EUROPEAN CATALOGUE OF MARINE DATA AND INFORMATION PORTALS

European contribution to the trilateral activity on a cross Atlantic knowledge platform

Abstract

AORAC-SA Work package 11 (the Knowledge Sharing Platform) contribution to the trilateral activity on a cross Atlantic knowledge platform focusing on European regional infrastructure and Atlantic coastal states

Neil Holdsworth (ICES), Ellen Johannesen (ICES)

neilh@ices.dk, ellen.johannesen@ices.dk

Acknowledgements

This Report was produced by the Atlantic Ocean Research Alliance Co-Ordination and Support Action.

Disclaimer

Responsibility for the information and views presented in this catalogue rest solely with the authors and do not necessarily represent those of the Atlantic Ocean Research Alliance, the European Union or the partners in the Atlantic Ocean Research Alliance Coordination and Support Action. Neither the authors or the aforementioned bodies accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting or refraining from action, as a result of a matter contained in this report

Table of Contents

Background

AORAC-SA

The Atlantic Ocean Research Alliance Coordination and Support Action (AORAC-SA) is a H2020 project with Canadian and US partners. It is made up of 11 funded work packages providing support to the AORA, the tripartite implementation committee (Canada, European Union, and the United States) of the Galway Statement. There are 6 research themes within the project which are the focus for trilateral activities, these are:

- Ecosystem Approach to Ocean health and Stressors
- Ocean Observation
- Marine Biotechnology
- Seabed and Benthic Habitat Mapping
- Ocean Literacy
- Aquaculture

These activities are supported by 2 cross-cutting tasks:

- Shared Access to Research Marine Infrastructures
- Knowledge Sharing Platform

Knowledge Sharing Platform

The aim is to establish a long-term Knowledge Sharing Platform across the 6 identified research priorities to allow for long-term usability of the data, information, and knowledge thereby ensuring tangible value creation from invested resources. The Inventory of data, information, and knowledge portals that is in development by AORAC-SA WP11 is currently focussing only on European and European Atlantic Coastal states. A further stage is to invite input from Canada and US on their regional and national portals, and also add the global components which are important to both North America and Europe.

European catalogue: rationale

The purpose of the European catalogue is to set the foundation from which to build understanding between European and North American partners on what infrastructure is already in place, and the focus of the infrastructure. This baseline can then be used to identify common aims across the Atlantic, recognise overlaps as well as gaps, and acknowledge where cooperation and synergy may be possible.

Limitations and Context

This is very much an ongoing process and the catalogue only reflects a snapshot of European infrastructure capability, the authors recognise that the catalogue is incomplete and have made some decisions to limit the scope of this catalogue to serve the AORA work, which means that it may be limited in its use for other purposes. The authors also recognise that there are many European projects that are developing similar catalogues with different aims – the authors have drawn on these efforts where possible.

The geographic focus of this catalogue is the Atlantic region and the adjoining Atlantic coastal states. While there are many relevant international infrastructures that also support this work, they have been excluded from the European inventory to focus on member state and European initiatives. It is anticipated the catalogue would expand to incorporate these at a later stage in agreement with the US and Canada as the activities around the Knowledge Sharing Platform progress.

This catalogue has built on input from the other AORAC-SA inventories of systems (Ecosystem approach, Ocean observation, Shared access to marine research infrastructures), H2020 AtlantOS catalogue (in preparation), GOOS catalogue and Aquacross catalogue.

The European Marine Infrastructure Landscape

The catalogue is visually represented in Figure 1 to give a flavour of the structure and links between systems. The top half of the tree represents regional and European systems whose focus are the European seas as a whole. The bottom half represents national infrastructures that have a regional, European, or even wider focus. The colour coding represents the relative position in the tree – everything branches off from European seas (in black), to the collections (in blue), and then down to portals, and portals of portals (green and orange).

