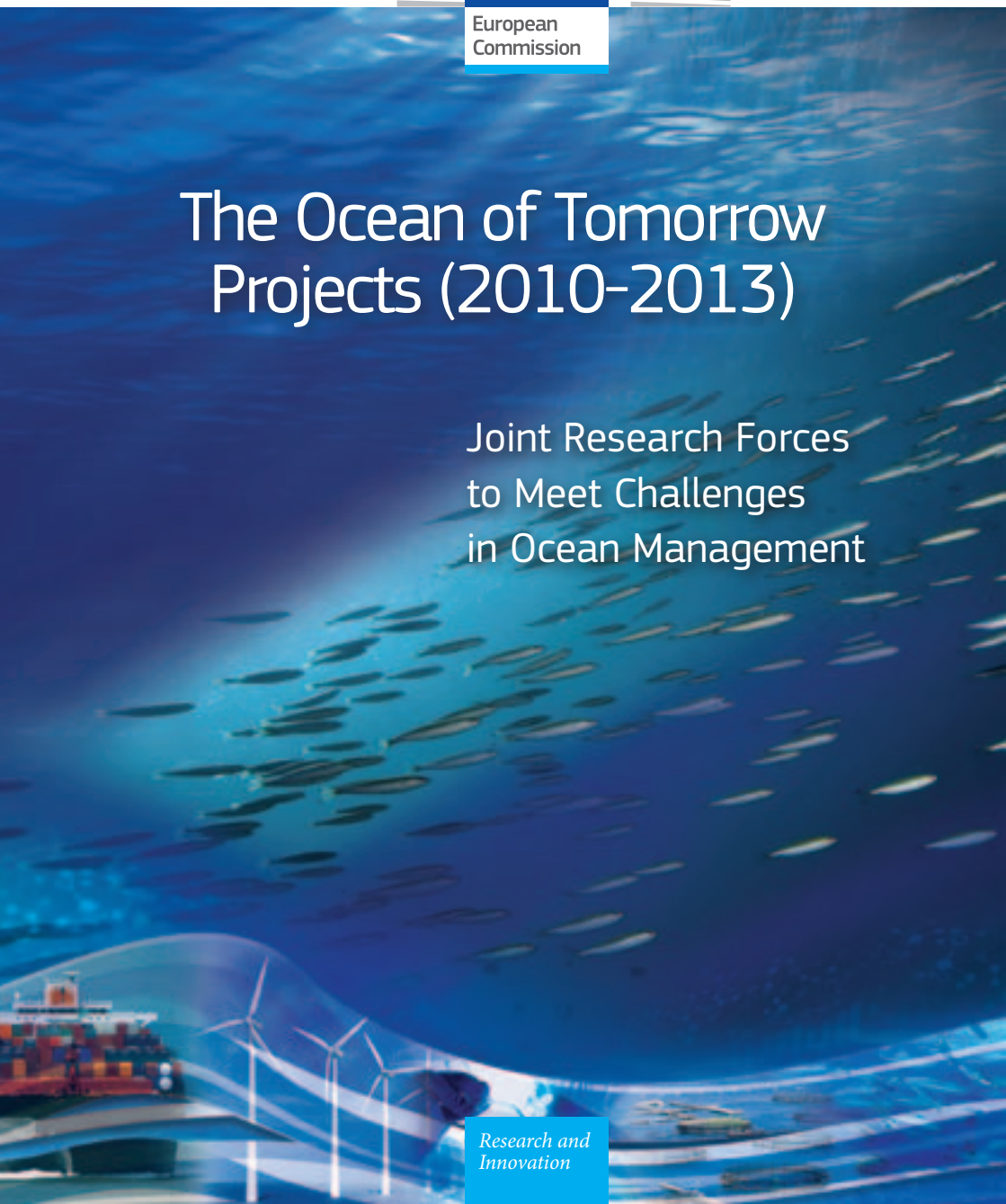
European Commission

The Ocean of Tomorrow Projects (2010-2013)

Joint Research Forces to Meet Challenges in Ocean Management



Research and Innovation

EUROPEAN COMMISSION

Directorate-General for Research and Innovation
Directorate F — Bioeconomy
Unit F4 — Marine Resources

