



**COUNCIL OF
THE EUROPEAN UNION**

Brussels, 20 September 2011

**14454/11
ADD 1**

**RECH 307
COMPET 405
ENV 694
TRANS 242
PECHE 242**

COVER NOTE

from:	Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director
date of receipt:	19 September 2011
to:	Mr. Uwe CORSEPIUS, Secretary-General of the Council of the European Union

No Cion doc.:	SEC(2011) 1042 final
Subject:	Commission Staff Working Paper accompanying the Commission Recommendation on the research joint programming initiative 'Healthy and Productive Seas and Oceans' (2011/EU)

Delegations will find attached Commission document SEC(2011) 1042 final.

Encl.: SEC(2011) 1042 final



EUROPEAN COMMISSION

Brussels, 16.9.2011
SEC(2011) 1042 final

COMMISSION STAFF WORKING PAPER

**accompanying the COMMISSION RECOMMENDATION on the research joint
programming initiative 'Healthy and Productive Seas and Oceans' (2011/EU)**

{C(2011) 6362 final}

COMMISSION STAFF WORKING DOCUMENT JPI OCEANS

I. Executive summary.....	1
II. Towards Joint Programming.....	1
III. Societal challenge – Need for Research.....	2
IV. Mapping of research.....	4
V. Goals – Potential outcomes – EU added value.....	22
VI. Role of the European Commission in the JPI.....	23
Annex I: Governing structure and stakeholder involvement.....	25
Annex I: Governing structure and stakeholder involvement.....	25
Annex II: Preliminary outline of the SRIA.....	26

I. Executive summary

The new ‘joint programming’ approach is a proposal for a more strategic cooperation between EU Member States on research and development to address major societal challenges under the umbrella of the European Research Area (ERA). Joint Programming Initiatives (JPIs) involve Member States engaging on a variable-geometry basis in defining, developing and implementing strategic research agendas. "Healthy and Productive Seas and Oceans" has been proposed as one such JPI.

Seas and oceans can provide a vital contribution to the EU 2020 goal of a smart sustainable and inclusive growth. But they also represent a largely unknown territory, under considerable environmental pressure, also from climate change. To conquer this new frontier, the JPI Oceans will seek to consolidate and integrate knowledge and technology across marine and maritime sectors to:

- ✓ Enable the advent of a knowledge based maritime economy, maximising its value in a sustainable way
- ✓ Ensure Good Environmental Status of the seas and optimise planning of activities in the marine space
- ✓ Optimise the response to climate change and mitigate human impacts on the marine environment.

II. Towards Joint Programming

In its communication from 15 July 2008, entitled "Towards joint programming in research: Working together to tackle common challenges more effectively"¹, the Commission called for

¹ 11935/08

the implementation of a process led by the Member States to step up their cooperation in the R&D area in order to better confront major societal challenges of European or worldwide scale, where public research plays a key role. With the Council conclusions of 2 December 2008², the High Level Group for Joint Programming (GPC) was established with a view to identifying and substantiating joint programming themes. The pilot JPI on combating neurodegenerative diseases, was launched with the Council conclusions of 3 December 2009³, which also welcomed the identification and substantiation of the first wave of themes for JPIs in the areas of 'Agriculture, food security and climate change', 'Cultural Heritage and Global Change', and 'A healthy diet for a healthy life'. The six "second wave" JPI themes⁴, which include 'Healthy and Productive Seas and Oceans' (JPI Oceans), were identified and substantiated in the Council conclusions of 26 May 2010⁵.

The 1st Interim Management Board (IMB) meeting of the JPI Oceans was convened in June 2010 and a secretariat for the JPI Oceans was established in support of the IMB. Three more meetings of the IMB took place between October 2010 and April 2011. During that period, the commitment of member states to the JPI Oceans has steadily grown and it includes now 14 countries as full members (Belgium, Denmark, France, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Turkey, Sweden, Iceland, Romania and United Kingdom) and 2 as observers (Germany and Finland). The BONUS (article 185 initiative) also decided to participate as an observer in the JPI Oceans.

A vision document, supported by a thorough mapping of research activities and capacities, both at member states and EU level, was developed. Terms of reference for the governing structures of the JPI were defined.

On the basis of all these developments substantiated by documents, the Commission assessed in May 2011 that the JPI Oceans was mature for a recommendation.

III. A major issue – Need for Research

1. Why are seas and oceans a major issue for Europe?

Seas and Oceans are the largest unexplored territory on Earth. We know little about the marine space and environment, and we have large knowledge gaps in our understanding of the crucial interactions between oceans and climate. The deep seas, in particular, are as poorly known as remote planets. There are compelling reasons, in terms of opportunities and challenges, why Europe should act collectively and decisively to conquer this new frontier.

Opportunities

Europe can be considered as a “blue” territory, with 89 000 km of coastline along two oceans and four seas: the Atlantic and Arctic Oceans, the Baltic, the North Sea, the Mediterranean,

² Official Journal C 24, 30.1.2009, p. 3–6.

³ 17226/09

⁴ 'Connecting Climate Knowledge for Europe (Clik'EU)', 'Healthy and Productive Seas and Oceans', 'More Years, Better Lives - The Potential and Challenges of Demographic Change', 'The microbial challenge - An emerging threat to human health', 'Urban Europe - Global Challenges, Local Solutions' and 'Water Challenges for a Changing World'.

⁵ 10246/10

and the Black Sea, as well as overseas territories with large territorial and jurisdictional waters.

The marine environment is a source of enormous wealth and well-being. The EU's coastal regions account for some 40% of its GDP and population⁶. Maritime transport, responsible for 90% of EU's external trade and 40% of its internal trade, is vital for its economy. European tourism, a substantial part of which takes place in coastal areas, accounts for 3 million jobs and 72 billion Euros of revenue per year. Fisheries, aquaculture and food processing are key sectors in food and food security and account for around 0.5 million jobs with a turnover of €32 billion Euros per year⁷. At global level, fish and other fishery products contribute 15% of mankind's animal protein intake⁸.

The unexploited potential of the sea is even greater, with still largely unknown resources. It is estimated that more than 90% of the marine biodiversity remains unexplored. Oceans and seas offer a huge potential for discovery of new species and applications derived from biotechnologies, a sector foreseen to grow at a 10% annual rate in the coming decade. The potential for marine energy still needs to be realised. In order to reach the EU 2020 renewable energy objectives, an essential contribution should come from offshore wind, and in the longer term, ocean energy at large can contribute an even bigger share to the EU zero Carbon society objective. Sea beds contain untapped mineral resources, some of which are of critical importance and could help improve Europe's security of supply of minerals.

Seas and Oceans also play a major role in the regulation of the climate. Not only does the sea act as a carbon sink limiting the global warming but global (thermohaline) oceans circulations such as the Gulf Stream have a large impact on the Earth climate.

Challenges

The Marine environment is dramatically affected by several pressures such as overfishing, oil-spills, pollution from land based industries, from maritime transport, discharge of nutrients, litter, invasive species transported with global trade together with the acidification of oceans resulting from climate change. Those pressures are putting the marine environment at risk from uncontrollable changes above and throughout the water column to the seabed.

Besides human pressures, the European coasts and offshore activities are exposed to a variety of natural hazards, deriving from sub-sea-floor processes (seismic events, landslides...). Sea level rise, coastal erosion and extreme events are threatening coastal settlements, forcing policy makers and management authorities to reconsider the design of costly coastal defence. Economic damages to European coastal areas have been estimated at 12-18 billion Euro / year by 2080, a risk which could be reduced to 1 billion Euros with appropriate adaptation measures.

