systems, multifunctional agriculture and forestry; rural development; animal welfare, breeding and production; plant health; sustainable and ~~competitive~~ responsible fisheries and aquaculture; infectious diseases in animals, including zoonoses; safe disposal of animal waste; conservation, management and exploitation of living aquatic resources~~,~~ ; developing the tools needed by policy makers and other ~~actors~~stakeholders in agriculture, fishering and rural development (landscape, land management practices etc.)~~.~~

- **Conservation and sustainable use of Agricultural Biodiversity**
  Researches to optimize the value to agriculture of biodiversity already present in the agro-ecological landscape. e.g. insects, soil microbia, for the maintenance and improvement of productivity and reduction in synthetic inputs; in particular to explore the relationship between agricultural practices, yield and the feedback mechanisms through this biodiversity which are impacted on by chemical inputs; farmland biodiversity and methodologies to assess environmental impacts of agriculture; develop methodologies to optimize the opportunities of farmers-based on farm genetic diversity conservation and utilisation.

"Fork to farm": Food, health and well being: Consumer, societal, industrial and health aspects of food and feed, including behavioural and cognitive sciences; nutrition, diet related diseases and disorders, including cancer, allergies and obesity; innovative food and feed processing technologies (including packaging); improved quality and safety, both chemical and microbiological, of food, beverage and feed; integrity (and control) of the food chain; environmental impacts on and of food/feed chains; total food chain concept (including seafood); traceability.

Life sciences and biotechnology for sustainable non-food products and processes: Enabling research for local food production systems; Enabling research, including 'omics' technologies, such as genomics, proteomics, metabolomics, systems biology and converging technologies for micro-organisms, plants and animals, including exploitation of their biodiversity; socially acceptable i~~I~~mproved crops ~~crops~~for low input agriculture and higher food quality, feed-stocks ~~feed-stocks~~, marine products and biomass (including marine ressources) for energy, environment, and high added value products such as materials and chemicals, including novel farming systems, bio-processes and bio-refinery concepts; bio-catalysis; forestry and forest based products and processes; environmental remediation and cleaner processing.

ESSF comments in general:

The 3 Commission's priorities are : biotech for sustainable production systems, « farm to fork » (food and nutrition research but forgetting allergies and food related cancers), and ...biotechnology!

We instead propose to regroup biotech an genomic approaches (when socially and environmetally relevant) in one and the same activity, to enlarge food research, and to create two new autonomous

activities : one for low-input production systems and organic agriculture (note that a 1992 US Federal Farm Bill provides funds for sustainable agriculture) and one for marine and farmland biodiversity issues. It is particularly important that the biotech and 'omics approaches does not take most of the money and to focus instead on supporting low-input agriculture less using water, chemicals and fossil energy (there are strong links to environment, health, energy), preserving biodiversity, soil quality (e.g. long term use) and local supply with agricultural products (strong links to transport, e.g. short circuits)

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3. Information and Communication Technologies
Objective
To enable Europe to master and shape the future developments of Information and Communication Technologies (ICT) so that the demands of its society and economy are met. Activities will strengthen Europe's scientific and technology base in ICT, help drive and stimulate innovation through ICT use and ensure that ICT progress is rapidly transformed into benefits for Europe's citizens, businesses, industry and governments.

Rationale
Information and Communication Technologies are critical to Europe's future and underpin the realisation of the Lisbon agenda. Half of the productivity gains in our economies are explained by the impact of ICT on products, services and business processes. ICT is the leading factor in boosting innovation and creativity and in mastering change in value chains across industry and service sectors. ICT is essential to meet the rise in demand for health and ssocial care and to modernise services in domains of public interest such as education, learning, security, energy, transport and the environment. And ICT is catalytic in the advance of other fields of science and technology as it transforms the way researchers conduct their research, co-operate and innovate.
The escalating economic and societal demands, together with the continued mainstreaming of ICT and the need to push further the technology limits set a growing agenda for research. To bring technology closer to people and organisational needs means: hiding technology complexity and revealing functionality on demand; making technology very simple to use, available and affordable; providing new ICT-based applications, solutions and services that are trusted, reliable, and adaptable to the users' context and preferences. Driven by the demand of more-for-less, ICT researchers are involved in a global race to achieve further miniaturisation, to master the convergence of computing, communications and media technologies, and the convergence with other relevant sciences and disciplines, and to build systems that are able to learn and evolve. From these diverse efforts a new wave of technologies is emerging. ICT research activities will also draw on a broader range of scientific and technological disciplines including bio- and life sciences, psychology, pedagogy, cognitive and social sciences.
ICT is one the most research intensive sectors. The ICT research effort, public and private, represents a third of the total research effort in all major economies. Although Europe already enjoys industrial and technological leadership in key ICT fields it lags in investing in ICT research behind its major competitors. Only through a renewed and more intensive pooling of the effort at European level will we be able to make the most of the opportunities that progress in ICT can offer.
The ICT research activities will be closely articulated with policy actions for ICT deployment and with regulatory measures within a comprehensive and holistic strategy. Priorities have been set following extensive consultations including input from a series of European Technology Platforms and industrial initiatives in areas such as nano-electronics, embedded systems, mobile communications, electronic media, robotics and software, services and Grids.

ICT as a democratic tool allowing the expression and early inclusion of public concerns and

expectations on the setting of priorties (public policy decisions) and in innovation processes (e.g. public debates, ICT as facilitators and shortcuts between citizens and health institutions).

Activities

ICT Technology Pillars:

– *Nano-electronics, photonics and integrated micro/nano-systems*. pushing the limits of miniaturisation, integration, variety and density; increasing performance and manufacturability at lower cost; facilitating incorporation of ICT in range of applications; interfaces; upstream research requiring exploration of new concepts.

– *Ubiquitous and unlimited capacity communication networks*: ubiquitous access over heterogeneous networks - fixed, mobile, wireless and broadcasting networks spanning from the personal area to the regional and global area - allowing the seamless delivery of ever higher volumes of data and services anywhere, anytime.

– *Embedded systems, computing and control*: powerful, secure and distributed computing and communication systems that are embedded in objects and physical infrastructures and that can control and adapt to their environment.

– *Software, Grids, security and dependability*: dynamic, adaptive, dependable and trusted software and services, and new processing architectures, including their provision as a utility.

– *Knowledge, cognitive and learning systems*: capturing and exploiting knowledge embedded in web and multimedia content; bio-inspired artificial systems that perceive, understand, learn and evolve, and act autonomously; learning by machines and humans based on a better understanding of human cognition.

– *Simulation, visualisation, interaction and mixed realities*: tools for innovative design and creativity in products, services and digital media, and for natural, language-enabled and context-rich interaction and communication.

New perspectives in ICT drawing on other science and technology disciplines, including insights from physics, biotechnologies, materials- and life-sciences, for miniaturisation of ICT devices to sizes compatible and interacting with living organisms, to increase performance of systems engineering and information processing, and for modelling and simulation of the living world.

Integration of Technologies:

– *Personal environments*: personal communication and computing devices, accessories, wearables, implants; their interfaces and interconnections to services and resources.

– *Home environments*: communication, monitoring, control, assistance; seamless interoperability and use of all devices; interactive digital content and services.

– *Robotic systems*: advanced autonomous systems; cognition, control, action skills, natural interaction; miniaturisation.

– *Intelligent infrastructures*: tools making infrastructures that are critical to everyday life more efficient, easier to adapt and maintain, more robust to usage and resistant to failures.

Applications Research:

– *ICT meeting societal challenges*: New systems and services in areas of public interest improving quality, efficiency, access and inclusiveness; user friendly applications, integration of new technologies and initiatives such as ambient assisted living.

– for *health*, improving disease prevention, early diagnosis and personalisation; autonomy, safety and mobility of patients; health information space for knowledge discovery.

– to improve *inclusion* and equal participation and prevent digital divides; assistive technology; design-for-all.

– for *mobility*; intelligent ICT-based transportation systems and vehicles enabling people and goods to move safely, comfortably and efficiently.

– in support of *the environment* and sustainable development, to reduce vulnerability and to mitigate the consequences of natural disasters and

industrial accidents.
– for *governments*; efficiency, openness and accountability, for a worldclass public administration and links to citizens and businesses, supporting democracy.
– *ICT for content, creativity and personal development:*
– new *media* paradigms and new forms of content; creation of interactive digital content; enriched user experiences; cost-effective content delivery.
– technology-enhanced *learning*; adaptive and contextualised learning solutions; active learning.
– ICT-based systems to support accessibility and use over time of digital *cultural* resources and assets, in a multilingual environment
– *ICT supporting businesses and industry:*
– new forms of dynamic networked co-operative *business* processes, digital eco-systems; optimised *work* organisation and collaborative work environments.
– *Manufacturing:* rapid and adaptive design, production and delivery of highly customised goods; digital and virtual production; modelling, simulation and presentation tools; miniature and integrated ICT products;
– *ICT for trust and confidence*: identity management; authentication and authorization; privacy enhancing technologies; rights and asset management; protection against cyber threats.

