



## Topics related to Marine Pollution within the first FP7 calls

11/01/2007

The European Commission recently published (22/12/2006) several calls for proposals in the frame of the FP7 ([http://cordis.europa.eu/fp7/home\\_en.html](http://cordis.europa.eu/fp7/home_en.html)).

**3 mains calls with deadline in May 2007** could be the purpose of proposals in the field of **marine pollution** :

- [FP7-ENV-2007-1](#)
- [FP7-ICT-2007-1](#)
- [FP7-SST-2007-RTD-1](#)

The goal of this document is to introduce these three calls and their thematics which could be interesting in the frame of MAPO.

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## I – Introduction of the call FP7-ENV-2007-1

### Thematic priority

**Environment (including Climate Change)**

### Identifier

FP7-ENV-2007-1

### Publication date

22 December 2006

### Budget

€ 200 000 000

### Closing Date

**02 May 2007** at 17:00 (Brussels local time)

### Web site

[http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call\\_id=6](http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call_id=6)

### Areas within this call and in relation with MAPO

#### Activity 6.1. CLIMATE CHANGE, POLLUTION, AND RISKS

##### Sub-activity 6.1.1. Pressures on environment and climate

###### Area 6.1.1.3. The Global Carbon cycle - GreenHouse Gas budgets

ENV.2007.1.1.3.1. Ocean acidification and its consequences

###### Area 6.1.1.6. Response strategies: Adaptation, Mitigation and Policies

ENV.2007.1.1.6.2. Effectiveness of adaptation and mitigation measures related to changes of the hydrological cycle and its extremes

#### Activity 6.2. SUSTAINABLE MANAGEMENT OF RESOURCES

##### Sub-activity 6.2.1. Conservation and sustainable management of natural and man-made resources and biodiversity

###### Area 6.2.1.2. Water resources

ENV.2007.2.1.2.1. Assessing the ecological status of water bodies

###### Area 6.2.1.4. Biodiversity

ENV.2007.2.1.4.1. Contribution of biodiversity to ecosystem services

ENV.2007.2.1.4.2. Use of natural resources: the impact on biodiversity, ecosystem goods and services

##### Sub-activity 6.2.2. Management of marine environments

###### Area 6.2.2.1. Marine resources

ENV.2007.2.2.1.1. Development of advanced ecosystem models and methodologies for the management and the sustainable use of resources

ENV.2007.2.2.1.2. Ecology of important marine species

ENV.2007.2.2.1.3. Habitat-marine species interactions in view of ecosystem based management in the deep-sea

ENV.2007.2.2.1.4. Dynamic of marine ecosystem in a changing environment

ENV.2007.2.2.1.5. Deep Ocean geophysical and biological processes

#### Activity 6.3. ENVIRONMENTAL TECHNOLOGIES

##### Sub-activity 6.3.1 Environmental technologies for observation, simulation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment

###### Area 6.3.1.1. Water

ENV.2007.3.1.1.1. Innovative technologies and services for sustainable water use in industries

ENV.2007.3.1.1.2. Technologies for measuring and monitoring networks

###### Area 6.3.1.6. Marine environment

(not open in 2007)

#### Activity 6.4. EARTH OBSERVATION AND ASSESSMENT TOOLS FOR SUSTAINABLE DEVELOPMENT

**Sub-activity 6.4.1. Earth and ocean observation systems and monitoring methods for the environment and sustainable development**

**Area 6.4.1.3. Earth Observation activities in emerging areas**

ENV.2007.4.1.3.2. Monitoring the ocean interior, seafloor, and subseafloor

## II – Introduction of the call FP7-ICT-2007-1

**Thematic priority**

**Information and Communication Technologies**

**Identifier**

FP7-ICT-2007-1

**Publication date**

22 December 2006

**Budget**

€ 1 019 000 000

**Closing Date**

**08 May 2007** at 17:00 (Brussels local time)

**Web site**

[http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call\\_id=11](http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call_id=11)