As the coastlines are getting ever more crowded with a growing population and industrial activities connected to ports, there is a strong drive to move coastal activities further offshore. Wind farms, offshore platforms, electrical grids, pipelines, sea motorways and mariculture, among others, are each occupying more and more marine space, as they also move further out

⁶ EUROSTAT Statistics in focus, 38/2010, "Portrait of EU coastal regions".

⁷ European Commission, Facts and Figures on the Common Fisheries Policy, Basic Statistical Data, ISSN 1830-9119, 2010 Edition.

⁸ FAO Fisheries and Aquaculture Yearbook 2008.

in the seas and oceans. This poses considerable challenges both technologically and from a marine spatial planning perspective.

2. Need for a substantial research effort

Because seas and oceans are a largely unknown territory, there is a primary need to gather basic knowledge to enable the development of new marine / maritime activities, ensure the sustainability of existing ones, understand and reach Good Environmental Status of our seas, and adapt to climate change impacts.

This comprises a joined effort to develop shared marine observation infrastructures, which can only be done through European or regional cooperation because of their high costs and the very nature of the marine environment and environmental / climate processes, which ignore borders.

Conquering seas and oceans also require the development of cross-cutting enabling marine technologies as well as major programmes to tackle research and technology challenges like those posed by the deep sea.

There is also a need for inter-disciplinary research to better understand interactions between oceans and climate, as well as the impact of climate change on the marine environment, marine resources, marine structures and coastal areas.

These are research challenges of considerable complexity, with an important socio-economic dimension. They must be tackled to enable the advent of a knowledge based, smart and sustainable maritime economy, resilient to climate change. There is a strong added value in addressing them through a joint research effort at European level, and this is further elaborated in chapter V of this document.

This can be done by building upon the important research work that has been undertaken, both at EU and Member States levels, as shown by the mapping of research activities presented thereafter.

IV. Mapping of research

The mapping of research at Member States level has been conducted by participating countries, through questionnaires sent by the JPI secretariat, which has compiled the results. It consists of a quantitative and qualitative overview of national research funding and innovation systems, competitive and non-competitive funding schemes. It has been divided into Marine environment, climate and oceans, biological resources, non-biological resources (including maritime transport and marine energy) and socio-economic research (including spatial planning) It should be noted that these figures cover infrastructures (investments and running costs), as well as human resources. It has been estimated by the JPI 'Oceans' that the mapping done covered approximately 80% of the relevant budget actually spent by Member States.

The mapping of marine and maritime research activities at EU level was undertaken by the European Commission (Directorate General for Research and Innovation) as a contribution to the mapping of research undertaken by the JPI. It covered the same areas as for Member

States, as well as FP 7 cross-thematic marine - maritime calls under the "Ocean of Tomorrow" heading.

The following table summarises key budget figures at Member States and EU levels:

Marine - maritime annual research funding of JPI members		Marine - maritime average annual research funding by FP7	
Marine environment (including climate)	40%	Marine environment (including climate)	29%
Biological resources (including fisheries)	35%	Biological resources (including fisheries)	19%
Non-biological resources (including transport and energy)	20%	Non-biological resources (transport and energy)	21%
Socio-economic research (including spatial planning)	5%	Ocean of tomorrow	9%
		Capacities and human resources	22%
Total	1666 M€		213 M€

A more detailed description is provided thereafter.

1. At Member State level

Belgium - Quantitative mapping contribution: 52 M€/year

Marine and maritime research and innovation policies and priorities

Belgium (Federal)

Major marine related programmes funded at federal level by the Belgian Science Policy Office (BELSPO) are: the Research programme "Science for a sustainable development - SSD" with sub programmes on the North Sea, Biodiversity, Climate and Atmosphere and Antarctic and polar regions; and the Research programme for Earth Observation (STEREO), for a total budget of 20 M€.

BELSPO counts 10 research institutes within its structure. Regarding marine research, the Royal Belgian Institute of Natural Sciences (RBINS) and the Royal Meteorological Institute (RMI) should be mentioned in particular.

Belgium (Flanders and Flemish community)

The Government of Flanders funds Research and Innovation through 4 main funding lines.

1. The Research Foundation–Flanders (FWO-Vlaanderen) supports mainly cutting edge research, through PhD and post-doc grants, many of which are related to marine topics.
2. The Flanders Innovation & Technology agency (IWT) supports strategic and applied research, with ~ 300 grants / year in applied research fields, some of them dealing with marine related topics (biotechnology, aquaculture, marine technology).
3. Strategic research centres, which can be considered as dedicated research programmes: VIB (Flanders Biotechnology Institute), VITO (Flanders Environmental technologies),...
4. BOF: Special Research Funds provided to the universities to develop their own research policy and support their flagship research priorities.

There is also a dedicated service, data and information platform for the marine/maritime research community, i.e. the Flanders Marine Institute (VLIZ).

Belgium (Walloon Region - French-speaking Community)

The Fund for Scientific Research - FNRS supports individual researchers by offering temporary or permanent positions; funding to research projects; grants and credits for international collaboration and scientific prizes.

In 2008, 10 - 20 projects in the field of marine and maritime sciences were funded accounting for approximately 2 M EUR or 4-5% % of all honoured research projects in 2008 (essentially projects related to interactions between oceans and climate as well as marine biodiversity.)

Denmark - Quantitative mapping contribution: 30 M€/year
--

National marine and maritime research and innovation policies and priorities

Throughout the past decades, the successful management of fishing, marine aquaculture, shipping industry, oil and natural gas production and the exploitation of sand and rubble, has been facilitated through a high level of Danish applied marine research and through basic research at the Danish universities.

A key driver for marine research is the major changes in the marine environment that will take place due to global warming, together with icecap retreat and changes in atmospheric circulation, which pose new challenges for the Danish and European marine research. They also require studies of climate history and structure of the ecosystems. It is expected that climate changes will lead to significant changes in size and distribution of fish and shellfish stocks, marine flora and fauna, the biodiversity and its biomass.

In the northern seas, the distribution of sea ice has already been substantially changed. In order to follow this trend and to predict the effects of climate change, it is necessary to intensify research on marine natural environment and continuously enhance the understanding of coupling between ocean physics, chemistry and biology. Research in exploiting and benefitting the changed marine conditions are also necessary.

The Danish strategic research in food issues offers consumers a wide and diverse range of Danish-produced marine quality food, promoting a competitive development in the fish processing industry and contributes to society's regulation of the profession in the interests of a sustainable and productive use of the marine renewable resources.

To obtain these aims, it is the overall Danish strategy to:

1. Strengthen the academic environments, including through a concentration of research in fewer and larger environments and conclusion of cooperation agreements.
2. Strengthen the interdisciplinary research and increase the national research specialization in order to avoid unnecessary duplication of research.
3. Improve the graduate and PhD training opportunities in the marine.
4. Expand and upgrade international research and collaboration as well as dissemination and exploitation of results.

Finland - Quantitative mapping contribution: 18 M€/year
--

National marine and maritime research and innovation policies and priorities

Finland aims to enhance our understanding of the sea and its marine ecosystems by building a scientific knowledge base. To achieve this goal Finland is also actively involved in international marine research organisations. Finnish marine research largely focuses on the Baltic Sea, with such studies accounting for about 90% of internationally published Finnish marine research. Marine research conducted in Finland is funded by various ministries and from the budgets of public research institutes and universities, as well as from competitive research funds.

