ORIENTATION PAPER FOR "THE OCEAN OF TOMORROW 2013" CALL

prepared in connection with the FP7 2013 Work Programme in the area of Food, Agriculture and Fisheries, and Biotechnology (FAFB) research, Nanosciences, Nanotechnologies, Materials and new Production Technologies (NMP), Environment (including climate change), Transport (including aeronautics) and Energy

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One potential cross-thematic call on "The Ocean of Tomorrow" is proposed, following the single stage procedure:

FP7-OCEAN-2013 – with 4 topics

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"THE OCEAN OF TOMORROW – 2013": JOINING RESEARCH FORCES TO MEET CHALLENGES IN OCEAN MANAGEMENT"

Fostering research and innovation on marine technologies

In order to promote cross-cutting marine and maritime research, a potential cross-thematic call "The Ocean of Tomorrow": joining research forces to meet challenges in ocean management" will be launched. The call will be implemented jointly between Theme 2 "Food, Agriculture and Fisheries, and Biotechnology" (KBBE), Theme 4 "Nanosciences, Nanotechnologies, Materials and new Production Technologies" (NMP); Theme 5 "Energy", Theme 6 "Environment (including climate change)" and Theme 7 "Transport (including Aeronautics)". The main objective of the call is to promote research and innovation on marine technologies, in particular sensors, anti-biofouling materials, and innovative transport and deployment systems for the offshore energy sector.

The aim of this potential call will be to support the EU integrated maritime policy's objective of a thriving maritime economy, making the most of marine resources in an environmentally sustainable manner, in line with the EU Strategy for Marine and Maritime Research COM 2008 (534). The Strategy helps deliver the full potential of the maritime economy to the 'Europe 2020' goal of a smart, inclusive and sustainable growth for Europe.

The topics and funding mechanisms will allow for large, multidisciplinary and multi-stakeholder topics with an appropriate balance between (basic/applied) research, knowledge transfer and demonstration, and to support a number of specific EU policies. The topics will be published in the Work Programmes of all participating Themes, as a cross-thematic call.

OCEAN 2013.1 – Biosensors for real time monitoring of biohazard and man made chemical contaminants in the marine environment

Due to growing concerns about the health of the oceans and their capacity to continue to provide resources, goods and services as well as associated risks to the human health, there is an increasing demand for real-time monitoring of the environmental status of marine water quality and the provision of early warning systems. Real-time in situ monitoring of marine chemical contaminants (including emerging pollutants, biohazards e.g. algal toxins) is of utmost importance for the sustainable management and exploitation of the seas and their resources.

Technology wise, marine biosensors have the potential to offer unique features for highly specific and precise measurements, including under multi-stressor conditions, by combining technological elements (including nanotechnologies) and bio-receptors in a single measurement device. Thus they could open new avenues to respond to the growing need for accurate real time monitoring of the quality of sea water and marine ecosystems to support relevant EU legislations such as the Marine Strategy Framework Directive (MSFD)[1].

Based on most recent knowledge on genomics and physiology as well as on materials, nanotechnology, information technologies and relevant existing detection/monitoring technologies, the research under this topic should aim at developing innovative real-time, in situ biosensors, taking advantage of nanotechnology when applicable. These sensors should target the detection and monitoring of high impact and presently difficult to measure emerging pollutants and other substances, such as algal toxins and their producers, synthetic organics, herbicides/pesticides and persistent organic pollutants (POP), including polycyclic aromatic hydrocarbons (PAH) and should enable early diagnosis of deterioration of the environmental status of the marine waters in multi-stressor conditions.

The proposals should include a test phase to demonstrate the potential of these biosensor(s) for in situ environmental and/or aquaculture related applications. Measurement devices should show ability to compete with/complement non real time alternatives and provide faster, less expensive, and less time-consuming measurements than the currently available instrumental analytical methods. A proof of concept in terms of product and/or process should be delivered within the project demonstrating industrial manufacturability.

The multi-disciplinary approach of the research undertaken is essential to address the topic. It will be considered during the evaluation of the criterion related to "S/T quality". The multi-sectoral composition of the partnership and the participation of industrial partners and relevant end-users are essential for the implementation of the project. It will be considered during the evaluation of the criterion related to "Implementation".

Funding scheme: Collaborative project
Several projects may be funded

[1] Directive 2008/56/EC of the European Parliament and of the Council establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), OJ L 164 of 25 June 2008.

Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
- Collaborative projects will only be selected for funding on the condition that the requested EU contribution going to SME(s) is 25% or more of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

Expected impact:
New biosensors in the field of marine environmental monitoring will:

- Enable early detection and more effective monitoring of the marine environment and its status and implementation of appropriate management actions in line with the Marine Strategy Framework Directive (MSFD);
- Improve sustainable management and exploitation of marine resources (such as fisheries and aquaculture) in particular the monitoring of quality of shellfish waters and minimise risks to human health;
- Provide competitive advantage and leadership to European industry, for example within the fields of biotechnology, sensor development, diagnostic technologies and nanotechnology.

