JPI OCEANS

GAPS TO FEED TO THE SRIA

Joint Programming Initiative Healthy and Productive Seas and Oceans

JPI Healthy and Productive Seas and Oceans
Gaps to feed the SRIA
Including Infrastructure and Human resources

Examples of cross cutting activities to feed the development of a Strategic Research and Innovation Agenda (SRIA)in relation to target group 1 (industries & service providers), target group 2 (researchers & technologists) and target group 3 (policy makers & society)

Interface "Marine Environment / Climate"			
Research areas	**Related Target Groups**		
	TG 1	**TG 2**	**TG3**
The oceans' role as climate regulators, and the impact of a changing climate on this function		x	
Effects of climate change on the marine and coastal ecosystems functioning, habitats and biodiversity	x	x	
Climate models necessary to predict regional changes, and particularly to downscale the global climate models to the sub-regional seas		x	x
Climate Change consequences on coastal areas economies (erosion, sea level rise, extreme events...)		x	x
Climate / ecosystems / food web models to improve predictions of ecosystems evolutions in relation to anthropogenic pressures and climate change	x	x	x
Impact of Climate Change and human activities on Good Environmental Status of European Seas and Oceans as required by the Marine Strategy Framework Directive	x	x	x
Valuation of ecosystem services – impact of climate change		x	x

Interface "Marine Environment / Marine – Maritime activities"			
Research areas	**Related Target Groups**		
	TG 1	**TG 2**	**TG3**
(Climate /) Ecosystems / food web models to improve predictions of ecosystems evolutions in relation to anthropogenic pressures (and climate change)	x	x	x
Regional knowledge necessary to define and move towards Good Environmental Status of European Seas and Oceans as required by the Marine Strategy Framework Directive.	x	x	x
Knowledge and mitigation of impact of human activities on Good Environmental Status of European Seas and Oceans as required by the Marine Strategy Framework Directive	x	x	x

(technologies for "greening" marine - maritime activities, including port expansion on land and in waters, building and dredging with nature and Carbon storage among others)			
Maritime Spatial Planning	x	x	x
Use of marine biodiversity for biotechnology applications in health, food (including feed for aquaculture), energy, etc...	x	x	
Integrated knowledge for the sustainable development of fisheries / aquaculture (taking into account impact on ecosystems, food webs, socio-economic impacts...)	x	x	x
Socio-economic services derived from operational oceanography, like forecasting	x	x	x
Valuation of ecosystem services – impact of human activities	x	x	x
Design of vessels to minimize the impact of shipping activities on the marine environment (e.g. Ballast free ship, Low ballast exchange ship, etc	x		x
Improvement and development of new technologies to fight against oil and HNS spills	x		x
To reduce the negative impacts of maritime technologies and practices	x	x	X
To improve competitiveness of the maritime transport	x	x	
To establish new scientific knowledge of the physical impacts on the marine environment of maritime technologies and practices;	x	x	x
Ballast Water Ballast free ship Low ballast exchange ship	x		
Impacts of noise from Maritime Transport on Marine environment Development of design tool for emitted noise reduction strategies in the far-field from maritime traffic(i.e. hydro-acoustic models)	x		
Impact of Emissions CO2, NOx, SOx	x		x

Interface " Marine – Maritime activities / Climate Change"			
Research areas	**Related to Target Groups**		
	TG 1	**TG 2**	**TG3**
Modelling scenarios and consequences of climate change on design of coastal defences, ports, offshore structures...	x	x	
Climate / ecosystems / food web models to improve predictions of ecosystems evolutions in relation to anthropogenic pressures and climate change (e.g. invasive species like jelly fish or algal blooms)	x	x	x
Climate Change impact on the spatial planning of marine-maritime activities and ICZM	x	x	x