**Areas within this call and in relation with MAPO**

**3.2 Challenge 2: Cognitive Systems, Interaction, Robotics**

Objective ICT-2007.2.1 (ICT-2007.2.2): Cognitive Systems, Interaction, Robotics

**3.3 Challenge 3: Components, systems, engineering**

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

Objective ICT-2007.3.5: Photonic components and subsystems

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

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

Objective ICT-2007.6.2: ICT for Cooperative Systems

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

### III – Introduction of the call FP7-SST-2007-RTD-1

**Thematic priority**  
**SUSTAINABLE SURFACE TRANSPORT**

**Identifier**  
FP7-SST-2007-RTD-1

**Publication date**  
22 December 2006

**Budget**  
€ 153 480 000

**Closing Date**  
**03 May 2007** at 17:00 (Brussels local time)

**Web site**  
[http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call\\_id=40](http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call_id=40)

#### Areas within this call and in relation with MAPO

##### **ACTIVITY: 7. 2. 1. The greening of surface transport**

##### **AREA: 7.2.1.1 The greening of products and operations**

SST.2007.1.1.1. Promoting the use of bio-fuels and alternative hydrocarbon fuels  
SST.2007.1.1.2. Vehicle/vessel and infrastructure technologies for optimal use of energy  
SST.2007.1.1.3 Integrating natural gas power-trains  
SST.2007.1.1.4 Electric ship technology  
SST.2007.1.1.5. Clean and energy efficient marine diesel power trains

##### **AREA: 7.2.1.2 Environment-friendly and efficient industrial processes**

SST.2007.1.2.1 The greening of transport-specific industrial processes  
SST.2007.1.2.2 End of life strategies for vehicles/vessels and infrastructures  
SST.2007.1.2.3 ECO-SHIP

## THEME 6 ENVIRONMENT (INCLUDING CLIMATE CHANGE)

### Activity 6.1. CLIMATE CHANGE, POLLUTION, AND RISKS

Sub-activity 6.1.1. Pressures on environment and climate

Area 6.1.1.3. The Global Carbon cycle - GreenHouse Gas budgets

#### **ENV.2007.1.1.3.1. Ocean acidification and its consequences**

Temporal and spatial changes of ocean acidification due to increasing CO<sub>2</sub> uptake. Quantification of the impacts of the acidification on marine biota and their physiology, and marine ecosystems. Feedback to the carbon and other key element cycles, to climate change and the Earth system over the next decades to centuries. Process and experimental studies and field work should be integrated in biogeochemical, ocean sediment, circulation and climate models.

**Funding scheme:** collaborative projects (large-scale integrating projects)

**Expected impact:** *Impacts of ocean acidification on ocean ecosystems and related feedback to the carbon cycle; determination of pH tipping points; a better understanding and description of the carbon cycle in coupled ocean-climate models.*

Area 6.1.1.6. Response strategies: Adaptation, Mitigation and Policies

#### **ENV.2007.1.1.6.2. Effectiveness of adaptation and mitigation measures related to changes of the hydrological cycle and its extremes**

Quantify the efficiency (cost and benefits) of current and novel adaptation and mitigation measures related to changes of the hydrological cycle and its extremes in Europe. Analysis of the social and economic implications. Develop (adaptive) management strategies (including considerations on resilience and mitigation measures) for risks caused by long term changes of the hydrological cycle taking into account economic and social pressures (e.g. population and GDP growth, land use) under current and future climate conditions.

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Quantitative assessment of the efficiency of current and future adaptation and mitigation measures to hydrological changes and related extremes in Europe. Support for EU and non-EU research activities and policies as a response to climate change, in particular on adaptation.*

### Activity 6.2. SUSTAINABLE MANAGEMENT OF RESOURCES

Sub-activity 6.2.1. Conservation and sustainable management of natural and man-made resources and biodiversity

Area 6.2.1.2. Water resources

#### **ENV.2007.2.1.2.1. Assessing the ecological status of water bodies**

Development of *methodologies, models, integrated indicators and multi-species metrics to be used in integrated assessment of the ecological status* of water bodies to evaluate and quantify the combined effects of pressures due to global change (land use, pollution, climate change) and catchment management measures. All surface water categories should be addressed, however, new data collection should focus on lakes, transitional and coastal waters.