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2014 Directorate-General for Research and Innovation

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PREFACE

Seas and oceans have a huge impact on our daily lives, providing an essential part of our wealth and well-being. They are not only a critical source of food, energy and resources, but also provide the majority of Europe's trade routes. The value of living by the sea, while intangible, is high to many of us. However, the impact of human activities on the marine environment keeps increasing. Maritime transport, offshore energy, tourism, coastal development, resource extraction, fisheries and aquaculture are examples of activities which can have a major impact on the marine environment, putting at risk marine ecosystems. 'The EU Strategy for Marine and Maritime Research' (COM (2008) 534) underpins the EU Integrated Maritime Policy. Through excellence in science and innovation, it aims to support a thriving and sustainable maritime economy. Science and technology have a vital role to play to preserve the marine environment as well as to support the 'Blue Growth'[1] to enhance the great economic potential of our seas and oceans. It is a key component to contribute to the 'Europe 2020'[2] goal of smart, inclusive and sustainable growth for Europe.

The 'European Strategy for Marine and Maritime research' (COM (2008) 534)[3], adopted in 2008, is a key pillar of the EU Integrated Maritime Policy and provides a reference framework for marine and maritime research at European level. Commissioner Geoghegan-Quinn stated in 2010: '*Just as oceans ignore borders, marine sciences and technologies are by their nature cross-cutting and involve many disciplines. There is no other way but to look beyond traditional sector-specific research to foster sustainable growth of maritime activities*'[4].

A key initiative in this context is the launch of 'The Ocean of Tomorrow' (FP7-OCEAN) cross-thematic calls in FP7[5]. The 'Ocean of Tomorrow' initiative aims to foster multidisciplinary approaches and cross-fertilisation between various scientific disciplines and economic sectors on key cross-cutting marine and maritime challenges. A key feature is also the participation of business partners, in particular SMEs, in the research projects that are funded.

The aim of this brochure is to present the 31 projects that have been selected so far under 'The Ocean of Tomorrow'. It comprises 21 projects from the FP7-OCEAN-2010, FP7-OCEAN-2011 and FP7-OCEAN-2013 calls for proposals as well as 10 projects under 'The Ocean of Tomorrow 2012' coordinated topics for a total EU contribution of 195,6M€ over 2010-2013. More specific description of the calls can be found in the following pages. The 'Ocean of Tomorrow 2013' with its strong focus on technologies and innovation, already paves the way to the new challenge-driven approaches under Horizon 2020.

Although the 'Ocean of Tomorrow' cross-cutting calls have progressively increased in size in recent years, it should be also mentioned that marine and maritime research actions take place in the different thematic priorities and specific programmes of FP7.

1 COM (2012) 494: http://ec.europa.eu/maritimeaffairs/policy/blue_growth/documents/com_2012_494_en.pdf

2 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

3 COM (2008) 534: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0534:FIN:EN:PDF

4 See Speech of Commissioner Geoghegan–Quinn at 'The Ocean of Tomorrow 2011 Info Day': http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/415&type=HTML

5 http://ec.europa.eu/research/bioeconomy/fish/research/ocean/index_en.htm

Micro B3:

Marine Microbial Biodiversity, Bioinformatics and Biotechnology

www.microB3.eu

With technological advances in the fields of 'Omics' analyses, oceanography and lab automation, marine scientists conduct projects they only dreamed of 10 years ago. The deluge of data produced is beyond the skill-set of many marine scientists and very little data management infrastructure exists. Micro B3 (Biodiversity, Bioinformatics and Biotechnology) will facilitate the whole process from sampling and data acquisition to analysis and interpretation. This will lead to better understanding of marine ecosystems and pave the way for novel biotechnological applications.

Nine interdisciplinary teams of experts in bioinformatics, computer science, biology, ecology, oceanography, bioprospecting, biotechnology, ethics and law are working together in the Micro B3 project. The consortium includes 25 European research groups with 32 participants from universities, research institutes and companies. The primary objective is to integrate biodiversity, genomic, and oceanographic databases into one Information System (IS), the Micro B3-IS, which is based on global standards for sampling and data processing.