Climate Change Impact on the production and location of ocean energy	x	x	x
Climate Change impact on the exploitation and harvesting of marine biodiversity, fisheries, aquaculture…	x	x	x
Impacts of climate change on maritime transport (sea level rise, Artic ice sheet melting, extreme events)	x		
Design of vessels and offshore structures to meet the challenge of extreme conditions.	x		
Monitoring marine environment and the benefits of metocean data to maritime transport and climate change A significant increase in appropriately instrumented vessels on representative shipping routes; - Establishing robust mechanisms for Europe-wide and global open access to, and sharing of, data, including real-time data; - Improved knowledge-based tools and services to enable decision support for safer and more efficient ship operations like current riding and weather routing	x	x	x

Generic cross-cutting technologies			
Research areas	**Related Target Groups**		
	TG 1	**TG 2**	**TG3**
Sensors (and related IT systems) for in situ observation of the marine environment	x	x	x
Hyperbaric technologies to observe and develop research activities in deep seas	x	x	
Development of more efficient and environmentally friendly anti-bio-fouling materials technology, (e.g. Bio-mimetic science; new antifouling agents and tools to reduce fouling)	x	x	
Development of new anti-corrosion materials and improvement of current materials	x	x	
Underwater mining and exploitation of minerals from deep sea. Deep Sea technologies	x		
Life at sea. Development of new concepts for factories at sea for energy / food / deep sea resources exploitation	x		
Development of technologies in Ports / Marina /Logistic Interfaces development	x		

Knowledge / technology transfer across the marine / maritime cluster/ other industries			
Research areas	**Related Target Groups**		
	TG 1	**TG 2**	**TG3**
Projects and actions to promote knowledge / technology transfer across maritime sectors (e.g. shipbuilding / offshore energy / fisheries / aquaculture)	x	x	
Projects and actions to promote knowledge / technology transfer between marine science and maritime sectors (new sensors for in situ measurements , AUV, ROV, use of offshore platforms for scientific purposes, ships of opportunities, use of marine deep sea technologies for subsea Carbon storage and resources exploitation)	x	x	
Projects and actions to promote knowledge / technology transfer between marine science and other non-maritime industry sectors (e.g. design of development of new materials, etc)	x	x	
Projects action to promote synergies between oil and gas industry and maritime industries at large including environmental actors.	x		

Actions to support policy making			
Areas	**Related Target Groups**		
	TG 1	**TG 2**	**TG3**
Knowledge to support the implementation of the Marine Strategy Framework directive	x	x	x
Knowledge to support marine spatial planning and integrated management of coastal zones	x	x	x
Knowledge to better manage impact of Climate Change on coastal zones	x		x
Knowledge to support sustainable exploitation of marine and maritime resources,	x	x	x
Knowledge to support a sustainable and competitive maritime industry		x	
Mechanism to secure transfer of knowledge from science to policy	x		x
Knowledge as basis to define a common legal framework regarding ownership of biotic and abiotic resources and IPRs for its exploitation and commercialization		x	x
Knowledge to preserve the heritage and enhance cultural and societal benefits from seas and oceans		x	x
Think tank and foresight to feed the continuous and longterm development of the JPI bringing it to the next ERA step as one of the framework conditions requested			x

(CONTINUATION)
Infrastructure and Human resources

Research Infrastructures (examples)

There is a strong case for better coordination between EMODNET (DG-MARE), WISE-MARINE (DG –ENVIRONMENT) and better integration with the GMES initiative.
A coordinated European Initiative, to provide Europe with an Integrated Ocean Observing Capability could be undertaken by:

- Ensuring an improved access to and pooling of marine data coming from different sources and regions (particularly through the development of the European Marine Observation Data Network – EMODNET[1]);
- An improved convergence between different marine research infrastructure projects, with a view to ensure that they respond better to societal and policy needs for instance we realise that the renewable energy sector and grid system, to develop strong depend on an integrated observation system to enable them;
- A coordinated effort to develop over the long term the most critical marine research infrastructure and fill the key gaps;
- A coordinated effort to undertake over the long term a complete seabed mapping of all European basins (including identification and characterization of habitats).