Important sources of competitive research funding include the Academy of Finland, the EU's research framework programmes, and the BONUS – Baltic Organisations Network for Funding Science EEIG, which funds marine research all around the Baltic Sea. Tekes, the Finnish funding agency for technology and innovation, is a major provider of funds in certain specialist areas. Several Finnish foundations also provide significant funding for Baltic marine research, including the Walter and Andrée de Nottbeck Foundation, the Nessling Foundation and the Kone Foundation.

In Finland marine and maritime research is a relatively small research field. Studies in the water sector, of which marine research is estimated to account for approximately a quarter in terms of funding, only received about 0.7% of government research funding in 2005. The Academy of Finland has estimated that during the same year competitive research funding accounted for about half of total research funding granted to the water sector.

Finland is currently preparing a national strategy for marine and maritime research.

France - Quantitative mapping contribution: 305 M€/year
--

National marine and maritime research and innovation policies and priorities

French marine research is mainly driven by the Ministry of Higher Education and Research (MESR), through the Universities and Research Performing Organizations, funded under the National Strategy for Research (SNRI) based upon 5 principles and 3 research priorities.

Principles:

1. Basic research and large research infrastructures is a necessity

2. Research must support competitiveness and address innovation
3. Limitation of risks and increased security in our societies
4. Development of social sciences
5. Increased multidisciplinary approach in the scientific developments

Priorities:

1. Health, welfare, food and biotechnologies
2. Important and impacting environmental topics and development of ecotechnologies
3. Information and communication technologies, nanotechnologies

The overall budget for marine research could be roughly estimate at 300 M€/year of non-competitive funds (research infrastructures are included) while competitive money comes mainly from European Projects under the Framework Program, from Structural Funds (Interreg, FEDER) and the National Research Agency (ANR) in France.

Marine research themes are addressing oceanography (air-sea interactions, physics, biogeochemistry, acidification, modelling, variability prediction), climate change impact and the marine environments, including paleoclimatology, ocean technologies (renewable energy, oil and gas, robotics, sensors), energy extraction from the sea, food from aquaculture and fisheries, safe and sustainable use of marine and coastal space, marine biodiversity and biotechnologies, new frontiers (deep sea resources, polar and tropical environment), regional integrated programs (Mediterranean, arctic), observation programs (e.g. ARGO, oceansites), socio-economic and policy support (WFD, MSFD, MPAs).

From 2010, research organizations and universities involved in the environment sciences are represented in the French Alliance for the Environment, where a cluster for marine science is represented. The aim of this cluster is to produce by mid-2011 a national program for marine research incorporating the major research performers in France (see §2). This program will be the basis for the French contribution to the JPI Oceans and will also have an impact on the ANR programs.

In 2008, the French Government decided to launch technology and science clusters to support the innovation process enterprise involving major companies, SMEs, research centres and higher education institutions. Two marine clusters have retained in a bottom up selective process (in Brest and Toulon). Now twinned, their mission is to identify and promote the emergence of innovative projects that will satisfy the demands of new markets. They focus on maritime safety and security, shipbuilding and leisure boat building, marine energy resources, marine biological resources, coastal and environmental planning and management, and operate through calls for proposals and the projects are financed by public and private funding.

Due to the fact that sea embraces different sectors, relevant funds come also from other Ministries: the Ministry of Ecology, sustainable development and transport, the Ministry of Agriculture Food and Fisheries, the Ministry of Economic Development and from the Local Administrations (mainly the Regions).

Germany - Quantitative mapping contribution: 300 M€/year

National marine and maritime research and innovation policies and priorities

German expenditures on marine on maritime RTD according to the Bundeshaushaltsplan 2010 are approximately 300 million Euro (institutional funding included). The main body responsible for scientific research funding is the German Federal Ministry of Education and Research (BMBF). One of the priorities for future activities is marine research on all local and global seas and oceans with three focal points for Marine and Earth System Science:

1. Arctic
2. German coastal seas
3. South-western African rim

Basic research in the marine sciences is mainly funded through the DFG (Deutsche Forschungsgemeinschaft). The DFG Senate Commission for Oceanography plans and coordinates the activities of the DFG in the area of marine research and oversees the key programs and collaborative research grants concerned. In addition, the senate committee functions as the German national committee for the affairs of the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU).

Applied marine and maritime research and technology development is funded by:

- ✓ The Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) provides research capacities via the Johann Heinrich von Thünen Institute in the fields of fisheries and aquaculture research.
- ✓ The Federal Ministry of Transport, Building and Urban Development (BMVBS) in the field of maritime transport. The BSH German Maritime and Hydrographic Agency has substantial capacities in the fields of operation marine research, including, but not limited to, ocean observations, marine environmental monitoring, maritime geospatial data, maritime spatial planning, etc.
- ✓ The Federal Ministry for Economics and Technology (BMWi) in the fields of maritime technology research. The BGR German Federal Institute for Geosciences and Natural Resources has extensive capacities related to marine resources RTD.

Iceland - Quantitative mapping contribution: 25 M€/year
--

National marine and maritime research and innovation policies and priorities

Icelandic policy on ocean issues is based on maintaining the future health, biodiversity and sustainability of the ocean surrounding Iceland, so it may continue to be a resource that sustains and promotes the nation's welfare. This means sustainable utilisation, conservation and management based on scientific research and applied expertise and guided by respect for the marine ecosystem as a whole. The health of the ocean and sustainable utilisation of its living resources provides the main basis for Iceland's economic welfare. In view of the importance of the waters surrounding Iceland, the government considers ocean issues to be central to its activities for the foreseeable future.

Icelandic policy is based on three pillars: the United Nations Convention on the Law of the Sea; the concept of sustainable development, and the view that responsibility for the conservation and utilisation of marine ecosystems is best placed in the hands of those states directly affected by the decisions taken and with the greatest interests at stake.

Sustainable utilisation is the key to rational and responsible conservation and management of marine resources. Iceland's policy places special emphasis on the importance of preventing ocean pollution. The application and further development of the ecosystem approach lays the basis for achieving Iceland's objectives in ocean issues.

Ireland - Quantitative mapping contribution: 25 M€/year
--

National marine and maritime research and innovation policies and priorities

The Sea Change Strategy (A Marine Knowledge, Research and Innovation Strategy for Ireland: 2007-2013) is the marine research component of the broader National Strategy for Science, Technology and Innovation (SSTI: 2006-2013).

The Sea Change Strategy builds on the vision and strategy outlined in the National SSTI with the aim of bringing about a transformation of the marine sector from a traditional one which is primarily associated with food harvesting to one which is multifaceted, embracing a range of new, high value, knowledge-intensive, commercial opportunities developed in a sustainable manner.

More specifically the Sea Change Strategy aims to:

1. Assist existing, and largely indigenous, marine sub-sectors to improve their overall competitiveness and engage in activity that adds value to their outputs by utilising knowledge and technology arising from research;
2. Build new research capacity and capability and utilise fundamental knowledge and technology to create new marine-related commercial opportunities and companies;
3. Inform public policy, governance and regulation by applying the knowledge derived from marine research and monitoring;
4. Increase the marine sector's competitiveness and stimulate the commercialisation of the marine resource in a manner that ensures its sustainability and protects marine biodiversity and ecosystems;
5. Strengthen the economic, social and cultural base of marine dependant regional/rural communities.