Inter-calibration of methodologies used for biological quality assessment, definition of reference conditions and thresholds for ecological quality classes to promote EU-wide harmonisation in the area and to underpin the characterisation and status classification of the water bodies. Specific attention must be paid to uncertainties, their quantification and inclusion in the assessment of the current state of the water body and in the predicted outcomes of management measures including their cost-effectiveness. (Policy relevant topic)

**Funding scheme:** collaborative projects (large-scale integrating projects)

**Expected impact:** *The research should contribute in a concrete way to the implementation of the Water Framework Directive and assist the member states to establish the programme of measures as foreseen by WFD and the subsequent assessment of these measures. Intercomparison of methodologies is expected in view of identifying the most relevant one(s) for a coherent implementation by all member states.*

#### Area 6.2.1.4. Biodiversity

##### **ENV.2007.2.1.4.1. Contribution of biodiversity to ecosystem services**

Understanding how biological diversity terrestrial, inland waters and marine - at European and international levels - contributes to ecosystem goods and services and to livelihoods. Based on major trends in biodiversity and patterns of species interactions, work should contribute to better understanding of the values of and human dependence on biodiversity, the implications of change, and an initial evaluation of the costs and social and environmental consequences of not halting biodiversity loss. In addition, it should be considered how these values can be realised through payments for ecosystem services (PES) such as habitats banking. Institutional contexts, cost and benefits of strategies to preserve, restore and use biodiversity in a more sustainable way should also be assessed. The topic is important in the context of European competitiveness and sustainable development in Europe and elsewhere because the loss of biodiversity will impact upon the provision of goods and services. Major economic sectors depending/impacting on biodiversity have to be considered (agriculture, forestry, fisheries, transport, trade, tourism, industry).

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Better quantification of the cost of losing biodiversity, e.g. in terms of products and services, use and non-use values, and ultimately in terms of reduced productivity and welfare. Increased understanding by researchers, regional planners and political and economic actors, including civil society organisations active in the economic sectors under consideration through public access to information should make it possible to develop inclusive management strategies that will protect or restore ecosystems and help maintain the provisions of the ecosystem services upon which economic competitiveness and welfare depend. Communicating research process and results in a constructively engaged way to the full spectrum of societal actors is of utmost importance to maximise its policy relevance and impact.*

##### **ENV.2007.2.1.4.2. Use of natural resources: the impact on biodiversity, ecosystem goods and services**

Improve understanding of how the use of and trade in natural resources at European and international levels affects biodiversity (marine, inland waters and terrestrial), ecosystem goods and services and the resilience and resistance of ecological-economic systems, and develop or improve methods to measure and value biodiversity and ecosystem resilience and detect when ecosystems are approaching the limits of their natural functioning or productive capacity. Establish and improve mechanisms and methods to determine the sustainability of various intensities of use of components of biodiversity and of ecosystems. This topic complements the preceding one. It relates to competitiveness, which depends on the state of biodiversity and ecosystem. Results will be shared effectively with citizens and other societal actors in ways that facilitate general understanding and impact on social, economic and environmental planning and decision making. Participation of International Cooperation Partner Countries (ICPC) is encouraged.

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Assessment of the impact of the use and abuse of natural resources on biodiversity, the ways in which systems (ecosystem services) may respond and how resource use could be made more ecologically sustainable. The results should allow governmental and non-governmental actors to discuss and develop viable policy options and should support their*

*implementation. Results will have to be communicated effectively to citizens and other societal actors in Europe and in other parts of the world in ways that facilitate general understanding and impact on social, economic and environmental planning and decision making.*

## Sub-activity 6.2.2. Management of marine environments

### Area 6.2.2.1. Marine resources

#### **ENV.2007.2.2.1.1. Development of advanced ecosystem models and methodologies for the management and the sustainable use of resources**

Develop methodologies based on existing data and knowledge about ecosystem functioning, processes and patterns, aiming at conservation, sustainable management and exploitation of marine resources and their environment (ecosystem management approach). Data from different sources should be integrated, including oceanographic, geophysical, geological, sedimentary, hydrological, ecological, biological, microbiological, social and economic data. Synthesizing methodologies comprise dynamic models, indicator frameworks, inter-operable data management systems and public information systems. The project should also include synthesis of knowledge about social and economic impacts of different management strategies. The methodologies should serve as tools to support conservation, management and sustainable use of resources, including fish and their environment (ecosystem management approach). The knowledge synthesis should therefore include development of communication modalities which could operationalise knowledge on marine ecosystems in the public debate and in policy decision making. Participation of International Co-operation Partner Countries is encouraged.