Figure 1 European Landscape - the big picture

The collections have been grouped at the blue level to give a broad indication of the type of infrastructure that the European marine community provide. In Figure 2, **Research activities** broadly covers European research projects that are aimed at advancing knowledge and research – these are mainly the European Framework programmes under the EU. **Commission services** reflect the large infrastructure that supports the European legal Directives and the European satellite programme. **Research infrastructure** is a collection of platforms, projects, and initiatives that provide integrating and regional infrastructures to support both research and policy makers. In Figure 3, **Coastal states** is the main branch linking to the different European countries platforms. Finally, in Figure 2 **OSPAR-ODIMS** relates to the management support for the regional sea convention (OSPAR), which sits outside the other categories but draws on Commission services and Research Infrastructure.

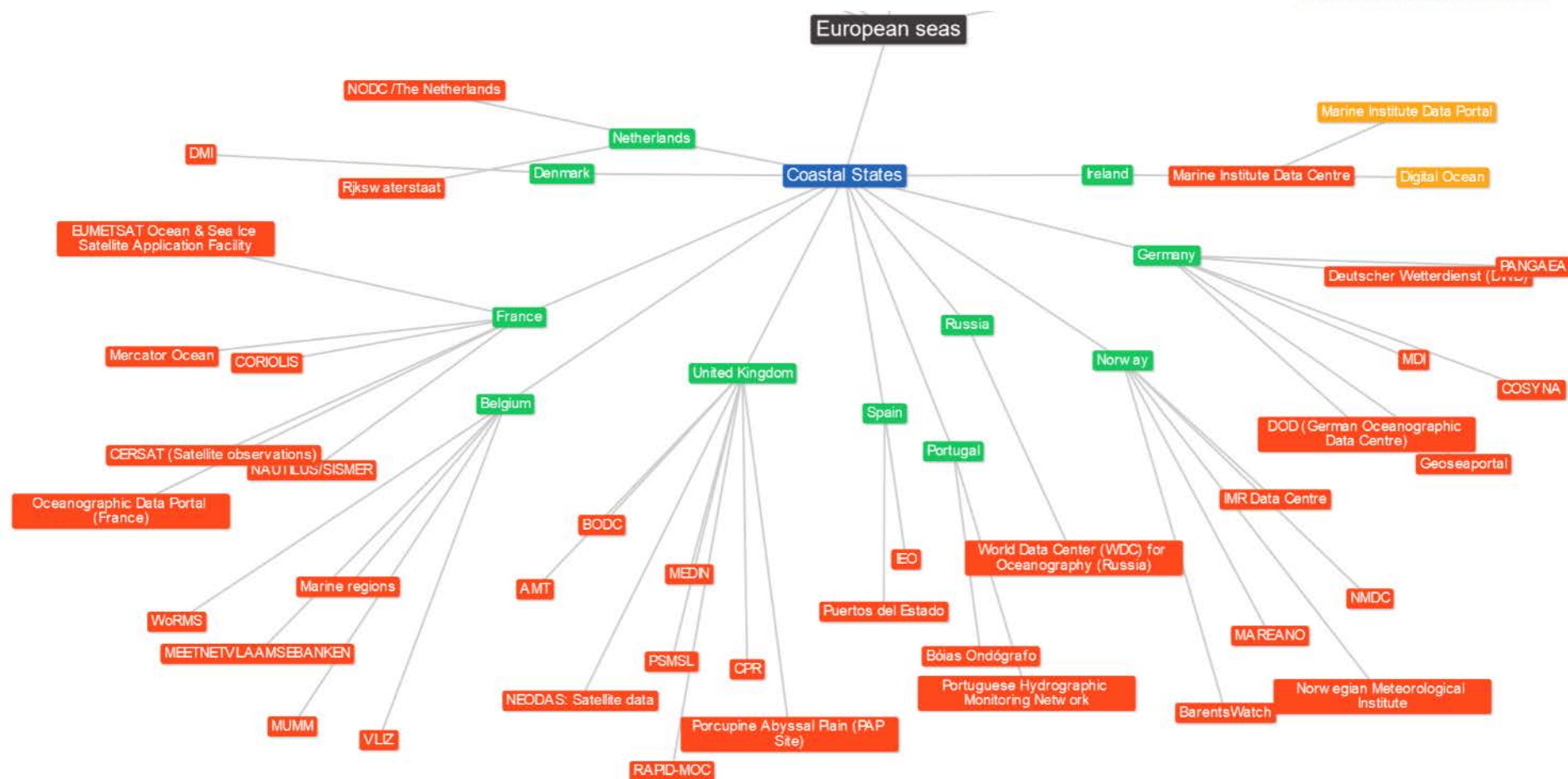*Figure 2 European marine infrastructure landscape: regional systems*