The priority marine research topics covered by the Sea Change Programme, under the sub-headings: Industry, Discovery Policy Support and Marine Research Infrastructures, are outlined above.

Further to a strategic Marine Foresight Analysis carried out in 2004-2005, a number of key gaps in Ireland's marine research capacity, essential for the implementation of the Sea Change Strategy, were identified. A significant number of these gaps have/are being filled through the establishment of research competencies linking existing and new researchers and specialist facilities under the Beaufort (Marine) Parsons (Energy) and Griffith (Geology) Research Funding Schemes.

Italy - Quantitative mapping contribution: 100 M€/year

National marine and maritime research and innovation policies and priorities

Italian marine research is mainly driven by the Ministry of Education, University and Research (MIUR), through the Universities and Research Performing Organizations and funded under the National Research Plan. The primary objective of the National Research Plan is the promotion of a mission oriented research, best uses of human resources, excellence of research groups, public-private collaboration, multidisciplinary actions, policy support and sustainable growth.

The overall budget for marine research could be roughly estimated 100 M€/year of non-competitive funds (research infrastructures are included) while competitive money comes mainly from European Projects under the Framework Program and from Structural Funds.

Marine research lines are addressed to oceanography, climate change and marine environment, ocean technologies, energy, food, oceans and health, safe and sustainable use of marine and coastal space, new frontiers (deep sea, polar and extreme environment), socio-economic and policy support.

From 2008, research organizations and universities involved in the marine activities are represented in the Italian Oceanographic Commission (COI), a National Research Council (CNR) commission established to fulfil the duties of the Italian National Coordination Body for the Intergovernmental Oceanographic Commission (IOC). The COI discusses also marine research strategies.

A Technological National Platform (PTNM), led by the Ministry of Infrastructures and Transportation (MIT), has been established and involves all the stakeholders in the sea-related technologies. It aims at reaching a consolidated networking among stakeholders and building a shared vision in terms of technological growth, developing initiatives of national relevance. Innovation is pursued in synergy with close technological sectors (cross-fertilization) and integrating research and industry (speeding up of innovation). In particular, the actions on Marine Technologies are run in line with the Industry 2015 Program that indicates strategic guidelines for the future Italian productive system development and competitiveness. PTNM is in tune with the EU Waterborne Technological Platform and has already published a Strategic Research Agenda.

Due to the fact that the sea embraces different sectors, relevant funds come also from other Ministries: the Ministry of Environment, the Ministry of Agricultural, Food and Forester Policy, the Ministry of Economic Development and the Local Administrations and Technological Districts.

The Netherlands - Quantitative mapping contribution: 32,5 M€/year
--

National marine and maritime research and innovation policies and priorities

Marine and maritime issues play a prominent role in The Netherlands. Large parts of the country are situated below sea level, implying the need for up-to-date coastal protection and efficient water management. Considerable effort and funds are allocated to research in this area. Technical and applied research is often commissioned by the ministry of Infrastructure and Environment (formerly transport and waterways) and is often carried out by the technical university of Delft and/or Deltares. This last research institution is dealing with many aspects of applied coastal and marine research (mainly abiotic and low trophic levels).

The harbour of Rotterdam (second-largest in the world) is one of the main drivers of the Dutch economy. Consequently, maritime issues (transport, harbour business, off-shore industry) are at the heart of Dutch policies. Fisheries play an important role too. The ministry of Economic Affairs, Agriculture and Innovation commissions extensive research through its research organization IMARES, which is linked to Wageningen University and focuses mainly on biotic studies incl. fisheries.

Academic research is mainly centred around the Royal Dutch Institute for sea Research (NIOZ), which is part of the national funding agency NWO (funded by the ministry of Education, Culture and Science).

Competitive money for academic research is channelled through the national funding agency NWO which administers the national program sea and coastal research (see below).

Other relevant activities

1. Funding program: National program Sea- and Coastal Research (NWO): funded for 5 years (2008-2012, 20M€) by different ministries and industry. Competitive money distributed by national funding agency through tender procedures.
2. Economic top sector water: Large-scale policy instrument launched by the Dutch government (1 of 9 “top sectors”). Its aim is to join forces between science, industry and authorities in stimulating economic development. Is currently being set up.
3. Delta Program: the Dutch government has approved a huge long-term program (50+ years) to safe-guard the country with respect to sea level rise. Planning has started but funding of the initial period is still unclear. After 2020 the government will spend 1 billion € a year on this program.

Norway - Quantitative mapping contribution: 230 M€/year
--

National marine and maritime research and innovation policies and priorities

Norway has 2 core funding organisation for research and innovation, the Research Council of Norway and Innovation Norway funding research and science based innovation, as well as competitive activities. In addition to this Norway has a tax deduction scheme (Skattefunn) to stimulate innovation in industries. The research Council is funded by all relevant Ministries in addition to substantial investments through the Norwegian oil fund.

Meeting global challenges is one of five strategic goals in the Norwegian research policy. Sustainable oceans and coastal areas is one of these challenges. Seas and oceans are affected by climate change, pollution, economic activity and other human activity. More knowledge is needed to secure sustainable management of marine resources and activities. A number of Ministries are engaged in marine and maritime research. The Norwegian government has set up a Fisheries and Aquaculture Fund for research and innovation to stimulate these activities in the mentioned sectors. To echo the JPI Oceans they have a Ministerial reference group coordinated by the Norwegian Ministry of Fisheries and Coastal Affairs in agreement with the Ministry of Education and Research.

Main priorities in Norwegian maritime research and innovation are:

1. Responsible resource management, including knowledge about and monitoring of the marine environment and the marine ecosystems.
2. Aquaculture research, mainly related to salmon, trout and cod.
3. Consequences of climate change and the oceans role in climate change. Research also includes consequences of acidification
4. Seafood safety, quality and effects on human health
5. Main Biotechnology, seafood innovation and market-adjusted production.
6. Environmentally friendly maritime operations and advanced transport and logistics
7. Maritime transport infrastructure
8. Energy

Total public funding of marine and maritime research was ~230 M€ in 2009 (205 M€ for Marine research and 25M€ for Maritime research). Approximately 73M€ are directly funded from the Government to Marine Research Institutes.

Marine research is allocated through the Research Council to various research programs, through Research Institutions and through the Universities. Within marine research in particular there is an objective to increase private funding.

In 2010, the maritime industry launched a strategy for research and innovation in maritime industries, called Maritime 21.

Portugal - Quantitative mapping contribution: 7 M€/year
--

National marine and maritime research and innovation policies and priorities

In Portugal, Fundação para a Ciência e a Tecnologia (FCT) is the main funder of marine and maritime research. FCT is responsible for following the bilateral and multilateral international agreements in science and technology. It is a public autonomous institute under the aegis of the ministry of Science, Technology and Higher Education, which covers all fields of science, from natural sciences to humanities, normally in a responsive mode, aiming at capability enhancement and research excellence. FCT's mission consists in continuously promoting the advancement of scientific and technological knowledge in Portugal, exploring opportunities that become available in any scientific or technological domain to attain the highest international standards in the creation of knowledge, and to stimulate their diffusion and contribution to improve education, health, environment, and the quality of life and wellbeing of the general public.

Funding is structured around the following schemes:

1. Promotion of training and career development (fellowships, scholarships, mainly for PhD, Post-doc and PhD in industry)
2. Support of centres of excellence (associated laboratories) and research centres (institutional funding)
3. Support to research infrastructures
4. Promotion and development of scientific activity (research projects) and the diffusion of scientific culture.