**Funding scheme:** collaborative projects (large-scale integrating projects)

**Expected impact:** *An improved knowledge base for the conservation and sustainable use of marine ecosystems and their resources. Engagement with key governmental and non-governmental actors which lead to the development of innovative approaches and modern participatory management tools for the restoring and sustainable use of marine ecosystems and their consideration for practical implementation. This work should contribute to EU orientations in the field of marine Protection Strategy, the proposed Marine Policy, the Common Fisheries Policy and the international agenda for the rebuilding of degraded marine ecosystems by 2015 (Johannesburg Plan of Implementation) and more generally the protection of the Sea and the sustainable use of the Oceans.*

#### **ENV.2007.2.2.1.2. Ecology of important marine species**

Increase knowledge on the ecology and role (including life cycle) of commercially important marine species and/or groups of species with significant ecological functions (keystone species). Special attention should be given to the life cycle and the migration patterns which for some key species remain virtually unknown. The work should be done having in mind the need for developing conservation measures and restoration options of key species in their ecosystem context.

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Public access in easily understandable formats to the knowledge base of scientists, fisheries manager, fishermen and civil society organisations involved in conservation efforts that are necessary to develop operational and innovative tools for the protection and/or a more sustainable use of the marine species. This research should contribute to the effective implementation of the EU Common Fisheries Policy and to the EU Environmental Policy.*

#### **ENV.2007.2.2.1.3. Habitat-marine species interactions in view of ecosystem based management in the deep-sea**

The link between marine species, including fish and deep-sea habitats is still poorly known. A better understanding of this relationship is essential for the evaluation of the impact of marine protected areas on fisheries, within the broader framework of a regional ecosystem-based management approach. Research will focus in the first instance on: i) the identification and modelling of the ecosystem function of cold water coral reef habitats and description of the ecological interaction between reefs and fish species of commercial interest; ii) the assessment of quantitative and qualitative fisheries effects upon these habitats, and impact upon associated fish species and productivity. Participation of International Co-operation Partner Countries is encouraged.

**Funding scheme:** collaborative projects (large-scale integrating projects)

**Expected impact:** *Publicly accessible results in easily understandable presentations. Beyond the better understanding of deep-water ecosystems, this activity should expand the knowledge base for the implementation of an ecosystem approach to deep-sea fisheries management, as well as developing options by governmental and non-governmental actors for protection, governance and management of deep-sea resource, including fisheries.*

#### **ENV.2007.2.2.1.4. Dynamic of marine ecosystem in a changing environment**

Investigate how marine ecosystems respond to and evolve with a changing environment. The scenarios to be considered should address in an integrated manner the main driving factors, essentially changes in climate patterns, ocean circulation, pollution, invasive alien species and ocean acidification (a particularly important process), as well as the impact of fisheries. The project will investigate the response of marine ecosystems to the combined effects of the many changing parameters and anthropogenic action e.g. acidification, eutrophication, temperature, light and nutrients, overfishing, invasive alien species. The focus should be on the consequences for marine organisms and population dynamics, the likely impacts on resource management, products and services.

**Funding scheme:** collaborative projects (large-scale integrating projects)

**Expected impact:** *The research should improve the knowledge base on marine ecosystems and the way they are impacted by the many driving forces, either anthropogenic or natural. This should provide input to governmental and non-governmental actors in the development of innovative tools and strategies for the rebuilding degraded marine ecosystems, protection and the sustainable use of the sea and its resources, in the perspective of the ecosystem approach. It should also improve the knowledge base for protection and management scenarios aimed at reconciling the interests of the many economic groups benefiting from the marine resource (including coastal). The topic is in support to EU Marine Strategy and should consider the long-term ecological objectives. It is also relevant to the EU Maritime Policy and the EU Common Fisheries Policy.*

#### **ENV.2007.2.2.1.5. Deep Ocean geophysical and biological processes**

The work to be undertaken within the perspective of a "Deep-Sea Frontier" initiative should lead to providing fundamental knowledge in many domains ranging from history, monitoring and prediction of geohazards to sustainable exploration and options for the conservation and sustainable use of deep sea resources. The project will aim to develop the actions required to implement a fully functional European Deep-Sea Frontier Initiative based upon an agreed road map. The truly European Deep-Sea Frontier project could be launched at mid FP7 (at the earliest).