Figure 3 European marine infrastructure landscape: coastal state systems

Access to data and information at the European scale

This catalogue has taken only a superficial look at access rights based on what can be found on the portals that have been surveyed. For a deeper study into the true accessibility and availability of data and information products, this is underway on the European side within EMODnet. There have been a series of regional sea basin checkpoints established (North Sea, Arctic, North Atlantic, Baltic, Mediterranean, and Black Sea). Each of these checkpoints has the task of evaluating the availability (and gaps), the ease of access, and the overall utility of marine data from the various data/information sources. This is done in the form of addressing 'challenges' set by the Commission – ranging from the siting of wind farms, eutrophication, alien species, fisheries management and impact, etc. The checkpoints have developed subjective criteria and scorecards to assess the marine data portals and therefore are developing dashboards that give an overview of the relative state of marine data and information structure in each sea region. Ultimately, this will lead to a pan-European comparison of the access and availability of marine data and information. An example is here for the Baltic http://www.emodnet-baltic.eu/ and Atlantic http://www.emodnet-atlantic.eu/ at the time of writing most of the checkpoints have completed literature reviews that describe the state of the art of knowledge and evidence in relation to each challenge set, and drafts of the so called data adequacy reports are now under evaluation by experts.
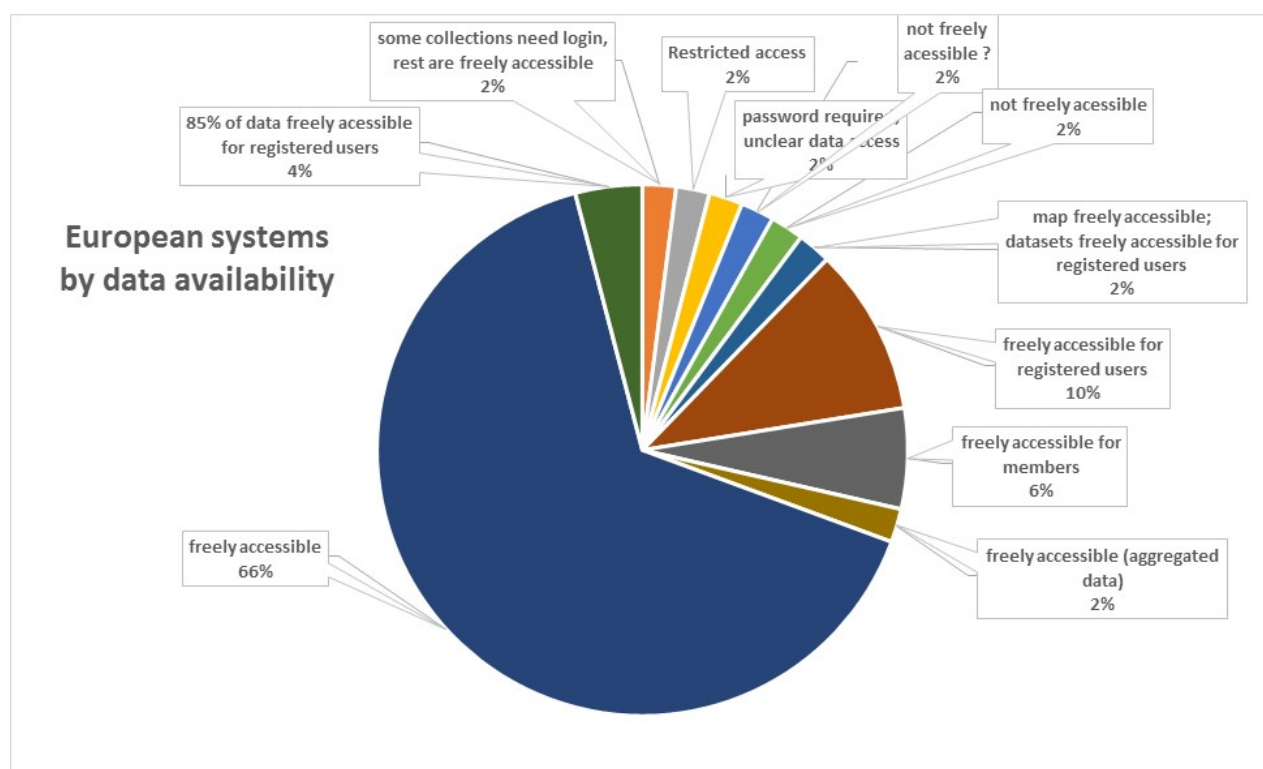
Figure 4 Data access for European systems