The competitive research activities financed by FCT are sub-grouped in thematic areas for evaluation and management purposes. Marine and maritime research was in 2009 considered

under the following sub-programmes: “Environment and Global Changes – Environment”, “Environment and Global Changes - Global Changes”, “Biological Sciences - Biodiversity and Conservation”, “Marine Sciences and Technologies”, “Electrical Engineering - Control and Robotics”, “Electrical Engineering - Electronics and Computers”. The value awarded in the last call in responsive mode, a funding of approximately 6,2M€ was awarded for R&D projects in this field.

Romania - Quantitative mapping contribution: 9 M€/year

National marine and maritime research and innovation policies and priorities

Romania has no dedicated marine and maritime R&D Programme. This applies to both National Agency for Scientific Research and the Romanian Academy Grants Programme. Funding available for marine and maritime research projects is available through the National Programme for Research, Development and Innovation II (NPRDI II), under development between 2007 and 2013.

The NPRDI II is divided into several sub-programmes, aiming at developing Romanian R&D activities and better integrating Romanian R&D system in the European Research Area.

These sub-programmes are:

1. Partnerships – developing R&D projects by consortia grouping universities, R&D institutes and private companies
2. Ideas – funding research on new scientific ideas. Obtaining of top R&D results, at European level
3. Human Resources – increment of numbers and capabilities of Romanian researchers
4. Capacities – improving R&D capacity and infrastructure of significant scientific entities and opening towards the European Research Area
5. Innovation – incrementing the capacity of innovation, technological development and assimilation of RD &I products in economy.
6. Sustaining the institutional performance – sustaining institutional performance by ensuring the continuity and stability of activities developed by R&D entities in agreement with the National R&D Strategy.

All these programmes are competitive, competitions being open at the national level. Each of these programmes covers a series of priorities in which marine and maritime research may find their positions and opportunities to participate.

Romanian Academy Grants may also be open to fund Marine research ideas, provided a high scientific value of the research topic – under other various priorities.

Spain - Quantitative mapping contribution: 107 M€/year

National marine and maritime research and innovation policies and priorities

Several Ministries, Agencies and Regional Organizations are involved in different ways. As the leading Ministry for funding and conducting research in Spain, MICINN is mainly engaged in bottom up research funding through fully fledged programmes and in funding and maintaining large infrastructures. The main actors in the competitive calls are the Spanish Research Council (CSIC), the Oceanographic Institute (IEO) and other RPOs like universities.

The main research areas are:

1. Marine ecosystem functioning and dynamics
2. Climate change effect on the oceans dynamics and marine ecosystems.
3. Relationships between oceanographic processes, marine living resources and fisheries.
4. Dynamic of fish populations and stocks assessments.
5. Trophic interactions in marine food webs.
6. Harmful algae blooms and proliferation of alloctonous species
7. Characterization of the seabed and subseabed in the continental margin and deep ocean (seabed mapping and characterisation of habitats, sedimentary structures, sedimentary and geochemical processes)
8. Effects of human activities on marine ecosystems: pressures and impacts of marine pollution, fisheries and other human activities on the marine environment.
9. Marine Biodiversity and Marine Protected Areas.
10. Marine Spatial Planning
11. Improvement of culture techniques fish and shellfish, development of new techniques for the self sustainable culture of new species and potential applications and use of marine algae (food, biotechnology, etc.).

MICINN provides grants to predoctoral and graduate scientists as well as to tenured scientists, with specific programmes to facilitate mobility of Spanish and visitor scientists.

It also supports Technology Platforms (TP) to promote innovation. TPs, driven by the industry, define priorities in strategic areas that require major research and technological advances at medium to long term, and try to catalyse the research into innovation. There are 50 TPs in Spain, 3 of them related to marine and maritime issues, namely PT MARITIMA (Maritime industries), PTEPA (Fisheries and Aquaculture) and PROTECMA (Coastal and Marine Environment Protection).

The Spanish Maritime Technology Platform (PT MARITIMA), with more than 200 members and 11 working groups, brings together all maritime activities, except fishing and aquaculture. PTEPA covers living resources, aquaculture, fishing technologies and marketing. PROTECMA has working groups on contingency plans against marine pollution, waste management in ports and coastal areas, dispersants and bioremediation, preparedness and response against chemical spills, etc.

Private non-profit organisations (e.g. INNOVAMAR, CETMAR) have been established to contribute to improve the competitiveness and internationalisation of the Spanish marine and maritime industries, facilitating collaboration and the use of synergies between different sub-sectors and promoting activities to enhance the development of the culture of innovation.

The Ministry of Environment and Rural and Marine Affairs covers a wide range of marine activities: i) monitoring of fisheries, ii) monitoring of coastal zones, iii) producing statistics and reports, iv) funding research activities in the Network of National Parks (some of them with a maritime component), v) maintaining and Observatory and some Research Performing Organisations, and vi) supporting the compliance of European Directives by funding the required programmes.

The Ministry of Public Works has an organisation (Puertos del Estado) in charge of the oceanographic and climate forecasting, operational oceanography and network of sensors, data management, etc.

Sweden - Quantitative mapping contribution: 200 M€/year

National marine and maritime research and innovation policies and priorities

Swedish marine and maritime research is driven via several ministries, namely: Education and Research, Environment, Rural Affairs, Enterprise, Energy and Communications.

Marine research is partly funded via non-competitive money directly distributed to Universities, University Colleges and Research Institutes. There are also several official funding organisations (e.g. the Swedish Research Council Formas, the Swedish Research Council, Swedish Energy Agency and VINNOVA), official foundations (e.g. Mistra – The Foundation for Strategic Environmental Research) and private foundations (e.g. Baltic Sea 2020) that fund marine and maritime research. Competitive funding via the official research funding organisations to marine research is about 14 M€/year (for the years 2002 – 2006). Sweden is among the top 10 countries that so far has received most funding via FP 7.

Swedish marine and maritime research encompass many problem areas and disciplines, including natural sciences (e.g. ecology, climate sciences, fish and fisheries, aquaculture, ecotoxicology, biotechnology), social sciences (e.g. ecological economics, socio-economics, governance), humanities (e.g. history, religion, archaeology), medicine (e.g. pharmaceutical contamination, new drugs), and technical sciences (e.g. wave energy, shipping, aquaculture, restoration procedures).

There are more than 100 internationally prominent marine research groups in Sweden and a wide range of universities, university colleges and other research organisations with marine and/or maritime research on its agenda. Marine research is conducted in several sea and ocean areas, including the Arctic, the Atlantic Ocean, the North Sea, the Baltic Sea and the Mediterranean, the North Sea and Baltic Sea being the main areas.

Turkey - Quantitative mapping contribution: 37 M€/year

National marine and maritime research and innovation policies and priorities

Turkish National S&T Policies are formulated, and priority areas are set for 2003-2023, in order to create an innovative economy and society in 2023, which marks the 100th Anniversary of the foundation of the Turkish Republic. The Scientific and Technological Research Council of Turkey (TÜBİTAK) coordinated the project entitled “Vision 2023: Science and Technology Strategies” which involves the first-ever national foresight exercise of Turkey.