Future and Emerging Technologies: to support research at the frontier of knowledge in core ICTs and in their combination with other relevant areas and disciplines; to nurture novel ideas and radically new uses and to explore new options in ICT research roadmaps.

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4. Nanosciences, Nanotechnologies, Materials and new Production Technologies
Objective
Improve the living conditions of European citizens and~~competitiveness of European industry~~ and ensure ~~its~~ the transformation of European industry from a resource-intensive to a knowledge-intensive industry, by generating breakthrough knowledge for new applications at the crossroads between different technologies and disciplines. Explore the potential of nantechnologies for sustainable development.

Rationale
~~The decline in industrial activities appears no longer to be limited to traditional sectors with a high labour intensity, but is beginning to be observed in intermediate sectors – which constitute the established strengths of European industry – and even in some high-technology sectors. This trend can and must be reversed by building, in Europe, a strong knowledgebased, knowledge intensive industry. This will include the modernisation of the existing SME base and the creation of new knowledge-driven SMEs, from the dissemination of knowledge and expertise through collaborative programmes.~~
Nanotechnologies open opportunities for applications in an extrem wide range of domains and are expected to change significantly living conditions and life style, medicine, transport and energy.
The EU has recognised leadership in fields such as in nanotechnologies, materials and production technologies and will further support the generation of new knowledge in nanosciences (e.g. for information technologies, for medical use, on material behaviour, for environmental issues). ~~which must be strengthened in order to secure and increase the EU position in a highly competitive global context.~~
Emerging technology accompanied by multiples questions of safety and impacts, the introduction of nanoparticles and nanotubes implies a responsible handling.
Therefore and in taking into account that there is a lack of evidence about risks posed bu

manufactured nanoparticles resulting in considerable uncertainties, the EU strongly supports interdisciplinary research addressing issues such as toxicity, epidemiology, persistence and bioaccumulation of manufactures nanoparticlems and nanotubes as well as their exposure pathways and the development of methodologies and instrumentation for monitoring these particles in the built and natural environment. Research concerning health risks will give a high priority to the consideration of the safety of nanoparticles in consumer products. All research results should maintain freely accessible.

European Technology Platforms in fields such as nanoelectronics, manufacturing, steel, chemistry, the transport industry, construction, industrial safety, textiles, pulp and paper help establish common research priorities and targets. In addition to industry relevant priorities and their integration for sectoral applications,~~,~~ the relevant policy, regulatory and standardisation, and impact issues will be addressed, including by responding flexibly to new policy needs that arise.

The EC will fund interdisciplinary research to investigate the social and ethical issues expected to arise from the development of some nanotechnologies. Research into public attitudes to nanotechnologies should involve more comprehensive qualitative work involving members of the general public as well as members of interested sections of society, such as the disabled, and might repeat the awareness survey to track any changes as public knowledge about nanotechnologies develops. This research should include the dialogue with representatives of a wide range of stakeholders to look at new and emerging technologies and identify at the earliest possible stage areas where potential health, safety, environmental, social, ethical and regulatory issues may arise and advise on how these might be addressed.

Appropriate research has to been undertaken on potential benefits and if they outweigh potential risks. The precautionary principle and a sustainable nanotechnology development will be important guidelines for research activities and the integration of new technologies. The exploration of opportunities that nanotechnologies open for sustainable and renewable energy production and water purification will be one focus.

Activities

Nanosciences, Nanotechnologies, Materials

– Generating new knowledge on interface and size dependent phenomena; on high-performance materials for new products and processes, nano-scale control of material properties for new applications; integration of technologies at the nano-scale; self-assembling properties; nano-motors; nano-machines and nano-systems; methods and tools for characterisation and manipulation at nano dimensions; nano and high-precision technologies and materials in chemistry; ~~impact on human safety, health and the environment~~; metrology, nomenclature and standards; exploration of new concepts and approaches for sectoral applications, including the integration and convergence of emerging technologies.

Impact on human health, environment and safety

- Generating knew knowledge on toxicity, epidemiology, persistence and bioaccumulation of manufactures nanoparticles and nanotubes and on exposure pathways; development of methodologies and instrumentation for monitoring nanoparticles and nanotubes in the natural (air, water, soil) and built environment (including comsumer products, accumulation in food chains); research into risk assessment (e.g. standards setting); developing evaluation criterias in respect to social impacts (both in Europe and the Global South).

- ~~**Materials**~~

~~- Generating new knowledge on high-performance materials for new products and processes; knowledge-based materials with tailored properties; more reliable design and~~

~~simulation; higher complexity; environmental compatibility; integration of nanomolecular-macro levels in the chemical technology and materials processing industries;~~
~~new nano-materials, bio-materials and hybrid materials, including design and control of their processing.~~

New Production and Integration of technologies for industrial applications

– Creating conditions and assets for knowledge-intensive production, including construction, development and validation of new paradigms responding to emerging industrial needs; development of generic production assets for adaptive, networked and knowledge-based production; development of new engineering concepts exploiting the convergence of technologies (eg, nano, bio, info, cognitive and their engineering requirements) for the next generation of high value-added products and services, and adaptation to the changing needs. Integrating new knowledge and technologies on nano, materials and production in sectoral and cross sectoral applications such as: health, construction, transport, energy, chemistry, environment, textiles and clothing, pulp and paper, mechanical engineering.~~**Integration of technologies for industrial applications**~~

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– ~~Integrating new knowledge and technologies on nano, materials and production in sectoral and cross sectoral applications such as: health, construction, transport, energy, chemistry, environment, textiles and clothing, pulp and paper, mechanical engineering.~~ Developing relevant toxicity tests for any new material to be released according to international risk assessment guidelines.

Social and ethical issues, public attitudes

- Addressing complex social and ethical issues related to the introduction of nantechnologies and nanoparticles; investigating development of public attitudes and dialogue with different stakeholders

Nanotechnologies into sustainable development issues

- Focusing on the development of technologies in domains such as renewable energy supply (e.g. solar cells), energy efficiency, water purification

ESSF comments in general:

Nanotechnology is today, nearly more than biotechnology, a matter of competitivity.The main problems with nanoparticules are currently the release into the environment without knowing enough about their impact, e.g. toxicity, spreading in soil, air and water, their impact on the human body, e.g; harming of organs, immun system, etc., and the question of how far nanotechnologies can be used for sustainable development, e.g. energy supply, water purification. There is far not enough focus on these questions. For more information: the report on opportunities and uncertainties of nanotechnologies of the British Royal Society from July 2004, proposing a rich and critical analysis of nanosciences and -technologies including applications, impacts on health, environment and safety; social and ethical issues, regulatory issues (http://www.nanotec.org.uk/finalReport.htm) and the reports of the ETC-Group (www.etcgroup.org),a NGO dedicated to the conservation and sustainable advancement of cultural and ecological diversity and human rights, and specialised in nanotechnologies issues since several years.

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5. Energy

Objective

Transforming the current fossil-fuel based energy system into a more sustainable one based on a diverse portfolio of energy sources, in particular renewable energies, and carriers combined with enhanced
energy efficiency, to address the pressing challenges of security of supply and climate

change, whilst increasing the competitiveness of Europe's energy industries.

Rationale

Energy systems are confronted with major challenges. The urgency to develop adequate and timely solutions is justified by the alarming trends in global energy demand (predicted to rise by 60% in the next 30 years), the need to curb dramatically emissions of greenhouse gases to mitigate the devastating consequences of climate change, the damaging volatility of oil prices (in particular for the transport sector which is heavily oil dependent) and geopolitical instability in supplier regions. Research and demonstration are needed to provide the most environmentally and cost-effective technologies and measures enabling the EU to meet its targets under the Kyoto Protocol and beyond and to implement its energy policy commitments, as described in the 2000 Green Paper on the security of energy supply.

Europe has developed world leadership in a number of energy technologies. It is the pioneer in modern renewable energy technologies, such as bio-energy and wind energy. The EU is also a global competitor in power generation and distribution technologies and has a strong research capability in the area of carbon capture and sequestration. These positions, however, are under severe threat from competition (in particular from the US and Japan).~~Radically transforming the energy system requires new technologies with risks that are too high and the benefits too uncertain for private firms to provide all the investment needed for research, development, demonstration and deployment.~~ The renewable and sustainable energy industry is a sector of growing economic potential and will be strongly supported by European reserach activities. Public support should therefore play a key role in mobilising private investment and European efforts and resources should be combined in a coherent and more effective manner, to compete with economies that are investing heavily and consistently in similar technologies. European technology platforms play a vital role in this regard, by mobilising the necessary research effort in a coordinated manner. The activities to meet the objective are set out below. A specific activity on knowledge for energy policy making is included which may also provide support to new policy needs that emerge, for example relating to the role of European energy policy in the developments of international climate change actions, and instabilities or disruptions in energy supply and price.

The threat of climate change is so urgent that this theme should seek to ensure global applicability of technologies and facilitate ease of transfer to developing countries.