**Funding scheme:** coordination and support actions (coordinating type)

**Expected impact:** *An agreed road map capable of leading to the implementation of a fully functional European Deep-Sea Frontier Initiative. The networking of the various research communities – ocean drilling, ocean margins, underwater observatories, climate change - thereby enabling them to build and demonstrate the foundations required for integrated pan-European research to be undertaken into the complex and interlinked physical, geological, chemical, ecological, biological and microbial processes that take place in the deep sea.*

### **Activity 6.3. ENVIRONMENTAL TECHNOLOGIES**

Sub-activity 6.3.1 Environmental technologies for observation, simulation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment

Area 6.3.1.1. Water

#### **ENV.2007.3.1.1.1. Innovative technologies and services for sustainable water use in industries**

This large-scale action should aim at the development and implementation of new, reliable and cost-effective 'clean' water technologies for helping European industries to reduce water use, mitigate environmental impacts, and better manage health and safety risks, while improving their product

quality and process stability. Proposals should consider adaptive solutions, within an integrated water resources management approach, which include monitoring, information management systems and cross-sectoral technologies for reducing wastes and by-products (e.g. separation technologies). Issues of industrial cooling, scaling and (bio)fouling, and monitoring of critical compounds in process water streams should be given due consideration. Project consortia should consist of at least 50% of industrial partners representing various industries, inclusive of relevant SMEs, and at least 50% of the requested EC contribution should be in benefit of industrial partners. (SME relevant topic)

**Funding scheme:** collaborative projects (large-scale integrating projects) (Community contribution from 4 up to 10 million Euros)

**Expected impact:** *Substantial reduction of fresh water needs in the considered industrial processes and of effluent discharge to the environment. More efficient use of limited water resources by integrating process technologies in different industrial branches for cascades of water usage, towards closed water cycles, adapted to the quality requirements of different industries. Improved process stability and product quality by improved and/or more constant water quality.*

#### **ENV.2007.3.1.1.2. Technologies for measuring and monitoring networks**

Technologies to assess the chemical and ecological status of water bodies for cost-effective monitoring campaigns need to be developed. Priority will be given to miniaturised sensing systems and wireless network technology for the deployment of essentially self-sustaining wireless sensor networks aimed at spatial and temporal water quality assessment. Emphasis should be put on the development of stable chemo- and bio-sensors with low maintenance requirements. Hardware components comprising smart (bio)materials and microchip technologies for sensing a wide range of parameters - including those required for the Water Framework Directive reporting- are to be developed with supporting software applications. A relevant participation of industrial partners as well as of SMEs is requested. (SME-relevant topic)

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Substantial reduction of labour-intensive field sampling and measuring campaigns as well as fewer errors during data collection and transcription of results. The temporally and spatially dense data provided by these technologies is expected to reveal previously unobservable phenomena. The action should lead to strengthening the European industrial competitiveness in this field.*

#### **Area 6.3.1.6. Marine environment**

(not open in 2007)

### **Activity 6.4. EARTH OBSERVATION AND ASSESSMENT TOOLS FOR SUSTAINABLE DEVELOPMENT**

Sub-activity 6.4.1. Earth and ocean observation systems and monitoring methods for the environment and sustainable development

Area 6.4.1.3. Earth Observation activities in emerging areas

#### **ENV.2007.4.1.3.2. Monitoring the ocean interior, seafloor, and subseafloor**

To contribute to develop and bring into the global context the European contribution to observing and monitoring systems for the Ocean Water Column, Ocean Seafloor and Subseafloor. The project should rely on existing European initiatives such as MerSea, Eur-Oceans, ESONET, HERMES and international ones like ARGO in order to contribute to developing the global ocean observatory system together with other existing initiatives (for instance the Neptune one). The project should support and complement existing collaboration activities in order to add missing scientific components and partners, develop or improve common data exchange protocol, exchange of technical know-how and user requirement specification, respectively this aims to ensure an optimal use of the available resources and to optimise existing project strategies. This initiative should build upon existing science, engineering and financial plans to develop such a global system, working together with relevant participants from the private sector.

**Funding scheme:** collaborative projects (small or medium-scale focused research projects)

**Expected impact:** *Development of the European component of the Global Ocean interior Observation system and related activities needed for GEOSS where observing/monitoring systems are lacking or need to be significantly completed.*

## THEME 3

### ICT - INFORMATION AND COMMUNICATION TECHNOLOGIES

#### 3.2 Challenge 2: Cognitive Systems, Interaction, Robotics

##### **Objective ICT-2007.2.1 (ICT-2007.2.2): Cognitive Systems, Interaction, Robotics**

Target outcome:

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

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

Work will result in demonstrators that operate largely autonomously in demanding and open-ended environments which call for a suitable mix of capabilities for sensing, data analysis, processing, control and acting; and for communication and co-operation with people or machines or both. Where required, systems will integrate high-level cognitive competencies; for example, for reasoning, planning and decision-making, and for active environmental modelling.