Figure 4 above is based on the 49 entries in the catalogue that are European and regional infrastructures i.e. not national systems. Encouragingly, 66% of the portals offer access to data and information products without any form of negotiation. A large proportion of the remaining portals offer free access but in some cases this is by registration, or there is a distinction between detailed and aggregated products, where only the latter are freely available. Only in 1 case are data 'restricted', however there are a number of examples where the access is not clearly defined or the links to resources are not functioning.

European Operational longevity and funding

The European marine infrastructure is diverse in its composition. Many of the information portals are the result of projects that have been sustained beyond the lifetime of initial funding, whereas others have been established through other means and have varying degrees of sustainability. The following charts give a flavour for this, in both how the infrastructure is funded and the expected lifetime of the various systems and portals.
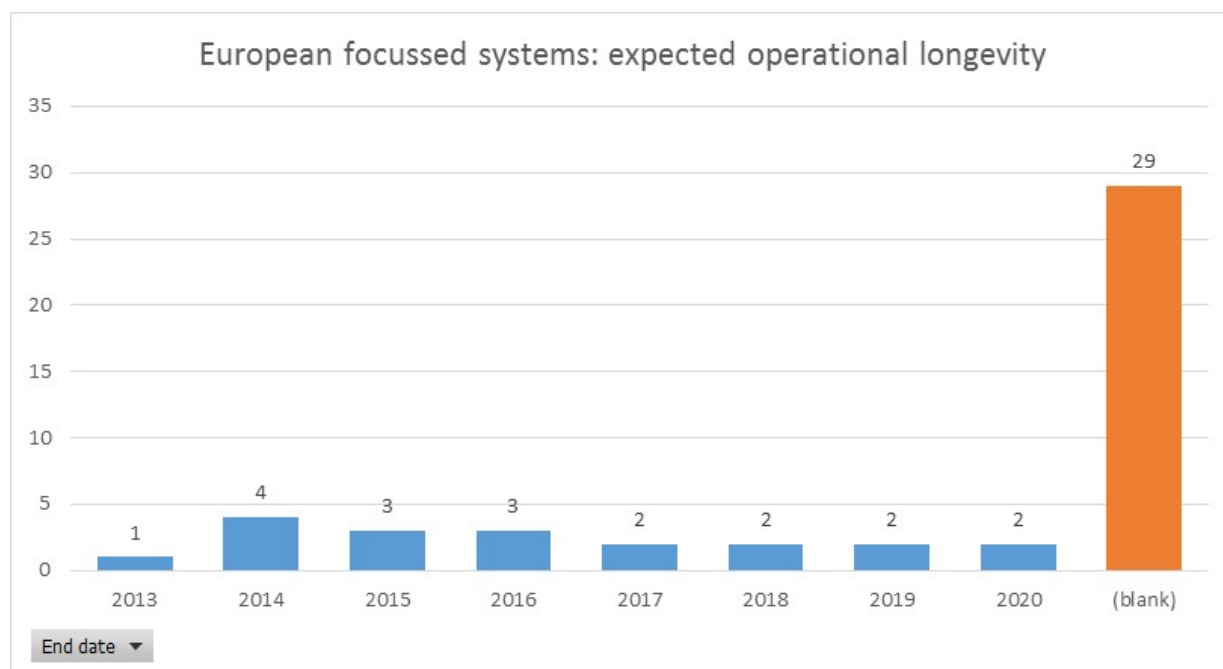