Activities

Hydrogen and fuel cells

Integrated action to provide a strong technological foundation for competitive EU fuel cell and hydrogen industries, for stationary, portable and transport applications. The Hydrogen and Fuel Cells European Technology Platform helps this activity by proposing an integrated research and deployment strategy.

Renewable electricity generation

Technologies to increase overall conversion efficiency, driving down the cost of electricity production from indigenous renewable energy sources, and the development and the demonstration of technologies suited to different regional conditions.

Renewable fuel production

Integrated conversion technologies: to develop and drive down the unit cost of solid, liquid and gaseous (including hydrogen) fuels produced from renewable energy sources, aiming at the cost-effective production and use of carbon-neutral fuels, in particular liquid biofuels for transport.

Renewables for heating and cooling

Technologies to increase efficiencies and drive down the costs of heating and cooling from

renewable energy sources, ensuring their use in different regional conditions.

CO2 capture and storage technologies for zero emission power generation

To drastically reduce the environmental impact of fossil fuel use aiming at highly efficient power generation plants with near zero emissions, based on CO2 capture and storage technologies.

Clean coal technologies

To substantially improve plant efficiency, reliability and cost through development and demonstration of clean coal conversion technologies.

Smart energy networks

To increase the efficiency, safety and reliability of the European electricity and gas systems and networks e.g. by transforming the current electricity grids into an interactive (customers/operators) service network and to remove obstacles to the large-scale deployment and effective integration of distributed and renewable energy and co-generation sources.

Energy efficiency and savings

New concepts and technologies to improve energy efficiency and savings for buildings, services, agriculture and industry. This includes the integration of strategies and technologies for energy
efficiency, the use of new and renewable energy technologies and energy demand management.Short circuits between place of production and place of consumption (supporting local production). Re-examine agricultural and forest production techniques in order to reduce their energy needs.

Knowledge for energy policy making

Development of tools, methods and models to assess the main economic and social issues related to energy technologies and to provide quantifiable targets and scenarios for medium and long term horizons.

ESSF comments in general:

Even if renewable energies are integrated in the text, it is not at all sure that a really strong focus will be put on them (as one can see from FP5 and FP6 where renewable energies got only about a quarter of the budget of nuclear energy, and from recent statements of EC officers). Renewable energies and energy efficiency should explicitly appear in the objectives and rationale. In the discussions on the distribution of the budget of the theme, attention should be payed to the fact that at least 75% of research money should be spent on renewable energies and energy efficiency.

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6. Environment (including Climate Change)

Objective

Sustainable management of the environment and its resources through advancing our knowledge on the interactions between the biosphere, ecosystems and human activities, and developing new technologies, tools and services, in order to address in an integrated way global environmental issues . Emphasis will be put on prediction of climate, ecological, earth and ocean systems changes; on tools and technologies for monitoring, prevention and mitigation of environmental pressures and risks including on health, as well as for the conservation of the natural and man-made environment.

Rationale

Environmental problems go beyond national frontiers and require a coordinated approach at a pan-European and often global level. Earth's natural resources and the man-made environment are under intense pressures from the growing human consumption and from wastage of resources due to growing population, urbanisation, continuousexpansion of ~~the~~intensive agriculture, aquaculture, transport and energy sectors, as well as climate variability and warming at local, regional and global

scales. Europe needs to engage in a new sustainable relationship with the environment while responding to citizens demands and improving competitiveness and strengthening European industry. EU-wide cooperation is needed to attain critical mass given the scale, scope and high level of complexity of environmental research. It facilitates common planning, the use of connected and inter-operable databases, and the development of coherent and large scale observation and forecasting systems.

Research is needed at EU level for the implementation of international commitments such as the Kyoto protocol, the UN Convention on Biological Diversity,the International Treaty on Plant Genetic Ressources for Food and Agriculture, the objectives of the World Summit on Sustainable Development 2002, including the EU Water Initiative, and contributions to the Intergovernmental Panel on Climate Change and the Earth Observation initiative. In addition there are significant research needs arising from existing and emerging EU level policies, the implementation of the 6th Environmental Action Plan and associated thematic strategies, the action plans on Environmental Technologies and Environment and Health, and Directives such as the Water Framework.

The EU needs to strengthen its position in world markets for environmental technologies. Such technologies help deliver sustainable growth providing eco-efficient and socially beneficial solutions to environmental problems at different scales and protecting our cultural heritage. Environmental requirements act as a stimulus for innovation and can provide business opportunities. European Technology Platforms on water supply and sanitation and on sustainable chemistry confirm the need for EU level action and their research agendas are taken into consideration in the activities below. Other Platforms (e.g. on Construction and on Forestry) partially deal with environmental technology issues and are taken into consideration as well.
A moral imperative and a broad understanding of security requires that water conservation, purification and pollution control technologies are cheap and applicable to developing country contexts

A series of activities are listed below many of which are directly relevant to policy needs. However, additional support may be provided to new policy needs that emerge, for example relating to sustainability impact assessments of EU policies; the follow up of the post-Kyoto action on Climate Change; and new environmental policies such as in maritime policy, standards and regulations.

Activities

Climate change, pollution and risks

– *Pressures on environment and climate:* Functioning of climate and the earth system; adaptation and mitigation measures; pollution in air, soil and water; changes in atmospheric composition and water cycle; interactions between climate, land surface and the ocean; and impacts on biodiversity and ecosystems.
– *Environment and health:* Interaction of environmental stressors with human health including identification of sources, links to indoor environment, and impact and emerging risk factors; integrated risk assessment methods for toxic substances including alternatives to animal testing; quantification and cost-benefit analysis of environmental health risks (as well as their representation) and alternative methods to costs-benefit analysis for judging risks and indicators for prevention strategies.
– *Natural hazards:* Improve prediction and integrated hazards- vulnerability - and risks assessments for disasters related to geological hazards (such as earthquakes, volcanoes, tsunamis) and climate (such as storms and floods); develop early warning systems and improve prevention and mitigation strategies.

Sustainable Management of Resources

– *Conservation and sustainable management of natural and man-made resources*: ecosystems; water resources management; waste management and prevention; protection and management of biodiversity, including agricultural biodiversity,soil protection, seabed and coastal areas protection,
approaches against desertification and land degradation; forest management; sustainable management and planning of urban environment, data management and information services; assessment and foresight relating to natural processes.
– *Evolution of marine environments*: Impacts of human activities on the marine environment and its resources; pollution and eutrophication in regional seas and coastal areas; deep sea ecosystems; assessment of marine biodiversity trends, of ecosystem processes and of ocean circulation; seabed geology.

Environmental Technologies

– *Environmental technologies for observation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment*: related to water, climate, air, marine, urban and rural environment, soil, waste treatment, recycling, clean production processes, chemicals safety, protection of cultural heritage and of the built environment.
– *Technology assessment, verification and testing*: Methods and tools for environmental risk and lifecycle assessment of processes, technologies and products; support for sustainable chemistry, water supply and sanitation Platforms; scientific and technological aspects of a future European environmental technologies verification and testing programme.

– Adaptation and cost reduction for developing country technology transfer

Earth observation and assessment tools

– *Earth observation:* Contribute to the development and integration of observation systems for environmental and sustainability issues in the framework of GEOSS; interoperability between systems and optimisation of information for understanding, modelling and predicating environmental phenomena, social appraisal of technology impacts.
– *Forecasting methods and assessment tools:* modelling links between economy/environment/society including market based instruments, externalities, thresholdsand non for profit activities
and developing the knowledge base and methodologies for sustainability impact assessment on key issues such as land use and marine issues; social and economic tensions related to climate change.

ESSF comments in general:
There should be a strong focus on the contradiction between environmental protection and the use of highly consuming and polluting technologies, as for instance in agriculture (e.g. water, chemicals, fossil energy), production processes (e.g. fossil energy, waste accumulation) and mobility behaviour (e.g. transport of goods (trains instead of lorries) and explosing individual use of airtransport)

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7. Transport (including Aeronautics)
Objective
Based on technological advances, develop integrated, "greener" and "smarter" pan-European public transport systems for the benefit of the citizen and society, respecting the environment and natural resources; restrict transport needs by developing short and local circuits and securing and further developing the leading role attained by the European industries in the global market.

Rationale

Transport is one of Europe's strengths - the air transport sector contributes to 2.6% of the EU GDP (with 3.1 million jobs) and the surface transport field generates 11% of the EU GDP (employing some 16 million persons). However, transport is responsible for 25% of all the EU emissions of CO_2, hence the absolute need for a "greening" of the system and the need to restrict and prevent growth in aviation and surface transport given the sector's threat to sustainability to ensure more sustainable transport patterns and compatibility with growth rates, as developed in the White Paper on "European Transport Policy for 2010: time to decide".

The enlargement (increasing land surface by 25% and population by 20%) and economic development of the EU present new challenges for transporting people and goods efficiently, cost-effectively and in a sustainable manner. Transport also has direct relevance on other major policies such as trade, competition, employment, cohesion, energy, security and the internal market. Investment in RTD in EU transport industries is a prerequisite to ensure technological competitive advantage in global markets. Activities at European level will also stimulate the restructuring of the industry, including the integration of the supply chain and in particular SMEs.