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

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

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

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

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

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

Expected impact:

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

### **3.3 Challenge 3: Components, systems, engineering**

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

Target outcome:

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

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

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

Industrially-driven projects will target:

1. Advances in **Integration and Miniaturisation Technologies**, and in **Devices** covering nanoelectronics process technology, metrology, materials, basic device and interconnect structures and related concepts and tools for modelling and simulation for below 32 nm CMOS and for System-on-Chip. Changes in the electrical characteristics, in thermal and mechanical behaviour, in performance, reliability, testability, manufacturability and power consumption of the components need to be addressed. Integration technology also includes wafer level packaging, assembly technology, integration of passives and 3D packaging.

2. **Design technologies** for next-generation components and electronics integration.

They must support a chip complexity of billions of transistors and take into account the increased process variability and changing performances of the advanced devices and processes. This requires a step increase in design productivity for instance through standardised Intellectual Property reuse and scalable and programmable chip architectures. Also targeted are design platforms for *SoC* and *SiP* supporting a heterogeneous, global and comprehensive performance simulation of different technologies covering multiple aspects including electrical, optical, mechanical and thermal behaviour. Emphasis will be put on SoC and SiP system design solutions from formal application specification down to physical implementation, and on the effectiveness of co-simulation between different description levels.

**3. Manufacturing technologies** for: reliable, cost effective industrial manufacturing of sub-45 nm chips; SoC and SiP processes; flexible, automated, adaptive, on-demand and short cycle time manufacturing under economically favourable conditions. This will be based on: (i) models, tools and equipment for AEC/APC-based manufacturing and maintenance; supporting metrology, characterisation and information tools and methods; (ii) advanced modelling techniques and chip design for increasing manufacturability, production yield, testability and reliability and linking manufacturing with design; (iii) alternative pattern transfer technologies, such as maskless lithography; (iv) characterisation techniques supporting multi-site and single wafer, small batch manufacturing; (v) handling of thin wafers and assembly of single chips. This also includes preparatory activities for 450-mm wafer processing and joint assessment of manufacturing and metrology equipment for chips and SiPs by equipment suppliers and users.

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

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

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

Expected impact:

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

### **Objective ICT-2007.3.5: Photonic components and subsystems**

Target outcomes

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

Expected Impact

- Leading position of European industry in high-value photonic products.
- New photonic based applications in several industrial sectors with emphasis on communications, health, well-being, environment, safety and security.
- Continued European leadership in RTD in photonics from components to systems, securing the necessary human resources and knowledge to design, produce and use new generations of photonic components.

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

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

Target outcome

c) ICT research in **Mobility Services for Goods** targets safer, more secure, efficient and environment-friendly ICT-based freight transport solutions in both urban and long-haul operations, supporting the most suitable selection of modes for consignments and safeguarding them along the transport chain as requested by Commission's Communication on freight logistics<sup>32</sup>. Closer cooperation between actors in the field is a key issue.

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

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

Expected impact

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

### **Objective ICT-2007.6.2: ICT for Cooperative Systems**

Target outcome

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

Expected impact

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

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

Target outcome

a) ICT RTD in **Collaborative Systems for Environmental Management** aims to integrate environmental monitoring and management with an enhanced capacity to assess population exposure and health risks, to report to and alert targeted groups and to organise efficient response. The target is a Single Information Space for the Environment in Europe in which environmental institutions, service providers and citizens can collaborate or use available information without technical restraints. The activities will aim at dependable, flexible and user-centric shared solutions for sustainable use of natural resources and for better management of ecosystems including the mitigation of environmental degradation and associated threats. Research is expected to deliver visionary concepts and techniques, or strategic integrated approaches for ICT systems addressing environmental applications that are cost-effective, easy to set up and to operate. The focus is on generic systems that will

integrate to a large extent autonomous, adaptive sensor networks<sup>33</sup>, extended data fusion, rapid and secure access to distributed information, modelling, simulation and visualisation as well as computing facilities for decision making. Full attention will be on the optimisation of complex data flows across all decision levels, across borders and sectors. Typically, these collaborative systems will be validated in the case of fresh surface water, ambient air, outdoor or indoor.