In Turkey, the research funding system, research infrastructure supports and R&D loans are mainly implemented in a bottom-up approach. The major funding, budget distribution and cooperation decisions are taken by the Science Board of TUBITAK, which is acting as the management board of the organisation. TUBITAK has many support programmes for basic research, industrial research, mobility and career development of researchers. All of these programmes are designed in a bottom up approach and funding decision is mainly dependent on the scientific excellence of the projects rather than thematic priority. Thus, TUBITAK does

not have specific programmes in any area. Marine and maritime research funding is provided through two programmes:

1. The Support Programme for Scientific and Technological Research Projects (1001)
2. International Industrial Research and Development Projects Support Programme-1509

TUBITAK (Scientific and Technological Research Council of Turkey) mainly funds fully fledged programmes carried out by Academic Research Funding Program Directorate (ARDEB) and Technology and Innovation Funding Programmes Directorate (TEYDEB). Research Grant Committees of ARDEB (namely Environment, Atmosphere, Earth and Marine Sciences, Engineering, Basic Sciences; Public Research) provide specified support to seas and oceans related research in their respective fields. Seas and oceans related issues are largely covered by Environment, Atmosphere, Earth and Marine Sciences Research Grant Committee (CAYDAG) and Public Research Grant Committee (KAMAG) housed by ARDEB. The former supports researchers conducting R&D activities in the areas of Environment, Atmosphere, Earth and Marine Sciences while the latter supports the public institutions to solve problems and satisfy needs by R&D projects in line with country priorities and global changes. In 2009, the total amount of research grants given by ARDEB to Turkish researchers was around 70 million Euros.

Technology and Innovation Funding Programmes Directorate (TEYDEB) is mainly responsible for funding of industry and SMEs carrying out market-driven research. The total amount of funding in 2009 by TEYDEB was around 250 million Euros.

United Kingdom - Quantitative mapping contribution: 189 M€/year
--

National marine and maritime research and innovation policies and priorities

UK spends approximately £3.5 billion on science through the Department for Business, Innovation and Skills (BIS). Most of this money is allocated to the Research Councils, in the case of the marine sector this is mainly the Natural Environment Research Council which receives approximately £392 million per year, of which c. £62 million is spent on all aspects of marine science including ship operations and some aspects of Antarctic research. Reference MSCC UK Marine Science Strategy.

In addition the Scottish Government allocates approximately £79 million per year to Marine Scotland, and the UK Department for Environment, Food and Rural Affairs (DEFRA) allocates £38 million per year to the Centre for Environment, Fisheries and Aquaculture Science (CEFAS). DEFRA has a total science budget of £145 million per year of which £11 million is allocated to marine. In addition the Department for Energy and Climate Change (DECC) spends approximately £120 million per year on renewable and low carbon energy including marine sector work.

In February 2010 the UK Government published its first UK Marine Science Strategy for 2010-2015 which sets out the shaping, support, co-ordinating and enabling of the delivery of world class marine science for the UK. The Strategy will be delivered by the Marine Science Coordination Committee which is comprised of representatives of the Government Departments, Devolved Administrations and main delivery bodies involved in UK marine science.

The passage of the Marine and Coastal Access Act 2009 and Scottish Marine Act 2010 has set in place the beginnings of a comprehensive marine spatial management system for all UK waters. In England marine spatial planning is managed by the new Marine Management Organisation, in Scotland by Marine Scotland, and by the devolved administrations in Wales and Northern Ireland.

The new planning systems are closely allied to the objectives of the European Marine Strategy Framework Directive. A UK-wide marine Policy Statement is currently under consultation, along with the establishment of the initial tranche of marine protected areas and the development of secondary legislation for marine licensing.

2. At EU level - Quantitative mapping contribution: 213 M€/year

The mapping of marine and maritime research at EU level (research framework programme) has been done by the Commission (DG RTD). It is based on an "Analysis and inventory of FP 7 marine-related proposals", which identified all projects with a marine / maritime content in the 2007-2008 calls for proposals of the 7th Research Framework Programme (FP7), across all programmes and thematic priorities⁹.

On that basis, an extrapolation was made to estimate average annual funding per area shown in the table in page 5. So these figures must be considered as the best estimates we could get at that stage to complete the mapping of European marine and maritime research. This exercise will be refined in the coming year, with a new study covering the 2009, 2010 and 2011 calls.

Cross-cutting activities – "The ocean of tomorrow"

‘The ocean of tomorrow’ initiative, launched within the context of the ‘European Strategy for Marine and Maritime Research’, seeks to promote a cross-sectoral approach between themes such as food, energy, environment, and transport. So far, 2 cross-thematic calls have been launched (FP7-OCEAN 2010 and FP7-OCEAN-2011) for a total EU contribution of 79M€, which represents 9% of the annual budget allocated in marine and maritime research in the different themes.

About 7-8 large projects should be funded under this umbrella, covering issues like subsea Carbon capture, development of activities in the Arctic, multi-use offshore platforms.

Marine environment Unit - Management of Natural Resources

The Environment Directorate has long worked on initiatives that have contributed to structure the European Research Area in the marine research domain since the Fourth Research Programme (with the Marine Science and Technology programmes - MAST- programme), till now.

In FP6 the environment priority has funded 30 marine research projects receiving an EU contribution of approximately 154 M€ (2002-2006).

Under the FP7 Environment (including climate change) Programme, the EU has supported 46 marine research projects receiving a total EC contribution of approximately 214 M€ (2007-2010 calls) in addition to an EC contribution of 50 M€ to the Joint Baltic Sea Research and

⁹

Development Programme BONUS. The overall budget representing the total projects' costs is estimated at 288 M€.

The projects address major issues and challenges in marine environmental research, such as the role of the oceans in the climate system, the overexploitation of marine living resources, pressures in coastal zones, the loss of marine biodiversity etc. These projects also seek to provide tools and techniques to better monitor, understand, protect and manage our oceans and seas.

The Environment priority contributes to the further consolidation of the European Research Area in the marine research domain, in particular by supporting in particular ERA-Nets (SEASERA) and the BONUS article 185 initiative in the Baltic.

The Environment programme has supported the EUROCEAN conferences (Galway – 2004, Aberdeen-2007, Ostende-2010), which have been instrumental in mobilising the European marine research community. The Ostende declaration at 2010 EUROCEAN conference refers to seas and oceans as a grand challenge and expresses support to a research Joint Programming Initiative to tackle this challenge.

Knowledge Based Bio-Economy (KBBE) and Marine Bio-economy

Research on marine bio-economy comprises projects related to fisheries and aquaculture, seafood safety and quality as well as projects on marine biotechnology. In FP7, it is mainly addressed in Theme 2 - KBBE (Knowledge Based Bio-Economy) of the specific programme “Cooperation”. I

To date (2007-2010), about 125 M€ have been awarded to over 48 marine bio-economy projects including "The ocean of tomorrow" 2010 marine and maritime cross-thematic call (9M€). The total budget allocated to marine bio-economy projects could reach approximately 265 M€ over the whole FP7 period (2007-2013).

Several European Technology Platforms are also active in the field of marine bio-economy such as the European Aquaculture and Innovation Technology Platform (EATIP) and the European Fisheries Technology Platform (EFTP).

Two ERANETS are also planned on marine biotechnology and on total seafood chain.

Sustainable Surface Transport – Waterborne

Research on maritime transport is addressed in Theme 7 – Sustainable Surface Transport (SST) of the specific programme “Cooperation”.

The maritime transport projects selected should contribute to the greening of Surface Transport/ the promotion of the cleanest use of transportation modes and elimination extra pollution caused by traffic congestion/the improvement of safety and security/ the Competitiveness of the EU/cross cutting activities.

From 2007-2010 (there was no Transport call in 2009) about 58 projects have been funded with a EC contribution of 181.5 M€.