The research agendas developed by European Technology platforms[20] support the need to take a new "transport systems" perspective that considers the interactions of vehicles, transport networks and the use of transport services, which can only be developed at European level. RTD costs in all these fields are rising substantially, and collaborative activity at EUlevel is essential to enable a "critical mass" of diverse RTD providers to address the scale and multi-disciplinary challenges in a cost-effective way, as well as meeting the political, technological and socio-economic challenges on issues such as the "clean and safe vehicle" of the future, interoperability and intermodality with particular reference to rail transport, affordability, safety, capacity, security and environmental impacts in an enlarged Union. Also, developing technologies in support of the Galileo system and its applications will be essential in implementing European policies.
As well as the strong industry relevance of the themes and activities set out below, the needs of policy makers will be addressed in an integrated way covering economic, social and environmental aspects of transport policy. In addition, support will be provided to respond to existing as well as new policy needs, for example relating to developments in maritime policy.

Activities

Aeronautics and air transport

– *The greening of air transport:* reduction of emissions and noise disturbance, incorporating work on engines and alternative fuels, structures and new aircraft designs, airport operations and traffic management.
~~– *Increasing time efficiency:* improvement of the efficiency of operating schedules focusing on innovative air traffic management systems in line with the effective implementation of Single Sky policy which integrate air, ground and space components, including traffic flow and more aircraft autonomy.~~
– *Ensuring* ~~*customer satisfaction and*~~ *safety*: *improving all safety aspects of air transport*: improvement of passenger comfort, innovative
in-flight services and more efficient passenger handling; improvement of all safety aspects of air transport; wider choice of aircraft ranging from wide body to small size vehicles.
~~– *Improving cost efficiency:* reduction of costs associated with product development, manufacturing and operating costs focusing on zero maintenance aircraft, increased use of automation and simulation.~~
– *Protection of aircraft and passengers:* enhancement of protection measures for the traveller, crew, aircraft and air transport system such as improved data and identification methods, protecting the aircraft against attack, auto recovery and improved security design of aircraft.

– *Pioneering the air transport of the future:* addressing the longer term challenges of aviation with more radical, environmentally efficient and innovative combinations of technologies which would lead to significant steps forward in air transport.
– *Reducing need or desire to fly:* understanding motivations and needs to fly and exploring how these could be met without doing so. What fiscal or cultural incentives could be adopted to reduce aviation growth

Surface transport (rail, road and waterborne)
– *The greening of surface transport*: reduction of environmental and noise pollution;; development of clean and efficient engines, including hybrid technology and the use of alternative fuels for transport applications; end of life strategies for vehicles and vessels.
– *Encouraging modal shift and decongesting transport corridors:* development of innovative, intermodal and interoperable regional and national transport networks, infrastructures and systems in Europe; cost internalisation; information exchange between vehicle/vessel and transport infrastructure; optimisation of infrastructure capacity.
– *Ensuring sustainable urban mobility:* innovative organisation schemes, including clean and safe vehicles and non-polluting means of transport, new public transportation modes and rationalisation of private transport, communication infrastructure, integrated town planning and transport.
– *Improving safety and security*: as inherent to the transport system, in transport operations for drivers, passengers, crew, cyclists and pedestrians, in the design of vehicles, vessels, and within the total transport system.
– *Strengthening competitiveness*: improvement of design processes; development of advanced power-train and vehicle technologies; innovative and cost-effective production systems and infrastructure construction; integrative architectures.
Support to the European global satellite navigation system (Galileo): precise navigation and timing services for use in a range of sectors; efficient use of satellite navigation and support to the definition of second generation technologies.

ESSF comments in general:
Reduction of transport needs as well for produced goods as for individuals should be one of the main research issues in transport (e.g. short circuits, trains). The enlargement of public transport systems including their economic rentability and environmental compatibility should be addressed by European research as well as the development of energy efficient and less polluting transport means.

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8. Socio-Economic Sciences and the Humanities
Objective
Generating an in-depth, shared understanding of complex and interrelated socioeconomic challenges Europe is confronted with, such as ~~growth, employment and competitiveness,~~ new social inequality and a widening gap between rich and poor, plural societies and cultural diversity, accelerated economic restructuring, social cohesion and sustainability, quality of life and global interdependence, in particular with the view of providing an improved knowledge base for policies and citizens in the fields concerned.

Rationale
Europe has a strong and high quality research base in socio-economic sciences and the humanities fields. The diversity of approaches within the EU in the economic, social, political and cultural domains provides a highly fertile ground for research in these fields at EU-level. There is a high European added value in collaborative research addressing European socioeconomic issues in the areas mentioned. First, the issues and challenges concerned are of high

priority at the EU level and are addressed by EU policies. Second, comparative research across several or all EU countries offers a particularly effective tool as well as important learning opportunities and a capacity of critical analysis across countries and regions. Third, EU-level research has particular advantages in being able to develop Europe-wide data collection and to employ the multiple perspectives needed to understand complex issues. Furthermore, in the knowledge based society, we are witnessing a process of permanent and disseminated innovation where society as a whole becomes a common productive and creative place. Humanities and socio-economic research will address this emerging issue, in particular in respect to social and environmental benefits as parameters of the strength of the society. In this context, the importance of a localisation of the research agenda has to be understood – making research responsive to local need – rather than an assumption that all research needs to be applicable Europe-wide.

The EU, as a major economic power, has to take into account and critically reflect the global impact of its socioeconomic development, including its patterns of production and consumption, trade policy and lifestyles.

Finally, the development of a genuinely European socio-economic knowledge base on these key challenges will make an essential contribution to promoting their shared understanding across the European Union and, most significantly, on the part of the European citizens.

The activities to be supported are listed below and are expected to contribute significantly to improve the formulation, implementation, impacts and assessments of policy in a wide range of areas such as economic, social, education and training, enterprise, international trade, consumer, external relations, justice and home affairs and official statistics policies. In addition, opportunities will be provided to address emerging socio-economic challenges as well as to undertake research on new or unforeseen policy needs.

Activities

~~**Growth, employment and competitiveness in a knowledge society:** developing and integrating research on the issues affecting growth, employment and competitiveness, ranging from innovation, education including life-long learning and the role of scientific and other knowledge, to national institutional contexts.~~

Social inequality under conditions of accelerated economic restructuring: Developing and integrating research on issues such as social inequality and social exclusion occurring in a process of or as a result of rapid economic change and neoliberal restructuring.

Combining economic, social and environmental objectives in a European perspective: by addressing the two key and highly interrelated issues of continuing evolution of European socio-economic models and economic and social cohesion in an enlarged EU, taking into account the protection of the environment.by developing concepts of socialised innovation

- **Governance of cultural diversity:** Deepening our understanding of cultural diversity and developing post-nationalist concepts of governance of cultural diversity.
- **Major trends in society and their implications:** such as demographic change including ageing and migration; lifestyles, work, families, gender issues, health and quality of life; criminality; the role of business in society and population diversity, the role of citizens in the « scientific-technical democracy », cultural interactions and issues related to protection of fundamental rights and the fight against racism and intolerance.

Europe in the world: understanding changing interactions and interdependencies between world regions, analysing exchanges and receptions in culture and arts -and their implications for the regions concerned, especially Europe; and addressing emerging threats and risks without undermining human rights, freedom and well-being.understanding responsibilities of Europe for social, economic and environmental justice in the European member states, in the Global South and in the world

The citizen in the European Union: in the context of the future development of the EU, addressing the issues of achieving a sense of democratic and cultural "ownership" and active participation by the peoples of Europe; effective and democratic governance including economic governance; and building a shared understanding and respect for Europe's diversities and commonalities in terms of culture, institutions, history, languages and values.

Socio-economic and scientific indicators: their use in policy and its implementation and monitoring, the improvement of existing indicators and the development of new ones for this purpose including long term social and environmental parameters (e.g. social rate of return of innovation) and for the evaluation of research programmes, including indicators based on official statistics.

Foresight activities on major science, technology and related socio-economic issues such as the future demographic trends and the globalization of knowledge and evolution of research systems, as well as of the future developments in and across major research domains and scientific disciplines.

- **Sustainable consumption:** increase understanding of psychological, social, cultural, and economic drivers of current consumption patterns with a view to tackling the barriers to moving to more sustainable levels of consumption.

ESSF comments in general:
Socioeconomic sciences and humanities should focus on the growing inequalities in our societies, on the evaluation of technologies according to social, environmental, and economic indicators (e.g. compatibility of emerging technologies with democratic values, impacts on the countries of the Global South, participatory technology assessment and foresight), and the implication of the European citizens in political decision processes (e.g. participatory deliberation processes,).