OCEAN 2013.2 - Innovative multifunctional sensors for in-situ monitoring of marine environment and related maritime activities

There is an urgent need to improve the in-situ component of the ocean observing systems to achieve an appropriate and comprehensive understanding of the functioning of the marine environment at different geographic, temporal scales and the monitoring of marine and maritime activities to ensure their sustainable development. As commercially available sensors tend to be too large, expensive, and power-hungry for widespread use, reducing the cost for acquisition of data is a key priority in order to implement EU legislations such as the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy CFP), support international initiatives such as the Global Ocean Observing System (GOOS) and the Global Earth Observation System of System (GEOSS).

In this context the topic seeks to develop robust, easily usable across multiples platforms, cost effective multifunctional sensors and their packages that provide reliable in-situ measurements of key parameters. Research and demonstration activities under this topic shall address in a comprehensive manner all the following aspects:

1/ Developing cost-effective sensors suitable for large-scale production, taking advantage of "new generation" technologies such as within the fields of miniaturisation, communication, positioning systems, disposable technologies, and IT tools, software, energy storage and usage.

2/ Sensors should be compact, autonomous multifunctional integrated packages that could be deployed using free floating devices or, buoys, platforms, or ships of opportunities including

fishing vessels. The sensors must be developed as precompetitive prototypes and field tested in close cooperation with stakeholders such as sensor designers, SME's, managers of monitoring/observing systems, marine industry e.g fishermen and end-users. An essential part of this topic will be to ensure technology transfer through an integrated approach, bridging between laboratory testing and commercially viable product.

3/ Addressing data flow issues, including data acquisition, access and retrieval, storage, transmission, standardisation, and pre-processing. The projects should take advantage of the latest web enablement technology for setting up sensors' networks suitable for open access and data sharing.

4/ Making the sensors fully interoperable with existing observing systems and compatible with standard requirement such as the EU Fisheries Data Collection Framework, the Marine Strategy Framework Directive, the INSPIRE directive[2], the GMES and GOOS/GEOSS initiatives.

The multi-disciplinary approach of the research undertaken is essential to address the topic. It will be considered during the evaluation of the criterion related to "S/T quality". The multi-sectoral composition of the partnership and the participation of industrial partners and relevant end-users are essential for the implementation of the project. It will be considered during the evaluation of the criterion related to "Implementation".

Funding scheme: Collaborative project
Several projects may be funded

Additional eligibility criteria:
- The requested European Union contribution shall not exceed EUR 6 000 000 per proposal.
- Collaborative projects will only be selected for funding on the condition that the requested EU contribution going to SME(s) is 30% or more of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

Expected impact:
The projects will:

- Provide a large increase in the temporal and geographic coverage from in-situ marine sensors to enhance the European contribution to Global Monitoring of the Oceans;
- Increase availability of standardised in-situ data that is suitable for integration within key marine observation, modelling and monitoring systems and reduce ocean modelling uncertainty;
- Reduce cost of data collection system in support of fisheries management;
- Advance competitiveness for European Industry's & particularly SME's within the Marine sensing sector;
- Enable better cooperation between key sectors (Manufacturing Industry, ICT, Maritime Industry, Marine Science, Fisheries etc.);

[2] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

- Support implementation of European Maritime Policies (MSFD, CFP, IMP, etc.);
- Promote new discoveries leading to better understanding of the seas.

OCEAN 2013.3 Innovative antifouling materials for maritime applications

Biofouling is a major concern for mobile (e.g. ships) and stationary (e.g. aquaculture cages or offshore power generation systems) maritime structures, sensors and equipments. It negatively affects marine and maritime activities by creating a need for regular maintenance, which is costly, might disrupt operations and is potentially polluting. With the purpose of avoiding toxic biocides and heavy metals used in antifouling coatings, novel alternative cost-efficient and environmentally friendly approaches are needed.

The proposals under this topic should focus on developing new, well beyond the state of the art, antifouling materials and should address in an integrative way mobile and stationary maritime applications.

On the basis of a thorough analysis of the state of the art, research could draw on the whole range of antifouling materials e.g. foul release approach, biomimetics, marine biotechnology based coatings, polymers etc. The proposals should include benchmarking of existing materials, technologies and on-going research. In this sense environmental and economic factors, as well as performance, must be duly considered.

Improvement in the understanding of marine biofouling processes, including their relation with biocorrosion, with respect of the developed materials should be an integral part of the proposals. For the resolution of the technological bottlenecks impeding the achievement of well performing final materials and products, applicants are welcome to investigate and exploit the potential offered by converging technologies such as e.g. materials science and engineering, maritime technology, nanotechnology and biotechnology.

The proposals should include relevant field testing for all the selected applications. Development, improvement and/or standardisation of relevant protocols should be included. Proof of concept in terms of product and/or process should be delivered within the project, excluding commercially usable prototypes (in compliance with European Commission Communication 2006/C323/01), but convincingly proving scalability towards industrial needs.