Figure 5 Operational longevity of European systems

In Figure 5, over 60% of the European and regional systems have no specific end date (the orange column) – they are sustained and funded. In the coming 4-5 years we will see only a small proportion of infrastructures coming to the end of their life cycle in a project. However, it should be noted that this does not necessarily mean that these systems will not be continued/funded through other follow-on activities. Indeed, most European projects in the latest Horizon 2020 round have work packages dedicated to defining how the project, or its outcomes, can be sustained and funded by the European network beyond the lifetime of the project.

Figure 6 provides an overview of how all the infrastructure elements (European, regional, and national systems) are funded, or have been funded. Over 40% of the surveyed portals are supported by some form of national funding, although in some cases these are subsidised by activities in European projects. There are two prominent European funders – the Framework programmes overseen by the EU Commission Director General RTD (FP6, FP7, Horizon 2020, etc.) and the European Maritime Fisheries Fund overseen by the EU Commission Director General MARE. Beyond these, there is a mixture of funding coming from member countries to specific regional platforms (the regional sea conventions and the International Council for the Exploration of the Sea (ICES)), funding from the EU Commission via its agencies (European Environment Agency (EEA), Joint Research Centre (JRC)) as well as the direct funding of the EU Commissions own service provision of data and information structures.
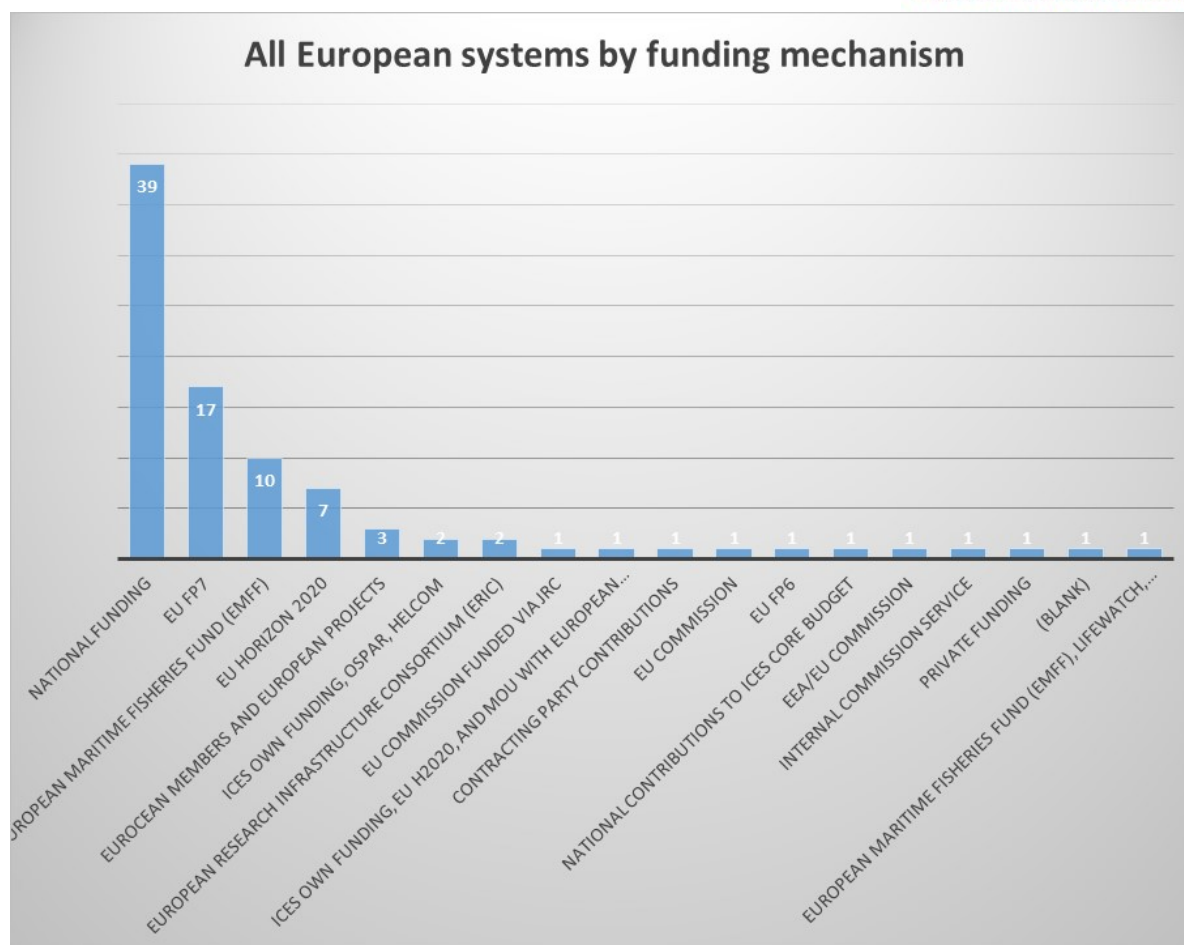
Figure 6 Funding mechanisms of European and regional systems