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9. ~~Security and Space~~ Peace research and conflict prevention
Objective

Non-violent conflict prevention and resolution processes
Social processes for overcoming gender and racial discrimination
Verification technology on WMD and other banned/restricted weaponry
Generation of mechanisms that ensure the clear and transparent separation of civilian and military research and applications
conflict resolution is almost entirely a socio-political subject. dealing with the modes of security that emphasise prevention of conflict rather than the military might to deal with it.
~~**To develop the technologies and knowledge for building capabilities needed to ensure the security of citizens from threats such as terrorism, and crime, while respecting fundamental human rights; to ensure optimal and concerted use of available technologies to the benefit of European security, and to stimulate the co-operation of providers and users for security solutions.**~~
~~**Supporting a European Space Programme focusing on applications such as GMES with benefits for citizens and for the competitiveness of the European space industry. This will contribute to the development of a European Space Policy, complementing efforts by Member States and by other key players, including the European Space Agency.**~~

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~~**9.2 Space**~~
~~**Rationale**~~

~~The EU can contribute in this field to the better definition of common objectives based on user requirements and policy objectives; to the coordination of activities, to avoid duplications and maximise interoperability; and to the definition of standards. Public authorities and decision-makers represent important potential users and the European industry will also benefit from a well defined European Space policy implemented through a European Space Programme, supported in part by the proposed research and technological development actions. European level actions are also needed to support EU policy objectives, for example in the fields of agriculture, fisheries, environment, telecommunications, security, transport as well as ensuring that Europe is a respected partner in regional and international cooperation.~~
~~In the last 40 years, Europe has built up excellent technological competence. Sustaining a competitive industry (including manufacturers, service providers and operators) requires new research and technologies. Space applications bring important benefits to the citizens.~~
~~The activities set out below aim at: the exploitation of space assets for the implementation of applications, namely GMES (Global Monitoring for Environment and Security) and their contribution to law enforcement in EU policies; as well as space exploration, allowing international cooperation opportunities and dramatic technological breakthroughs;. exploitation and exploration of space supported through enabling activities guaranteeing the strategic role of the European Union. These activities will be complemented by other actions included in the Competitiveness and Innovation Framework Programme and in the Education and Training Programme. The public policy benefits of the below activities will also be maximised, included additional support for new policy needs that may arise, for example: space based solutions in support of developing countries; and use of space-observation tools and methods to support developments in Community policies.~~

~~Activities~~

- **~~Space-based applications at the service of the European Society~~**

~~– GMES: development of satellite-based monitoring systems and techniques relating to the management of the environment and security and their integration with ground-based, ship-borne and airborne components; support to the use and delivery of GMES data and services.~~
~~– Innovative satellite communication services, seamlessly integrated in the global electronic communication networks, for citizens and enterprises in application sectors encompassing civil protection, e-government, telemedicine, tele-education and generic users.~~
~~– Development of technologies for reducing the vulnerability of space-based services and for~~

- **~~contributing to the surveillance of space.~~~~Roots of insecurity and conflict: analysis of social, economic and environmental factors which can contribute to all forms of insecurity (especially at the international level) and at times to conflict.~~**
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~~The above four areas will be supported by the following themes of a more cross-cutting nature:~~

- **~~Security Systems Integration and interoperability:~~** ~~focusing on technologies to enhance the interoperability of systems, equipment, services and processes, including law enforcement information infrastructures, as well as on the reliability, organisational aspects, protection of confidentiality and integrity of information and traceability of all transactions and processing.~~
- **~~Security and society:~~** ~~mission orientated research which will focus onsocio-economic analyses, scenario building and activities related to: crime, the citizen's perception of security, ethics, protection of privacy and societal foresight. Research will also address technologies that better safeguard privacy and liberties, and will address vulnerabilities and new threats, as well as the management and impact assessment of possible consequences.~~
- **~~Security Research Co-ordination and structuring:~~** ~~co-ordination of European and international security research efforts and development of synergies between civil, security and defence research, improvement of legal conditions, and encouragement to the optimal~~

- ~~**use of existing infrastructures.**~~
- ~~**9.1 Security**~~

~~**Rationale**~~

~~Security in Europe is a precondition of prosperity and freedom. The EU Security Strategy: 'A Secure Europe in better World', adopted by the European Council, addresses the need for a comprehensive security strategy encompassing both civil and defence-related security measures.~~

~~Security related research is an important building block in supporting the Common Foreign and Security Policy as well as for realising a high level of security within an EU-wide area of justice, freedom and security as underpinned by the Hague programme. It will also contribute to developing technologies and capabilities in support of other EU policies in areas such as transport, civil protection, energy and environment.~~

~~Existing security related research activities in Europe suffer from the fragmentation of efforts, the lack of critical mass of scale and scope and the lack of connections and interoperability. Europe needs to improve the coherence of its efforts by developing efficient institutional arrangements and by instigating the various national and international actors to co-operate and co-ordinate in order to avoid duplication and to explore synergies wherever possible. Security research at Community level will focus on activities of clear added value to the national level. As a consequence, security research at Community level will reinforce the competitiveness of the European security industry.~~

~~The activities set out below will complement and integrate the technology- and systemsoriented research relevant to security which is carried out in other themes. They will be mission-oriented, developing the technologies and capabilities as required by the specific security missions. They are by design flexible so as to accommodate as yet unknown future security threats and related policy needs that may arise, stimulating cross-fertilisation and the take-up of existing technologies for the civil security sector, European security research will also encourage the development of multi-purpose technologies in order to maximise the scope for their application.~~

~~**Activities**~~

- ~~**Protection against terrorism and crime:** delivering technology solutions for threat (e.g. CBRN) awareness, detection, prevention, identification, protection, neutralisation and containment of effects of terrorist attacks and crime.~~
- ~~**Security of infrastructures and utilities:** analysing and securing existing and future public and private critical/networked infrastructure (e.g. in transport, energy, ICT), systems and services (including financial and administrative services).~~
- ~~**Border security:** focusing on technologies and capabilities to enhance the effectiveness and efficiency of all systems, equipment, tools and processes required for improving the security of Europe's land and coastal borders, including border control and surveillance issues.~~
- ~~**Restoring security in case of crisis:** focusing on technologies in support of diverse emergency management operations (such as civil protection, humanitarian and rescue tasks, support to CFSP), and on issues such as inter-organisational co-ordination and~~
- ~~**communication, distributed architectures and human factors.**~~
- ~~**Exploration of space**~~

~~– Contribution to international space exploration initiatives.~~

- ~~**RTD for strengthening space foundations**~~

~~– Space transportation technology: research to increase the competitiveness of the European space transportation sector.~~

– ~~**Space sciences including life in space.**~~

II IDEAS

Objective

This programme will enhance the dynamism, creativity and excellence of European research at the frontier of knowledge. This will be done by supporting "investigatordriven" research projects carried out across all fields by individual teams in competition at the European level. Projects will be funded on the basis of proposals presented by researchers on subjects of their choice and evaluated on the sole criterion of excellence as judged by peer review.

Rationale

Investigator-driven "frontier" research key driver of wealth and social progress, as it opens new opportunities for scientific and technological advance, and is instrumental in producing new knowledge leading to future applications and markets.

Despite many achievements and a high level of performance in a large number of fields, Europe is not making the most of its research potential and resources, and urgently needs a greater capacity to generate knowledge.

A Europe-wide competitive funding mechanism for frontier research executed by individual teams is a key component of the European Research Area, complementing other EU and national activities. It will help reinforce the dynamism and attractiveness of Europe for the best researchers from both European and third countries, and for industrial investment.

Activities

This action will respond to the most promising and productive areas of research and the best opportunities for scientific and technological progress, within and across disciplines, including engineering and social sciences and the humanities. It will be implemented independently of the thematic orientations of the other parts of the Framework Programme, and will pay attention to young researchers and new groups as well as established teams.

The EU activities in frontier research will be implemented by a European Research Council (ERC), consisting of a scientific council, supported by a dedicated implementation structure.

The scientific council will consist of representatives of the European scientific community at the highest level, acting in their personal capacity, independently of political or other interests. Its members will be appointed by the Commission following an independent procedure for their identification. The scientific council will, inter alia, oversee decisions on the type of research to be funded and act as guarantor of the quality of the activity from the scientific perspective. Its tasks will cover, in particular, the development of the annual work programme, the establishment of the peer review process, as well as the monitoring and quality control of the programme's implementation from the scientific perspective.

The dedicated implementation structure will be responsible for all aspects of implementation and programme execution, as provided for in the annual work programme. It will, in particular, implement the peer review and selection process according to the principles established by the scientific council and will ensure the financial and scientific management of the grants.

The implementation and management of the activity will be reviewed and evaluated at appropriate intervals to assess its achievements and to adjust and improve procedures on the basis of experience.

The European Commission will act as the guarantor of the ERC's full autonomy and integrity.

III PEOPLE

Objective

Strengthening, quantitatively and qualitatively, the human potential in research and technology in Europe, by stimulating people to enter into the researcher's profession, encouraging European researchers to stay in Europe, and attracting to Europe researchers from the entire world, making Europe more attractive to the best researchers. This will be done by putting into place a coherent set of "Marie Curie" actions, addressing researchers at all stages of their careers, from initial research training to life long learning and career development.