In the case of marine biotechnology based approaches the issues of supply and the need for the biobased active antifouling compounds to be produced in bulk, as required for final commercial production should be given due consideration.

The proposals should follow a life cycle approach for the new materials and their selected applications also taking into account issues of cost efficiency, effective life span, production, handling, maintenance, environmental impact, ecotoxicological profile and end of life. The proposals should include assessment of the environmental, health and toxicological effects according to REACH[3], OECD Guidelines for the Testing of Chemicals and/or relevant international standards.

[3] Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC)

The multi-disciplinary approach of the research undertaken is essential to address the topic. It will be considered during the evaluation of the criterion related to "S/T quality". The multi-sectoral composition of the partnership and the participation of industrial partners and relevant end-users are essential for the implementation of the project. It will be considered during the evaluation of the criterion related to "Implementation".

Funding scheme: Collaborative project
Several projects may be funded

Additional eligibility criteria:

- The requested European Union contribution shall not exceed EUR 8 000 000 per proposal.
- Collaborative projects will only be selected for funding on the condition that the requested EU contribution going to SME(s) is 25% or more of the total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.

Expected impacts:
The projects will:

- Increase efficiency and competitiveness of maritime activities based on mobile and/or stationary maritime structures (transport, aquaculture, fisheries, marine energy) by reducing operation and life-cycle-costs, negative impacts on the marine environment and, in particular for the transport sector, CO2 emissions;
- Enhance competitiveness and sustainability of the European biotechnology, and/or materials related industry;
- Better understanding/assessment the scope of existing antifouling materials and technologies;
- Contribute to the implementation of EU policies, Environment policy (e.g. the Marine Strategy Framework Directive, REACH), Transport policy (Roadmap to a Single European transport Area – Towards a competitive and resource efficient transport system) as well as industrial and innovation policy, such as the EU Strategy for Key Enabling Technologies and the Lead Market Initiative on Bio-based products.

No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

OCEAN 2013.4 Innovative transport and deployment systems for the offshore wind energy sector

In its Communication "Offshore Wind Energy: Action needed to deliver on the Energy Policy Objectives for 2020 and beyond", the Commission underlines that the exploitable potential of offshore wind by 2020 is likely to be 30-40 GW, and in the 2030 time horizon it could be up to 150 GW.

In 2007, the Energy Wind Association assessed that achieving 40 GW by 2020 will mean that 7,800 turbines of 5 MW need to be built over the next 13 years. Those turbines have to be assembled, transported and installed on sites.

The Strategic Energy Technology Plan (SET-Plan) European Wind Initiative identifies transport and logistic issues as key elements for the deployment and maintenance of offshore wind farms. The TP Wind Strategic Research Agenda also points to research needs both in relation to the cost-effective installation, maintenance, operation and decommissioning of large offshore wind farms as well as to transport, logistics and equipment needs.

In its Communication on Strategic goals and recommendations for the EU's maritime transport policy until 2018, the Commission stresses that maritime transport is an important instrument of the European energy policy. Amongst others offshore servicing vessels are considered as increasingly important aspect for ensuring the well functioning of the energy market.

Research activities under this topic shall address the following aspects:

- Development of innovative and cost-effective deployment strategies for large-scale turbines, including building and testing onshore;
- Elaboration of optimal logistical processes and on-land transport links for large offshore structures
- Design of novel vessel types and equipment for installation, maintenance and decommissioning and validation at reduced scale;
- Development of safety procedures for installation, operation and maintenance activities, regarding both offshore wind structures and the vessels;
- Improved operations and maintenance including the enhanced role of remote condition monitoring and systems with reduced human intervention;
- Development of new business models at European level for large offshore systems based on integrated life-cycle approaches;
- Development of methods and tools to assess the field performance of offshore wind farms servicing vessels and for optimised service activities in terms of lead time and energy usage.

Proposals are expected to include validation activities at reduced but industrially relevant scale using testing models and where possible tests at real scale using existing infrastructure and equipment, adapting those to validate models and management tools. Tests should also address extreme conditions. The proposal should cover both ground based and floating wind parks.

The multi-disciplinary approach of the research undertaken is essential to address the topic. Knowledge exchange with oil/gas and maritime sectors is expected. These aspects will be considered during the evaluation of the criterion related to "S/T quality". The multi-sectoral composition of the partnership and the participation of industrial partners and relevant end-users are essential for the implementation of the project. It will be considered during the evaluation of the criterion related to "Implementation".

In the framework of the SET-Plan European Industrial Initiatives a specific monitoring and knowledge sharing mechanism will be established under the auspices of the Commission and the selected project will be expected to participate.

Funding Scheme: Collaborative Project
Up to one project may be funded.

Additional eligibility criteria:
The requested European Union contribution shall not exceed EUR 10 000 000 per proposal.

Expected impact*:* The project will:

- Contribute to the implementation of the roadmap activity of the European Wind Initiative aiming at supporting offshore take-off in the medium-term;
- Contribute to the development of new niche markets for the European shipbuilding and shipping industries thereby contributing to competitiveness of the sector and to the creation of new jobs.