In this section, each portal or system is presented as a factsheet with key information. An example template is provided below to describe what each field in the table shows.

PROJECT/PORTAL/SYSTEM Acronym

Full title of system

Established year: **operational start year**   Expected lifetime: **end year, blank if sustained**

Short abstract describing the main purpose of the portal

No. of organisations connected	No. of known partner institutes/organisations involved
Funding mechanism	Main funding instrument
Contact	Contact person and affiliation
Keywords	5-6 keywords describing the main content/function
AORA/Galway statement relevance	
Which of 6 research priorities this portal is relevant to	
US or Canadian partner interactions	If there are known relationships to US/Canada institutes
Links to regional/international organizations	If there are known associations to International initiatives i.e. FAO, IOC etc
Highest spatial resolution	The spatial resolution that the portal offers
Data and information access	Data policy (Free access, registration, restricted etc)
Predominant information types	i.e. publications, digital maps, dataset files, online tools
Link to main website	**Additional link(s) to information portal.**

AQUAEXCEL

Aquaculture Infrastructures for Excellence in European Fish Research

Established year: **2011**   Expected lifetime: **2015**

In order to avoid infrastructure duplication in the planning of new tools and services for future aquaculture development in Europe, a gap analysis was carried out. This in-depth study was based on the conclusions found in the EATIP SRIA and on the currently available expertise and properties in existing RIs in Europe. Conclusions show that European RIs cover a large part of the expertise that is needed to comply with the main challenges in the aquaculture sector. However, several specific goals that were set by the EATIP in its strategic agenda were found not to be sufficiently covered by current RIs in Europe and rely on expertise and/or facilities from 3rd countries or on the development of new research teams and infrastructure.