Rationale

Abundant and highly trained qualified researchers are a necessary condition to advance science and to underpin innovation, but also an important factor to attract and sustain investments in research by public and private entities. Against the background of growing competition at world level, the development of an open European labour market for researchers and the diversification of skills and career paths of researchers are crucial to support a beneficial circulation of researchers and their knowledge, both within Europe and in a global setting.

Mobility, both trans-national and intersectoral, including stimulating industrial and civil society participation and the opening of research careers and academic positions at European scale, is a key component of the European Research Area and indispensable to increase European capacities and performances in research.

Activities

Initial training of researchers to improve their career perspectives, in both public and private sectors, **and in public interest organisations,** including through the broadening of their scientific and generic skills, and

attracting more young researchers to scientific careers

This will be implemented through Marie Curie Networks with the main objective to overcome fragmentation of and to strengthen at European level the initial training and career development of researchers. Members of the trans-national networks shall exploit their complementary competencies through integrated training programmes. Support will comprise recruitment of early stage researchers, organisation of training events also open to researchers outside the network and senior chairs and/or industry positions **and/or CSO positions** for knowledge transfer and supervision. **Promising young researchers will be given the opportunity to take a short leave to enlarge their views on science in society issues.**

Life-long training and career development to support the career development of experienced researchers. With a view to complementing or acquiring new skills and competencies or to enhance inter/multidisciplinarity and/or inter-sectoral mobility, support is foreseen for researchers with particular needs for additional/complementary competences and skills, for researchers to resume a research career after a break and for (re)integrating researchers into a longer term research position in Europe, including in their country of origin, after a trans-national/international mobility experience. This action line will be implemented through both individual fellowships awarded directly at Community level and through the co-financing of regional, national or international programmes.

Industry – academia pathways and partnerships: Support to longer term co-operation programmes between organisations from academia and industry, in particular SMEs, aims at increasing knowledge sharing through joint research partnerships, supported by the recruitment of experienced researchers to the partnership, by staff secondments between both sectors, and by the organisation of events.

• Civil Society Organisation-academia pathways and partnerships: Support to longer term co-operation programmes between organisations from academia and CSOs aims at increasing knowledge sharing through joint research partnerships, supported by the recruitment of experienced

researchers to the partnership, by staff secondments between both sectors, and by the organisation of events

The international dimension, to increase the quality of European research by attracting research talent from outside Europe and fostering mutually beneficial research collaboration with researchers from outside Europe. This will be addressed through international outgoing fellowships (with an in-built mandatory return phase); international incoming fellowships; partnerships to support the exchange of researchers. Common initiatives between European organisations and organisations from countries neighbouring the EU and countries with which the EU has a Science and Technology agreement will also be supported. The activity will include measures to counter the risk of "brain drain" from developing countries and emerging economies and measures to create networks of European researchers working abroad. These actions will be implemented in line with the international activities under the "Co-operation" and "Capacities" Programmes.

Specific actions to support the creation of a genuine European labour market for researchers, by removing obstacles to mobility and enhancing the career perspectives of researchers in Europe. Furthermore, awards to improve the public awareness of Marie Curie actions and their objectives will be provided.

IV CAPACITIES

This part of the Framework Programme will enhance research and innovation capacities throughout Europe and ensure their optimal use. This aim will be achieved through:

– Optimising the use and development of research infrastructures.
– Strengthening innovative capacities of SMEs and civil society organisations and their ability to benefit from research.
– Supporting the development of regional research-driven clusters.
– Unlocking the research potential in the EU's convergence and outermost regions.
– Bringing science and society closer together for the harmonious integration of science and technology in European society.
– Horizontal actions and measures in support of international co-operation.

The activities undertaken in this part of the Framework Programme will also support the coherent development of policies, complementing the coordination activities under the cooperation programme, and contributing to Community policies and initiatives that aim to improve the coherence and impact of Member States policies. This will include:

– Strengthening and improving the European science system, such as questions of scientific advice and expertise (pluralistic expertise including civil society organisations) and contributing to « better regulation »
– Strengthening and improving the democratic governance of the European Science and Technology Policy, through participatory Technology assessment and foresight.
– Monitoring and analysis of research related public policies and industrial strategies.
– Coordination of research policies, including trans-national cooperation initiatives undertaken at national or regional level on issues of common interest.

RESEARCH INFRASTRUCTURES

Objective

Optimising the use and development of the best research infrastructures existing in Europe, and helping to create in all fields of science and technology new research infrastructures of pan-European interest needed by the European scientific community to remain at the forefront of the advancement of research, and able to help industry, public

bodies and civil society organisations to strengthen ~~its~~their base of knowledge and its technological know how.

Rationale

Research infrastructures play an increasing role in the advancement of knowledge and its exploitation. For example, radiation sources, data banks in genomics and data banks in social science, observatories for environmental and space sciences, systems of imaging or clean rooms for the study and development of new materials or nano-electronics, are at the core of research. They are expensive, need a broad range of expertise to be developed, and should be used and exploited by a large community of scientists, ~~and~~ customer industries, public bodies and civil society organisations on a European scale.

The development of a European approach with regard to research infrastructures, including computing and communication based *e*-infrastructures, and the carrying out of activities in this area at Union level, can make a significant contribution to boosting European research potential and its exploitation.

The EU can and should play a catalysing and leveraging role by helping to ensure wider and more efficient access to, and use of, the infrastructures existing in the different Member States, by stimulating the development of these infrastructures in a coordinated way and by fostering the emergence of new research infrastructures of pan-European interest in the medium to long term.

Activities

Activities carried out in this field will be executed in the whole field of science and technology. They will be implemented in close cooperation with the activities taking place in the thematic areas to ensure that all the actions undertaken at European level in the EU framework respond to the needs for research infrastructures in their respective area including international cooperation.

The activities will be the following:

Support to existing research infrastructures

– *trans-national access* to ensure that European researchers may have access to the best research infrastructures to conduct their research, irrespective of the location of the infrastructure

– *integrating activities* to structure better, on a European scale, the way research infrastructures operate in a given field and promote their coherent use and development

– *research e-infrastructure* by fostering the further development and evolution of highcapacity and high-performance communication and grid infrastructures and reinforcing European high-end computing capabilities, as well as fostering the adoption by user communities, enhancing their global relevance and increasing the level of trust and confidence, building on the achievements of GEANT and Grid infrastructures.

Support to new research infrastructures

– *construction of new infrastructures and major updates of existing ones* to promote the creation of new research infrastructures, based on the work conducted by ESFRI[22] notably, and which may be decided on the basis of Article 171 of the Treaty or on the basis of Specific Programme Decisions in accordance with Article 166 of the Treaty. In particular, research fields linked to sustainable development, e.g. renewable energies, toxicity testing of chemicals, organic agriculture, will benefit from these new infrastructures

– *design studies*, through a bottom-up approach of calls for proposals, to promote the creation of new research infrastructures by funding exploratory awards and feasibility studies for new infrastructures.

Infrastructures projects proposed for funding in this respect will be identified on the basis of a series of criteria including in particular:

– Added value of EU financial support

– Capacity to offer a service to users from the scientific (academic and industrial)

community at European level
- Capacity to offer a service to users from public bodies and civil society
– Relevance at international level
– Socioeconomic and environmental impacts
– Technological feasibility
– Possibilities for European partnership and commitment of major stakeholders
– Construction and operating costs evaluated.
As far as the construction of new infrastructures is concerned, an efficient coordination of the Community financial instruments, Framework Programme and Structural Funds in particular, will be ensured.

RESEARCH FOR THE BENEFIT OF SMEs
Objectives
Strengthening the innovation capacity of European SMEs and their contribution to the development of new technology based products, in particular in the renewable energy and the energy efficiency sector, in the public health domain, in the sustainable food production and in waste reduction, and markets by helping them outsource research, increase their research efforts, extend their networks, better exploit research results and acquire technological know how.

Rationale
SMEs are at the core of European industry. They should be a key component of the innovation system and in the chain of transformation of knowledge into new products, processes and services. Faced with an increasing competition in the internal market and globally, European SMEs need to increase their knowledge and research intensity, expand their business activities on larger markets and internationalize their knowledge networks. Most Member states actions relevant to SMEs do not encourage and support trans-national research cooperation and technology transfer. Actions at EU level are necessary to complement and enhance the impact of actions undertaken at national and regional level. In addition to the actions listed below, the participation of SMEs will be encouraged and facilitated, and their needs taken into account, across the Framework Programme.