Expected impact:

- Innovative applications and breakthrough ICT solutions in environmental monitoring and management, with perspectives for wide deployment and new market opportunities, while consolidating research efforts and building a European Research Area in the field.
- World-best technological capability to respond adequately to major environmental threats, with links to major environmental initiatives in Europe.
- World leadership in ICT-enabled energy efficiency through intelligent solutions and in support of Europe's objective to save 20% of energy consumption by 2020<sup>35</sup>.
- Wide take-up of ICT systems to enable future buildings to become at least energyneutral
- Position Europe in the international context for development of new ICT-supported approaches to produce, distribute and trade energy efficiently.
- Reduction in personal energy usage through analysis of information coming from the developed monitoring systems.

## THEME 7 TRANSPORT

### ACTIVITY: 7. 2. 1. The greening of surface transport

AREA: 7.2.1.1 The greening of products and operations

#### **SST.2007.1.1.1. Promoting the use of bio-fuels and alternative hydrocarbon fuels**

New technologies and innovative solutions for the progressive introduction of bio-fuels and alternative hydrocarbon fuels. Proposals will cover one or more of the following subjects:

1. adaptation and optimisation of existing power trains (based on gasoline or diesel), systems (including after-treatment), components and materials;
2. new power train concepts with emphasis on efficiency and environmental impact, covering power ranges for all transport modes;
3. effective, safe and clean delivery of these fuels at distribution points.

International Cooperation with Brazil, USA and India is suggested.

**Funding scheme:** Collaborative Projects small or medium-scale focussed research, Coordination and Support actions aiming at coordinating research activities

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.1.2. Vehicle/vessel and infrastructure technologies for optimal use of energy**

Vehicle/vessels and infrastructure technologies (excluding research on power-trains which are covered in previous topics) to further reduce energy consumption. Proposals will cover one or more of the following subjects:

1. advanced low mass, low friction and low rolling resistance concepts and materials applied to components and structures for vehicles and vessels;
2. fluid-dynamic and aero-dynamic analysis and solutions for drag reduction;
3. exploiting additional natural and non-polluting sources of energy such as wind or solar energy;
4. improved interactions between vehicles/vessels and infrastructure (including the surrounding medium) for minimal energy consumption and wash (for high speed vessels);
5. smart components and auxiliary systems to reduce energy consumption and/or which make use of energy harvesting;
6. design tools and methodologies for optimised overall energy efficiency and life cycle performance.

**Funding scheme:** Collaborative Projects small or medium-scale focussed research, Coordination and Support actions aiming at coordinating research activities

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.1.3 Integrating natural gas power-trains**

Demonstrate the full potential of natural gas when applied to a custom designed light duty engine (including, for instance, higher or variable compression rates) integrated with specific after-treatment systems dealing more efficiently and at a lower cost than current technology with the reduction of methane emissions in addition to the other pollutants already treated by three way catalysts. Advanced storage systems and vehicle architectures, as well as multi-grade fuel tolerance and fuel flexibility are additional features to be researched.

The research will lead to increased efficiency by 10 % compared with diesel engines of today (2006), particularly at part load, and ultra low emissions (better than EURO 6 and US tier 2).

**Funding scheme:** Collaborative Projects large scale integrating projects

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.1.4 Electric ship technology**

The objective of the research is to significantly enhance the overall efficiency and cost effectiveness of electric power and propulsion systems, in order to enlarge the economically viable range of vessel applications. Activities will address research, development and validation of advanced concepts and technologies towards an all electric ship. This includes the following subjects:

1. New power generation, control and drive machinery, components and systems with higher power and torque density, efficiency and flexibility in design and operation, all at lower cost, size and weight.
2. New concepts enabling the maximum benefits of electric propulsion, control, manoeuvrability and low noise to apply to a wider range of vessels and operating speeds with lower build and operating costs.
3. New transformers, frequency converters, motor and generator designs based on high speed drives, Permanent Magnet and Super-Conducting component technologies.
4. Electrical actuation of major equipment to provide reduced footprint, installation design flexibility and more controllable, reliable operation for new vessels.
5. New electrical power system and ship designs to enable operation from clean shore power supplies to eliminate airborne emissions in harbour.

Expected outcomes will include: electrical power, actuation and propulsion system designs and models that demonstrate increased efficiency and cost effectiveness for existing and new vessel concepts; new validated component designs for high power generators and propulsion systems.