No. of organisations connected	17
Funding mechanism	EU FP7
Contact	Marc Vandeputte,marc.vandeputte(at)jouy.inra.fr, INFRA
Keywords	fish & aquaculture research, research infrastructures, knowledge transfer, gaps and needs
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Aquaculture, Biotechnology, Ocean Literacy	
US or Canadian partner interactions	yes
Links to regional/international organizations	none
Highest spatial resolution	?
Data and information access	not freely acessible
Predominant information types	publications, bioinformatic tool, interactive map
http://www.aquaexcel.eu/	**Additional link(s) to information portal.**

ATLANTOS

Optimizing and Enhancing the Integrated Atlantic Ocean Observing System

Established year: **2015**   Expected lifetime: **2019**

AtlantOS is a BG 8 (Developing in-situ Atlantic Ocean Observations for a better management and sustainable exploitation of the maritime resources) research and innovation project that proposes the integration of ocean observing activities across all disciplines for the Atlantic, considering European as well as non-European partners.

The vision of AtlantOS is to improve and innovate Atlantic observing by using the Framework of Ocean Observing to obtain an international, more sustainable, more efficient, more integrated, and fit-for-purpose system. Hence, the AtlantOS initiative will have a long-lasting and sustainable contribution to the societal, economic, and scientific benefit arising from this integrated approach. This will be archived delivered by improving the value for money, extent, completeness, quality and ease of access to Atlantic Ocean data required by industries, product supplying agencies, scientist and citizens.

The overarching target of the AtlantOS initiative is to deliver an advanced framework for the development of an integrated Atlantic Ocean Observing System that goes beyond the state-of – the-art, and leaves a legacy of sustainability after the life of the project.

The legacy will derive from the AtlantOS aims:

• to improve international collaboration in the design, implementation and benefit sharing of ocean observing,

• to promote engagement and innovation in all aspects of ocean observing,

• to facilitate free and open access to ocean data and information,

• to enable and disseminate methods of achieving quality and authority of ocean information,

• to strengthen the Global Ocean Observing System (GOOS) and to sustain observing systems that are critical for the Copernicus Marine Environment Monitoring Service and its applications and

• to contribute to the aims of the Galway Statement on Atlantic Ocean Cooperation

No. of organisations connected	72
Funding mechanism	EU Horizon 2020
Contact	Martin Visbeck, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
Keywords	Atlantic Ocean Observing System, in situ observating systems, international cooperation

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Sytems, Ocean Literacy, Seabed mapping

US or Canadian partner interactions	yes
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES); United Nations Educational, Scientific and Cultural Organization (UNESCO), associates: World Ocean Ocean Council (WOC)
Highest spatial resolution	?
Data and information access	not freely acessible ?
Predominant information types	?

https://www.atlantos-h2020.eu/	**Additional link(s) to information portal.**

BISE

Biodiversity Information System for Europe

Established year: **2010**   Expected lifetime:

web portal centralising information about European biodiversity - policies, data and assessments - in a single location. BISE also serves as the EU Biodiversity Clearing House Mechanism to CBD

No. of organisations connected	28
Funding mechanism	EEA/EU Commission
Contact	EEA
Keywords	marine policy, state of species, habitats, ecosystems, genetic diversity, threats to biodiversity, impacts of biodiversity loss, evaluation of policy responses, EU

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Ocean Literacy

US or Canadian partner interactions	none
Links to regional/international organizations	EU, JRC, CBD
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	reports, maps, metadata, indicators, aggregated data

http://biodiversity.europa.eu/	**Additional link(s) to information portal.**

BlueBridge

BlueBRIDGE

Established year: **2015**   Expected lifetime:

BlueBRIDGE is European initiative funded under the H2020 framework to further develop and exploit the iMarine e-Infrastructure data services for an ecosystem approach to fisheries. 14 European partners are involved in the initiative.

BlueBRIDGE's overall objective is to support capacity building in interdisciplinary research communities actively involved in increasing scientific knowledge about resource overexploitation, degraded environment and ecosystems with the aim of providing a more solid ground for informed advice to competent authorities and to enlarge the spectrum of growth opportunities as addressed by the Blue Growth Societal Challenge.