Activities
Specific actions in support to SMEs are conceived to support SMEs or SME associations in need of outsourcing research to universities and research centres: mainly low to medium tech SMEs with little or no research capability. Research intensive SMEs who need to outsource research to complement their core research capability may also participate. Actions will be carried out in the entire field of science and technology. Financial means will be allocated through two schemes:
– ***Research for SMEs:*** To support small groups of innovative SMEs to solve common or complementary technological problems
– ***Research for SME associations:*** To support SME associations and SME groupings to develop technical solutions to problems common to large numbers of SMEs in specific industrial sectors or segments of the value chain.
The Competitiveness and Innovation Programme will provide support to networks of intermediaries and national schemes for actions to encourage and facilitate the participation of SMEs in the Framework Programme.

RESEARCH FOR THE BENEFITS OF CSOs
Objectives
Strengthening the innovation capacity of European CSOs and their contribution to the development of the European knowledge society.

Rationale
Civil society (non profit sector, social and solidary economy sector) has become a major location for knowledge, innovation and expertise (« scientific third sector»). Innovation is not limited to specialised professional institutions but can emerge from bottom-up civil society initiatives. Not to tap into and enhance these new knowledge-society dynamics would be actively counter-productive to Europe's aspiration towards a knowledge-based society.
The present challenges require new forms of cooperation between scientists, citizens and policy makers further proving that a high quality research is possible starting from socially driven demands.

Activities
Specific actions in support to CSOs are conceived to support CSOs or CSO associations in need of research from universities and research centres. Actions will be carried out in the entire field of science and innovation. FP7 funds will be invested in dedicated programs to enhance NGO - academic joint research and innovation projects and to support the professional mobility of researchers between the non profit sector and public research institutions.
Research for CSOs: To support CSOs to solve common or complementary problems concerning all research domains.

REGIONS OF KNOWLEDGE
Objectives
Strengthening the research potential of European regions, in particular by encouraging and supporting the development, across Europe, of regional "research-driven clusters" associating universities, research centres, enterprises, non for profit civil society organisations and regional authorities.

Rationale
Regions are increasingly recognised as important players in the EU's research and development landscape. Research policy and activities at regional level often rely on the development of "clusters" associating public and private actors. The *Pilot Action* on "*Regions of Knowledge*" demonstrated the dynamic of this evolution and the necessity to support and encourage the development of such structures.
The actions undertaken in this area will enable European regions to strengthen their capacity for investing in RDT and carry out research activities, while maximising their potential for a successful involvement of their operators in European research projects.

Activities
The new *Regions of Knowledge* initiative will involve and bring together regional actors involved in research: universities, research centres, industry, civil society organisations, public authorities (regional councils or regional development agencies). Projects will cover joint analysis of research agendas of regional clusters (in coordination with other activities on the broader issue of regional innovation clusters) and the elaboration of a set of instruments to address them in specific research activities, including through "mentoring" of regions with a less developed research profiles by highly developed ones. This will comprise measures aiming at improving research networking and access to sources of research funding as well as better integration of research actors and institutions in regional economies. These activities will be implemented in close relationship with EU regional policy and the Competitiveness and Innovation Programme and the Education and Training Programmes.
In the context of the specific activity of "Regions of Knowledge" synergies will be sought with the EU's regional policy, in particular with regard to convergence and outermost regions.

RESEARCH POTENTIAL

Objective

Stimulating the realisation of the full research potential of the enlarged Union by unlocking and developing the research potential in the EU's convergence regions and outermost regions, and helping to strengthen the capacities of their researchers to successfully participate in research activities at EU level.

Rationale

Europe does not fully exploit its research potential, in particular in less advanced regions remote from the European core of research and industrial development. In order to help researchers and institutions of these regions to contribute to the overall European research effort, while taking advantage of the knowledge and experience existing in other regions of Europe, this action aims at establishing the conditions that will allow them to exploit their potential and will help to fully realise the European Research Area in the enlarged Union.

Activities

The action in this domain will comprise support to:

Trans-national two-way secondments of research staff between selected organisations in the convergence regions, and one or more partner organisations; the recruitment by selected centres of incoming experienced researchers from other EU countries;

The acquisition and development of research equipment and the development of a material environment enabling a full exploitation of the intellectual potential present in the selected centres in the convergence regions;

The organisation of workshops and conferences to facilitate knowledge transfer; promotion activities as well as initiatives aiming at disseminating and transferring research results in other countries and on international markets.

"Evaluation facilities" through which any research centre in the convergence regions can obtain an international independent expert evaluation of the level of their overall research quality and infrastructures.

Strong synergies will be sought with the EU's regional policy. Actions supported under this heading will identify needs and opportunities for reinforcing the research capacities of emerging and existing centres of excellence in convergence regions which may be met by Structural and Cohesion funds.

SCIENCE IN SOCIETY

Objective

With a view to building an effective and democratic European Knowledge society, the aim is to stimulate the democratic governance and harmonious integration of scientific and technological endeavour, and associated research policies in the European social web, by encouraging at European scale reflection and debate on science and technology, and their relation with society, economy and culture.

Rationale

The influence of science and technology on our daily lives becomes increasingly profound.Science and technology are commonly associated with social and economic progress and have been shaped by European cultures and in turn deeply influence the way Europe deals with its societal questions. However, recently a growing uneasiness is affecting relations between science and civil society. Eruropean societies manifest difficulties to tackle the nature, the size and the complexity of societal dilemmas such as pollution, poverty and social injustice, food safety, health threats, energy supply and global warming.

Products of the social activity and shaped by social and cultural factors, science and technology nevertheless remain a remote domain far from the daily concerns of a large part of the public and of policy decision makers, and continues to be the subject of misunderstandings and

unfounded hopes and fears. Contentious issues relating to emerging technologies should be addressed by society on the basis of well informed debate leading to sound choices and decisions. Public and policymakers need to understand that today's research and innovation policies will largely contribute to shape our futur society. The question « what is science for » becomes central and whether science can make society a more sustainable, just and peaceful place to live. In this context, the diversification of the types of knowledge recognized as relevant, what means the use of scientific knowledge in combination with other forms of knowledge (traditional, empiric, local, from civil society actors, etc.) is a precondition to tackle the complex societal issues the society is confronted with.

Activities

The substantial and integrated initiative undertaken in this field will comprise support to:

Strengthening and improvement of the European science system, including: questions of scientific advice and expertise; the future of scientific publications (open science and knowledge as a public good); safeguards for scientific domains open to misuse; and frauds, trust and "self regulation".

Broader engagement of researchers and the public at large, including organised civil society, on science-related questions, to anticipate and clarify political and societal issues, including ethical issues and to express research needs.

Reflection and debate on science and technology and their place in society, drawing on history, sociology, political science and philosophy of science and technology.

- Enlarged introduction of participatory tools like consensus conferences, scenario workshops, citizens juries and others in public policiy decision processes

Gender research, including the integration of the gender dimension in all areas of research and the role of women in research.

Creation of an environment which triggers curiosity for science and social impacts of science and technology in young people, by reinforcing science education at all levels including schools and promoting interest and participation in science among young people.

- Creation of conditions that permit scientists to work a limited time for civil society organisations without loosing their career possibilities

Development of a policy on the role of universities and the engagement of universities in the necessary reforms to face the challenges of globalisation.

Improved communication between the scientific world and the wider audience of policymakers, the media, civil society and the general public, by helping scientists better communicate their work, by helping non for profit CSOs to address scientific issues and by supporting scientific information and media.

These activities will take the form of, in particular, research projects, studies, networking and exchanges, public events and initiatives, prizes, surveys and data collection. In many cases they will imply international partnerships with organisations from third countries.

ACTIVITIES OF INTERNATIONAL CO-OPERATION

To become competitive, ~~and~~ play a leading role at world level, and take its responsibilities for the well-being of the world population and the planet, the European Community needs a strong and coherent international science and technology policy.

This international policy has two interdependent objectives:

– To support European competitiveness through strategic partnerships with third countries in selected fields of science and by engaging the best third country scientists to work in and with Europe;

– To address specific problems that third countries face or that have a global character, on the basis of mutual interest and mutual benefit.

Cooperation with third countries in the Framework Programme will be targeted in particular at the following groups of countries:

– Candidate countries;
– Countries neighbouring the EU, Mediterranean partner countries, Western Balkans and the Newly Independent States;
– Developing countries, focusing on their particular needs;
– Emerging economies.
The theme-oriented international cooperation actions are carried out under the “Cooperation” programme. The international actions in the area of human potential are carried under the “People” programme.
Under the “Capacities” programme, horizontal support actions and measures with a focus other than a specific thematic or interdisciplinary area will be implemented. Efforts will be undertaken to improve the coherence of national activities by supporting the co-ordination of national programmes on international scientific co-operation. The overall coordination of the international cooperation actions under the different programmes of the Framework Programme will be ensured.

NON NUCLEAR ACTIONS OF THE JOINT RESEARCH CENTRE

Objective

To provide customer driven scientific and technical support to the EU policy making process, ensuring support to the implementation and monitoring of existing policies and responding to new policy demands.