Biodiversity research in Micro B3 has already led to novel results concerning the role of marine viruses as well as providing interactive guidance and tools for ecological analysis. Case studies were chosen to explore the marine microbial ecosystem, including spatial monitoring done through expeditions and temporal monitoring programmes for long-term ecological research sites.

Bioinformatics work has led to interoperable structures for submission, storage and exchange of data between the established archives SeaDataNet, EurOBIS, the European Nucleotide Archive (ENA at EBI) and the Micro B3-IS. For the Ocean Sampling Day (OSD) planned on 21st June 2014, best practice guidelines for microbial

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biodiversity assessments in rich environmental context were agreed, tested and gathered in an OSD Handbook. (http://www.microb3.eu/sites/default/files/deliverables/MB3_D4_3_PU.pdf).

A citizen science and crowd funding campaign (www.my-osd.org) was started to raise awareness for the marine ecosystem. Training is done in bioinformatics, ecological statistics and modelling with an interdisciplinary summer school, metagenomic and annotation courses planned.

To further biotechnological applications, bioinformatics tools were developed for determining functions of still unknown genes found in marine microbes. One is using co-occurrence networks for determining hypothetical functions of unknown genes from marine microbes. Results from genome mining for anti-tumour compounds, enzyme databases, libraries and new expression systems for experimental screening are becoming available. Industry leaders are targeted through expert workshops and Think Tanks to promote understanding of the value of integrating environmental and 'Omics' data.

Intellectual Property Rights issues are addressed through the development of model agreements and organisation of a stakeholder workshop facilitating access to and benefit sharing of marine genetic resources.

The innovative Micro B3-IS allows for seamless processing, integration, visualisation and accessibility of the huge amounts of marine data collected in on-going biodiversity sampling campaigns and long-term observations. Interoperability is a key feature for data transfer of sequence and contextual data to public repositories. Therefore all entries will adhere to the Minimum Information checklists Standard (MIxS) for describing molecular samples as outlined by the international Genomic Standards Consortium (GSC, www.gensc.org). Micro B3 also offers analytical and feedback tools on its platform which are unique in terms of integrating genetic and ecological information and generating collective knowledge. This provides new perspectives for the modelling and exploration of marine microbial communities.

MICRO B3 European Added Value

With Micro B3 we expect to achieve a new communication culture crossing traditional boundaries. As part of the 'Ocean of Tomorrow' initiative we can enhance Europe's ability to make use of the Petabytes of data produced aiming to develop marine ecosystems' biology and biotechnology. Micro B3 integrates expertise from sampling to supporting storage, analysis and downstream use of resulting environmental and bioinformatics data with the objective to create long-lasting and interoperable structures and resources for data mining. Expected impacts include a better understanding of marine microbial ecosystems in terms of their complexity and the parameters driving their functions. Novel bioinformatics tools are having wide-ranging impacts, for example providing information for the cost- and time-efficient generation of new targets for biotechnological applications.

Partners:

Germany (Coordinator), United Kingdom, Greece, France, Spain, Italy, Belgium, Turkey, The Netherlands, Denmark, Ireland, Monaco, Swiss, Iceland, Macedonia

Project N°287589	Topic: FP7-OCEAN-2011-2: Marine microbial diversity	EU contribution: € 8,987,491	Duration: 48 months	From: January 2012

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The aim of this brochure is to present the 31 projects that have been selected under "The Ocean of Tomorrow" initiative (2010-2013). "The Ocean of Tomorrow" calls fall within the activities launched under FP7 to implement the "European Strategy for Marine and Maritime Research" (COM (2008) 534) and to address marine sciences and technologies as a challenge that cuts across themes. "The Ocean of Tomorrow" aims to foster multidisciplinary approaches and cross-fertilisation between various scientific disciplines and economic sectors on key cross-cutting marine and maritime challenges. Research projects funded under these calls bring together scientists, technology providers, industrial partners (including SMEs) and end-users. "The Ocean of Tomorrow" also links to the "Horizon 2020" programme, which acknowledges the importance of cross-cutting approaches.

Project information

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