Two ERANETS TRANSPORT II (3 M€) and MARTECII (2 M€) are funded under the FP7. In the framework of FP6, around 170 M€ were allocated to research on maritime transport.

The WATERBORNE Technology Platform provides useful inputs to the activities of the Transport theme.

Marine renewable energy

Research on marine renewable energy covers offshore wind and other ocean energy technologies.

Wind energy research covers turbine technologies, support structures both ground-based or floating, grid connection systems and wind power forecasting. For Ocean energy, the EU-funded activities cover mostly research and demonstration of innovative ocean energy.

The TPWind Technology platform has been instrumental in the preparation of the European Industrial Initiative on Wind Energy (EWI) as part of the implementation actions required for the Strategic Energy Technology Plan (SET-Plan). The EWI has a strong focus on off-shore wind energy and addresses resource assessment and spatial planning. Public acceptance is part of the EWI implementation plan.

In addition to the EWI, a European Energy Research Alliance on Wind Energy is already operational within the SET-Plan activities. Here again, one of the EERA-Wind sub-group is dealing with off-shore aspects.

As regards Ocean energy, the topic ERA-NET Ocean 2011 received no proposal. Ocean energy is modestly mentioned in the SET-Plan and no industrial initiative is yet planned. However, a European Energy Research Alliance, EERA-Ocean, is under preparation and could be launched before the end of 2011.

Research Infrastructure actions

The overall objective of the ‘Research infrastructures’ part of the FP7 Capacities programme is to optimise the use and development of the best research infrastructures existing in Europe (Integrating Activities, e-Infrastructures). Furthermore, it aims to help to create new research infrastructures of pan-European interest in all fields of science and technology (Design Studies and Preparatory Phase of ESFRI¹⁰ projects).

In FP6 and FP7, approximately 100 M€ have been allocated to marine research infrastructure projects.

Some FP7 projects are managed by DG INFSO for instance GEO-SEAS (Pan-European infrastructure for management of marine and ocean geological and geophysical data - 5 M€).

The research infrastructures are essential to the European scientific community to remain at the forefront of the advancement of research, and they help marine and maritime industries to strengthen their base of knowledge and technological knowhow, necessary to their development.

Most of research infrastructures actions are strongly multidisciplinary in particular those related to research vessels (EUROFLEETS), deep sea (EMSO) or coastal observatories (JERICO), biological laboratories (EMBRC), marine data centres (SeaDataNet); some

¹⁰ European Strategy Forum on Research Infrastructures

research infrastructures are more specialised such as those supporting research for aquaculture, marine renewable energy and mesocosms facilities.

SMEs

In 2007-2010, about 40 marine related SME projects have been selected for about 53M€ with an average funding of about 1,5M€. In terms of scientific fields, a detailed analysis reveals that aquaculture and fisheries, transport as well as energy are the most represented sectors in marine related SME projects.

Human resources

In 2007-2010, about 188 marine related projects have been selected for about 76M€. Grants dealing with life-long training and career development as well as activities with an international dimension have generated most interest.

International dimension and initiatives

International research cooperation in the framework programme

There is extensive international research cooperation in all areas of marine and maritime research. The following areas can be mentioned in particular:

1. Marine environment research (including ocean / climate interactions) cooperation in the Mediterranean and Black Sea, Baltic, Arctic, North Atlantic;
2. Fisheries and aquaculture research cooperation in the Mediterranean, Black Sea, Africa, Asia;
3. Marine biotechnology research and genomics with the US, within the framework of the EU US Task Force on Biotechnology Research
4. Maritime transport research cooperation in the Arctic.

Global Ocean Observation

GOOS, the Global Ocean Observing System, is a permanent global system for observations, modelling and analysis of marine and ocean variables to support operational ocean services worldwide. Coordinated by the Inter-governmental Oceanographic Commission of UNESCO, contributes to the oceanographic component of GEOSS, the Global Earth Observing System of Systems. It is structured in regional alliances (EURO-GOOS, MED-GOOS...).

The FP7 Environment Programme contributes 20 M€ / year to GEOSS, and also to projects supporting the development of GOOS.

The European Space Programme (FP7) focusing on applications such as "Global monitoring for environment and security" (GMES) with benefits for citizens and for the competitiveness of the European space industry. The dedicated GMES Marine Service is providing a strong and reliable capacity for Ocean Monitoring and Forecasting in Europe through the MyOcean project and EMSA.

Marine regional conventions

There are four marine regional conventions in Europe, which seek to protect the marine environment in marine regions:

1. The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM)
2. The convention for the protection of the marine environment of the North-East Atlantic (OSPAR)
3. The Bucharest Convention on the Protection of the Black Sea Against Pollution
4. The Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution

These conventions are managed by Commissions, which collect scientific works produced by marine institutes in their Member States. They have provided a framework for scientific cooperation at the level of regional seas, in relation to the protection of the environment.

Regular Process for the assessment of the state of the marine environment

At the World Summit on Sustainable Development, held in Johannesburg in September, States agreed to “establish by 2004 a regular process under the United Nations for global reporting and assessment of the state of the marine environment, including socio-economic aspects, building on existing regional assessments”. This was endorsed by the UN General Assembly in its resolution 57/141 of 12 December 2002.

In June 2009, an "assessment of assessments" was produced as a first step towards this regular process. A European regional assessment of the state of the marine environment, based on the requirements of the Marine Strategy Framework Directive, would provide an essential contribution to the UN Regular Process.

V. Goals – Potential outcomes – EU added value

The JPI Oceans will pursue 3 main goals:

- ✓ Enable the advent of a knowledge based maritime economy, maximising its value in a sustainable way
- ✓ Ensure Good Environmental Status of the seas and optimise planning of activities in the marine space
- ✓ Optimise the response to climate change and mitigate human impacts on the marine environment.

It will improve the efficiency and impact of EU research marine / maritime funding by:

Promoting integration between different sea-related scientific disciplines. The JPI Ocean will contribute to develop convergences and knowledge transfer across the maritime cluster, which is conducive to innovation in the different areas.

Strengthening synergies at EU level and within regional seas. The JPI initiative will build upon existing initiatives (like SEASERA and The BONUS Art. 185 Programme for the Baltic Sea) to strengthen cooperation and synergies both at EU level and at the level of regional seas.

Improving Coherence and value added in the development of research and observation infrastructure. These infrastructures are pre-requisites and enabling factors for marine

research and the development of maritime activities. This JPI will provide a coordinated European Framework for their progressive development and, if appropriate, for an adequate governance framework, in cooperation with the Commission.

Tackling complex marine research issues and grand technological challenges. Large cross-thematic research actions and big technological challenges like deep sea exploration / exploitation are better undertaken at EU level since the resources they require are more easily pooled at European level.

Improving scientific advice to support policy making. By definition, the marine system has no boundary and developing the necessary knowledge on it requires pooling of resources and data from different countries. This applies particularly to the implementation of the Marine Strategy Framework Directive, where the Good Environmental Status must be reached at the level of regional seas and harmonised across Europe.

Link to EU Policy initiatives

The JPI Oceans is an objective of the **EU strategy for marine and maritime research**¹¹. It addresses key challenges, which strongly relate it to **EU 2020** objectives. As indicated in the Commission Communication "Europe 2020"¹², *the EU should in particular harness the contribution of EU Maritime Policies to achieve its emissions reduction and biodiversity targets, address climate change adaptation, disaster prevention and response, more efficient use of resources and contribute to improving global food security*. The JPI Oceans will support the EU maritime policy and enable it to make this contribution to EU 2020. It will also support the implementation of the Marine Strategy Framework Directive.