The ESFRI (European Strategy Forum for Research Infrastructures) has already identified some key infrastructures needed in marine research. Among these infrastructures there are examples of regional integrated infrastructures (for instance SIOS in the High Arctic aimed to integrate the studies of geophysical, chemical and biological processes from all research and observation platforms) as well as infrastructures for ocean and marine environmental research (e.g. EUROARGO, EMSO) and research in marine biotechnology across Europe (e.g. EMBRC). The long term support to these ESFRI infrastructures is key for the success of marine and maritime research programmes, to achieve integration and coherence at European level , and for providing tools to tackle societal and industry needs.

As regards ocean energy, given the continuous lack of qualified and skilled workers in this sector an European infrastructure for creating human capacity building would be needed to cover the present and future demand of the sector and will be essential to industries for achieving 20% target of renewable energy by 2020.

Regarding aquaculture, research infrastructures are needed to be at the forefront in the sustainable farming of some key species like bluefin tuna, and they are essential to support European research and industry in moving towards an industrial and self-sustainable culture of this species, which would alleviate the pressures on wild stocks . Other critical gaps of European dimension remain to be identified.

Human Resources

The very nature of the marine and maritime field and the complexity pressing issues, such as climate change and human pressures, requires that enough and competent personnel is

[1] COM (2010) 461

engaged in marine and maritime research, by creating a framework that enables to support human capacity building and contributes to the knowledge, expertise and skills of researchers, engineers and technicians needed for cross-sectoral multidisciplinary activities and approaches.

Answers are needed to questions like:

- How can we stimulate recruitment to marine and maritime research careers?
- How do we engage and retain the "best brains" to solve the crucial issues?
- How can we guarantee the development and consolidation of a professional career for researchers?
- How do we increase gender equality?
- How can we develop regional clusters, choose to build research infrastructure and establish Centres of Excellence in areas that otherwise would not be attractive for young recruits?
- How can we increase visibility of the marine issues and reach common understanding among researchers, business communities, politicians and the general public in order to rise our youth's interest to work in this field?
- The need for people with interdisciplinary skills is rising steadily. How can we increase their recruitment and educate them effectively?
- How we can stimulate the urgent recruitment of scientist for some disciplines that are very little attractive to researchers, but of great relevance in marine environmental research (e.g. phytoplankton and zooplankton taxonomy)

The measures suggested and partly implemented through the ERA-initiative "Mobility and careers", as well as the capacity building activities within SEAS-ERA, should act as a starting point for the formulation of the above questions and create an appropriate framework that should eventually lead to overcome the present barriers and challenges, fulfilling the needs in the marine and maritime research fields, contributing to creation of jobs and providing Europe with the best qualified and skilled researchers, engineers and technicians.

The continuous training and exchange of personnel are issues of great relevance in experimental sciences. The proper use, handling and calibration of delicate and sensitive equipment's and the use of the most suitable techniques, methods and tools (e.g. laboratory analysis, develop of predictive models, statistical tools, etc) together with the adequate training to acquire the best knowledge and skills are indispensable to conduct high quality research. The training and exchange of personnel among partners involved in the JPI as well as with other international partners will be promoted with a view to enhance the skills and capabilities of researchers, engineers and technicians.

On the other hand, comparison of data is frequently rather difficult due to the lack of harmonization and standardization and the use of different techniques, methods and tools used for collecting, handling and analysing samples or data. This is major obstacle that needs to be overcome to give coherence to the European research and make more efficient the investment in marine and maritime research. The JPI should agree on data harmonization, standards and certification across the partners to overcome this barrier and put forward proposal for encourage an European policy on harmonization and standardisation of techniques, methods and tools.

Pollution of oceans is a key challenge that should be tackled from different angles. Nevertheless, science can and should play a role in increasing the perception of the society on the role the oceans and seas in our life styles, welfare and economies. In that respect, this JPI

can contribute to improve the general public awareness on oceans and seas, however this is not a core objective of the JPI. This can be done by sharing results and information with the stakeholders from different sectors (policy makers, management authorities, industry, NGOs and CSO), public at large and also with the educational system. Sharing of best practices in this respect is important not only to raise the awareness of the importance of oceans and seas, for example as climate regulator or source of energy, and the assets of the seas themselves, but also to strengthen early enthusiasm and possible recruitment.