Rationale

The JRC’s independence of special interests, whether private or national, combined with its technical expertise enable it to facilitate communication and consensus building between stakeholders (industry associations, environmental action groups, Member States’ competent authorities, other research centres etc.) and policy makers, especially at the EU level. Through scientific and technological support the JRC helps to make the EU policy process more effective, transparent and based on sound science.
The usefulness and credibility of the JRC’s support to EU policies is closely linked to the quality of its scientific expertise and its integration in the international scientific community. The JRC will therefore continue investing in research and networking with other centres of excellence in relevant fields. It will participate in indirect actions in all its aspects with emphasis on common scientific reference systems, networking, training and mobility, research infrastructure and participation in Technology Platforms and coordination instruments where it has the relevant expertise to produce added value.
The JRC will actively pursue promoting the integration of New Member States and Candidate Countries in its activities to the level currently enjoyed by the EU15.

Activities

The JRC’s priorities will be in fields which are strategically important for the Union and where its input provides high added value. Scientific and technical support to EU policies will continue to be delivered in core areas such as sustainable development, climate change, food, energy, transport, chemicals, alternative methods to animal testing, research policy, information technologies, reference methods and materials, biotechnology, risks, hazards and socio-economic impacts. Growth will be in areas of key concern for the Union:

Prosperity in a knowledge-intensive society

– To carry out and develop advanced econometric modelling and analysis techniques in the context of policy definition and monitoring such as the follow-up of the Lisbon agenda, the Internal Market and the Research and Education Policies.
– To develop models to support a new balance between sustainability objectives and competitiveness in a responsible way.

Solidarity and responsible management of resources

– To become a recognised S&T reference centre on sustainable agriculture focusing on food quality, traceability and safety (including GM food and feed), spatial management and cross-compliance and to support the implementation of the CAP.

– To provide S&T support to the Common Fisheries Policy.
– To enhance the provision of harmonised European geo-referenced data and spatial information systems (support to INSPIRE) and to continue developing new approaches to global environmental and resources monitoring (support to GMES).
– To support the implementation of the EU Action Plan on Environment and Health including providing support to on-going activities to establish a community integrated Environment and Health information system.

Security and freedom

– To develop activities contributing to the establishment of freedom, justice and security especially in areas related to fighting terrorism, organised crime and fraud, border security and prevention of major risks, in relation with law enforcement agencies and relevant EU services.
– To support the Community response to natural and technological disasters.

Europe as world partner

– To strengthen support to EU external policies in specific areas such as external aspects of internal security, environment, labour conditions, trade and intellectual property, technology regulation, development cooperation and humanitarian aid.

ANNEX II: INDICATIVE BREAKDOWN AMONG PROGRAMMES

The indicative breakdown among programmes is as follows (in EUR million):

Cooperation ~~*~~,44735

Health 8373
Food and~~,~~ Agriculture ~~and Biotechnology~~ 2472
Information and Communication Technologies 12756
Nanosciences, Nanotechnologies, Materials and new Production Technologies 4865
Energy 2951
Environment (including Climate Change) 2552
Transport ~~(including Aeronautics)~~ 5981
Socio-economic Sciences and the Humanities 798
Peace research and conflict prevention ~~Security and Space 3987~~

Ideas 11942

People 7178

Capacities 7536

Research Infrastructures * 3987
Research for the benefit of SMEs 1914
Research for the benefits of CSOs ?
Regions of Knowledge 160
Research Potential 558
Science in Society 558
Activities of International Co-operation 359
Non-nuclear actions of the Joint Research Centre 1817

ESSF comments in general:
The overall framework needs reforming, not least a greater emphasis on concerns such as social justice and environmental sustainability and lower priority given to economic goals. The proposed distribution of costs between the 'Co-operation themes' in particular reflects such bias, not least in the large budgets earmarked for ICTs and nanotechnologies (and nuclear energy through Euratom), and the unreasonably low budgets earmarked for non-nuclear energy and environment. It is critical that there is a re-allocation of funds which better reflects the scale and urgency of social and environmental problems to which science and technology can help tackle. The budgets for Ideas, People and Capacities should be reequilibrated. A budget for « Research for the benefit of CSOs » has to be introduced.

ANNEX III

FUNDING SCHEMES

Indirect Actions
The activities supported by the 7th Framework Programme will be funded through a range of "Funding schemes". These schemes will be used, either alone or in combination, to fund different categories of actions implemented throughout the Framework Programme.
The decisions for specific programmes, work programmes and calls for proposals will mention, as and when appropriate:

The type(s) of scheme(s) used to fund different categories of actions;

The categories of participants (such as research organisations, universities, industry, public authorities) which can benefit from it;

The types of activities (research, development, demonstration, training, dissemination, transfer of knowledge and other related activities) which can be funded through each of them.

Where different funding schemes can be used, the work programmes may specify the funding scheme to be used for the topic on which proposals are invited.
The funding schemes are the following:
a) To support actions which are primarily implemented on the basis of calls for proposals:

1. Collaborative projects
Support to research projects carried out by consortia with participants from different countries, aiming at developing new knowledge, new technology, products or common resources for research. The size, scope and internal organisation of projects can vary from field to field and from topic to topic. Projects can range from small or medium-scale focused research actions to larger integrating projects which mobilise a significant volume of resources for achieving a defined objective.

2. Networks of Excellence
Support to joint research programmes implemented by a number of research organisations integrating their activities in a given field, carried out by research teams in the framework of longer term co-operation. The implementation of these joint programmes will require a formal commitment from the organisations integrating part of their resources and their activities.

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

4. Individual projects
Support to projects carried out by individual research teams. This scheme will mainly be used to support investigator-driven "frontier" research projects funded in the framework of the European Research Council.

5. Support for training and career development of researchers
Support for training and career development of researchers, mainly used for the implementation of the Marie Curie actions.

6. Research for the benefit of specific groups (in particular SMEs)
Support to research projects where the bulk of the research is carried out by universities, research centres or other legal entities, for the benefit of specific groups, in particular SMEs or associations of SMEs.

7. research for the benefit of non for profit CSOs
Support to research projects where the bulk of the research is carried out by universities, research centres or other legal entities, for the benefit of CSOs or associations of CSOs.

b) To support actions implemented on the basis of decisions by the Council and the European Parliament[25], based on a proposal from the Commission, the Community will provide financial support to multi-financed large-scale initiatives.

A financial contribution from the Community to the joint implementation of well identified national research programmes, on the basis of Article 169 of the Treaty. This joint implementation will require the establishment or existence of a dedicated implementation structure. Community financial support will be provided subject to the definition of a financing plan based on formal commitments from competent national authorities.

A financial contribution from the Community to the implementation of Joint Technology Initiatives to realise objectives that cannot be achieved through the funding schemes identified in point 1 above. Joint Technology Initiatives will mobilise a combination of funding of different nature and from different sources, private and public, European and national. This funding can take different forms and can be allocated or mobilised though a range of mechanisms: support from the Framework Programme, loans from the European Investment Bank, support to risk capital. Joint Technology Initiatives may be decided and implemented on the basis of Article 171 of the Treaty (this may include the creation of joint undertakings) or through the Specific Programme Decisions. Community support will be provided subject to the definition of an overall blueprint of financial engineering, based on formal commitments from all parties concerned.

A financial contribution from the Community to the development of new infrastructures of European interest. This contribution may be decided on the basis of Article 171 of the Treaty or through the Specific Programme Decisions. The development of new infrastructures will mobilise a combination of funding of different nature and origin: national funding, Framework Programme, Structural funds, loans from the European Investment Bank and others. Community support will be provided subject to the definition of an overall financial plan based on a formal commitment from all parties concerned.
The Community will implement the funding schemes in compliance with the provisions of the regulation adopted pursuant to Article 167 of the Treaty, the relevant State Aid instruments, in particular the Community framework for state aid to research and development, as well as international rules in this area. In compliance with this international framework, it will be necessary to be able to adjust the scale and form of financial participation on a case-by-case basis, in particular if funding from other public sector sources is available, including other sources of Community financing such as the European Investment Bank (EIB).
In addition to direct financial support to participants, the Community will improve their access to EIB loans through the “Risk-Sharing Finance Facility” by providing a grant to the Bank. The Community grant shall be used by the Bank, in addition to its own funds, to cover the provisioning and capital allocation for its loan financing. Subject to and in

accordance with modalities to be established by the regulation adopted pursuant article 167 of the Treaty and the Council decisions adopting the specific programmes, this mechanism will enable broader EIB lending to European RTD actions (such as joint technology initiatives, large projects-including Eureka projects, and new research infrastructures).

In the case of participants to an indirect action established in a region lagging in development (convergence regions and outermost regions[26]), complementary funding from the Structural Funds will be mobilised wherever possible and appropriate. In the case of participation of entities from the candidate countries, an additional contribution from the pre-accession financial instruments could be granted under similar conditions. As regards actions in the "research infrastructures" part of the "capacities" programme of the 7th Framework Programme, the detailed funding arrangements for these will be defined with a view to ensuring that there is effective complementarity between community research funding and other EU and national instruments, notably the Structural Funds.

Direct actions

The Community will undertake activities implemented by the Joint Research Centre, which are referred to as direct actions.