**Funding scheme:** Collaborative Projects large scale integrating projects

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.1.5. Clean and energy efficient marine diesel power trains**

The objective of the research is to significantly reduce pollutant emissions and increase the overall efficiency of marine diesel propulsion systems, hence reduce fuel consumption and CO<sub>2</sub> emissions. Furthermore, NO<sub>x</sub> emissions reduction and the use of alternative fuels should be included. Activities will address research, development and validation of advanced concepts and technologies towards an efficient, fuel flexible and reliable marine diesel propulsion system that drastically reduces gaseous and particulate emissions. Proposals will cover the following subjects:

1. new knowledge for better understanding of the spray, mixing and combustion process, including validated soot formation models;
2. validated thermophysical fuel properties data.
3. development of advanced testing facilities towards better understanding and validation of numerical models and concepts.
4. intelligent engine controls (which are model based and closed loop controlled) and flexible power-trains;
5. new generation of after-treatment systems which are integrated, durable and compact. Research should include better understanding of the process ;
6. innovative components and auxiliary systems;
7. overall power-train optimisation.

This topic is open for waterborne transport only. The proposals should take into account previous collaborative research efforts.

**Funding scheme:** Collaborative Projects large scale integrating projects

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

### AREA: 7.2.1.2 Environment-friendly and efficient industrial processes

#### **SST.2007.1.2.1 The greening of transport-specific industrial processes**

Technologies will concentrate on innovative industrial processes and methods specific to surface transport products characterised by a high degree of complexity and the necessity to couple environmental objectives with consideration to competitiveness and working conditions. Proposals will address cleanliness and energy efficiency in one or more of the following processes: manufacturing; assembly; construction (of surface transport infrastructures); maintenance; repair and recycling. Activities may also address design for ecological processes, models and systems for inspection and condition assessment.

**Funding scheme:** Collaborative Projects small or medium-scale focussed research, Coordination and Support actions aiming at coordinating research activities

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.2.2 End of life strategies for vehicles/vessels and infrastructures**

New methods and processes for improved vehicles, vessels and infrastructure end of life strategies.

Proposals will cover one or more of the following subjects:

1. ecological processes for clean and safe dismantling;
2. clean and safe disposal;
3. cost-effective and clean recycling (in particular for hard-to-recycle materials such as composites) and re-use of vehicles/vessels and infrastructures including conversion and retrofitting.
4. Vehicles/vessels and infrastructure end of life analysis addressing industrial, ecological and economic criteria.

For processes involving human operations special consideration will be given to the improvement and safety of working conditions, the minimisation of human intervention and exposure to potentially harmful substances.

International Cooperation with China, India, Brazil, Russia and South Africa is suggested in the field of recycling.

Concerning dismantling and disposal International Cooperation with additional Asian countries (in particular Pakistan and Bangladesh) is also suggested specially for ship dismantling.

**Funding scheme:** Collaborative Projects small or medium-scale focussed research, Coordination and Support actions aiming at coordinating research activities

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1

#### **SST.2007.1.2.3 ECO-SHIP**

The research objective is to minimise the impact of ships on eco-systems by minimizing waste and water residues and discharges into water and by developing technology and designs for the next generation of efficient and environmentally friendly vessels, particularly cruise and Ropax, whilst aiming at efficient operational and maintenance costs. Activities will address:

1. Research, development and validation for innovative vessel and system designs with low environmental impact, operationally and cost effective ballast water treatment and reduced or no dependency on ballast. All waste sources (including ballast water) will be addressed in a holistic way;
2. Explore ways by which one system waste can be used as input to another. Innovative flue gas cleaning systems will be designed to recover waste heat and waste water to be used in diesel engine injection systems in order to reduce NOx.
3. For the expanding fleet of smaller recreational vessels, economic, efficient and robust anti-pollution processes, technologies and systems are to be developed and validated.

Expected outcomes include: verifiable reduced impact on eco-systems as compared to existing vessel types; validated designs of vessels with zero or minimal impact from ballast water; innovative designs and logistic chain developments leading to reduced dependency on ballast; recovery of waste and flue gas (for example using plasma reduction); solutions against bio-pollution and anti-fouling contamination of water.

**Funding scheme:** Collaborative Projects large scale integrating projects

**Open in call:** FP7-SUSTAINABLE SURFACE TRANSPORT (SST)-2007-RTD-1