The "marine knowledge 2020" initiative¹³ aims to reduce operational costs and delays for those who use marine data, increase innovation amongst users and re-users of marine data and reduce uncertainty in knowledge of the oceans and the seas by providing better access to the marine observations currently collected by public and private bodies.

Under the flagship "**Innovation Europe**" of Europe 2020, the JPI Oceans has links with the challenges of energy, transport, climate change, resource efficiency, building the bio-economy and environmentally-friendly production.

Under the flagship "**Resource efficient Europe**" and "**An industrial policy for the globalization era**", there are links with the renewable energy and transport challenges, more efficient use of biological resources and minerals, and effective space policy through GMES and related services, competitiveness of (maritime) tourism...

VI. Role of the European Commission in the JPI

The Commission may provide complementary measures for this JPI, which could include support for the management structure and development of the SRA by the JPI, the provision of data, information and analysis on the state of play in this field in Member States and at EU level.

¹¹ COM(2008) 534

¹² COM(2010) 2020 – A strategy for smart, sustainable and inclusive growth – page 16.

¹³ COM(2010) 461

The Commission will explore the scope for cooperation on development of concepts and solutions, both at national and at EU level, promoting a holistic approach of seas and oceans challenges.

Moreover, once the JPI is operational, the Commission will coordinate with the JPI to define which research work ought to be carried out at EU level.

Annex I: Governing structure and stakeholder involvement

The JPI “Healthy and Productive Seas and Oceans” will be run by a high-level management board with 2 representatives from each country at a level with sufficient authority to agree on joint action plans and potential funding initiatives across Europe.

The Management Board will mandate an Executive Committee to execute the decisions taken by the Management Board and to supervise the different JPI activities.

The Management Board will put in place a Strategic Advisory Board of high-ranked scientists, technologist/industrialist and civil society. They will be tasked to develop a strategic research and innovation agenda and advice on the implementation tools needed.

The Executive Committee will be mandated to translate this agenda into a proposed implementation plan to be decided upon by the Management Board. The implementation plan will be based on the principle of variable geometry.

The European Commission will be invited to participate as a non-voting member in the Management Board. The JPI Oceans will have the following decision flow:

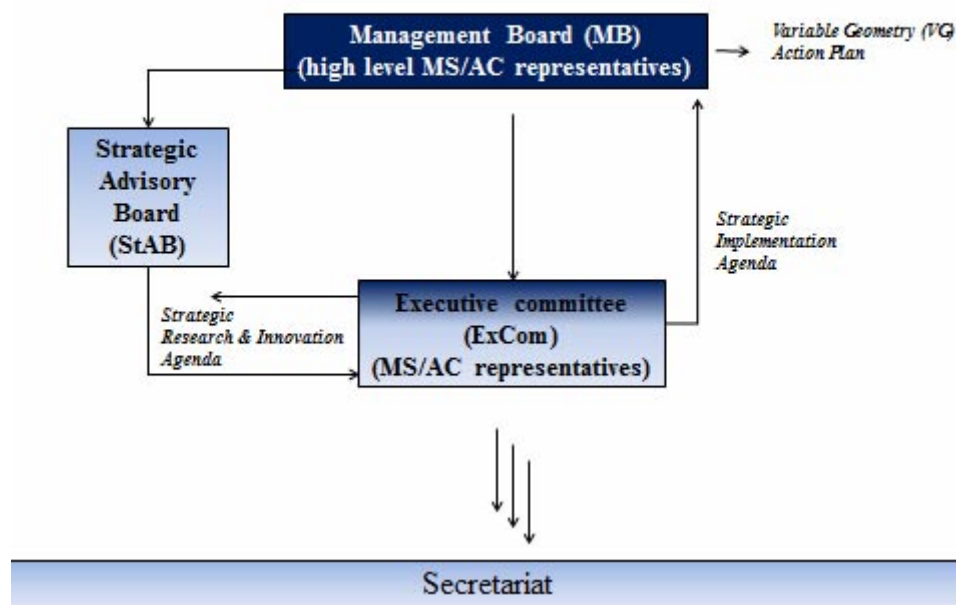


Fig. 1 - JPI Healthy and Productive Seas and Oceans decision flow

The JPI will foster a science-policy-NGO-industry P-P-P-P dialog, bringing stakeholders into the governance structure. The JPI in order to achieve its goal sees the need to take stakeholder involvement to a next step of involvement in the implementation phase.

Annex II: Preliminary outline of the SRIA

Examples of cross cutting activities to feed the development of a Strategic Research and Innovation Agenda (SRIA) (in relation to target groups 1,2,3 ¹⁴)

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	x	x	x

¹⁴ Target Group 1 (TG1): Industry, Target Group 2 (TG2): Scientists, Target Group 3 (TG3): Policy makers.

Marine Strategy Framework Directive.			
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 (technologies for "greening" marine - maritime activities, including port expansion on land and in waters, building and dredging with nature and Carbon storage among others	x	x	x
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, noise, litter, emissions... etc	x		x
Improvement and development of new technologies to fight against oil and HNS spills	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, Arctic ice sheet melting, extreme	x		

events)			
Design of vessels and offshore structures to meet the challenge of extreme conditions.			
Marine data for maritime industries is included in “Knowledge to support a sustainable and competitive maritime industry”			
Monitoring marine environment and the benefits of meta-ocean data to maritime transport and climate change A significant increase in appropriately instrumented vessels on representative shipping routes; <ul style="list-style-type: none"> - 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 			

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.	x	x	

shipbuilding / offshore energy / fisheries / aquaculture)			
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.			
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)	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

Research Infrastructures (examples)

Marine research infrastructure is an essential base and a pre-requisite to develop the necessary knowledge identified previously. But marine infrastructures are extremely costly and can benefit from a European dimension. Large efforts have been and still are being undertaken to pool resources across member states. Nevertheless we still need to reduce the fragmentation and invest in suitable marine infrastructure amongst others to have the necessary tools for MS to respond to MSFD.

The main challenges in the field of research infrastructures are in the area of in-situ marine observation infrastructures, where the main obstacles are:

- ✓ Fragmentation of different initiatives;
- ✓ Insufficient geographical coverage (particularly in the Mediterranean and Black Sea)
- ✓ Insufficient biological observation both at temporal and spatial scales
- ✓ Short-term funding of initiatives (on the basis of research projects) while ocean observation requires long time data series;
- ✓ Observation is often science driven rather than based on societal needs.

Oceanographic vessels are the marine research platform par excellence for marine research and observation of the ocean. Moreover they are the only way to get marine samples (e.g. water, plankton, sediments) or to acquire some type of data needed for multipurpose studies and activities (e.g. mapping of the European seabed and habitats). Moreover, oceanographic vessels are also essential for building collaborations and capacities amongst scientist, technicians and research ships operator. Efforts are being pursued to improve the pooling and sharing of capacities at European level (e.g. EUROLLEET, barter system). Nevertheless, there are still important gaps and challenges in some areas, particularly for vessels of middle range (so-called regional oceanographic vessels) designed for multidisciplinary studies.

There is a strong case for better co-ordination 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 – EMODNET¹⁵);
- 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

¹⁵

COM(2010) 461

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 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 alleviated the pressures on wild stocks . Other critical gaps of European dimension remain to be identified.