BlueBRIDGE capitalizes on past investments and uses the proven D4Science infrastructure that counts over 2000 users, integrates more than 50 repositories, executes around 20,000 models & algorithms per month and provides access to over a billion records in repositories worldwide, with 99,7% service availability.

BlueBRIDGE aims to develop innovative services in the following areas:

Blue Assessment - services for stock assessment and for the generation of unique identifiers for global stocks;

Blue Economy - services supporting the analysis of socio-economic performance in aquaculture;

Blue Environment - spatial planning services to identify aquaculture and fisheries infrastructures from satellite imagery;

Blue Skills - on-line training services and capacity building on existing training modules for fisheries scientists and other practitioners.

No. of organisations connected	15
Funding mechanism	EU Horizon 2020
Contact	Donatella Castelli, National Research Council (Cnr)
Keywords	expanding iMarine e-Infrastructure data services, knowledge bridging, stock assesment,Virtual Research Environments , Blue Growth
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	FAO, ICES,
Highest spatial resolution	?
Data and information access	freely accessible for members
Predominant information types	virtual research environments
http://www.bluebridge-vres.eu/	**Additional link(s) to information portal.**

Copernicus

Copernicus Sentinels and other ESA Earth Observing satellites

Established year: **2014**   Expected lifetime: **2020**

Copernicus is a European system for monitoring the Earth.

Copernicus consists of a complex set of systems which collect data from multiple sources: earth observation satellites and in situ sensors such as ground stations, airborne and sea-borne sensors. It processes these data and provides users with reliable and up-to-date information through a set of services related to environmental and security issues.

The services address six thematic areas: land, marine, atmosphere, climate change, emergency management, and security. They support a wide range of applications, including environmental protection, management of urban areas, regional and local planning, agriculture, forestry, fisheries, health, transport, climate change, sustainable development, civil protection, and tourism.

The main users of Copernicus services are policymakers and public authorities who need the information to develop environmental legislation and policies or to take critical decisions in the event of an emergency, such as a natural disaster or a humanitarian crisis.

The Copernicus programme is coordinated and managed by the European Commission. The development of the observation infrastructure is performed under the aegis of the European Space Agency for the space component and of the European Environment Agency and the Member States for the in situ component.

No. of organisations connected	?
Funding mechanism	EU Commission
Contact	Mauro FACCHINI,Copernicus Unit, European Commission
Keywords	Earth monitoring, in situ observing systems, satellites, environment protection, management of urban areas, regional and local planning, agriculture
AORA/Galway statement relevance	
Ecosystem Approach, Observing System, Ocean Literacy	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible for registered users
Predominant information types	interactive maps, databases, interactive catalogues, graphs
http://www.copernicus.eu/	**Additional link(s) to information portal.**

Copernicus CMEMS

Copernicus Marine Environment Monitoring Service

Established year: **2015**   Expected lifetime:

The Copernicus Marine Environment Monitoring Service (CMEMS) provides full, free and open access to regular and systematic reference information on the physical state and marine ecosystems of the oceans and European regional seas (including, for example, temperature, currents, salinity, sea surface height, sea ice, marine optics, nutrients, etc.). The service is enabled by satellite and in situ observation-based data, and can provide a description of the current situation (analysis), a prediction of the situation a few days ahead (forecast) and the provision of consistent retrospective data records for recent years (re-analysis).

The service, which has been fully operational since May 2015, will also contribute to the monitoring of compliance with major EU policies, such as the Marine Strategy Framework Directive. The service provides information applicable to a diverse range of fields including the protection of marine species, maritime safety and vessel routing, the sustainable exploitation of ocean resources, marine energy resources, climate monitoring, and weather forecasting.

CMEMS has been built up through a series of three EU-funded research and development projects (MyOcean, MyOcean2 and MyOcean Follow-On), coordinated by Mercator Océan with the participation of 60 other partners. During the course of these projects, starting from March 2009, the service was available on a pre-operational, pilot basis.

The products delivered by the service are provided free of charge to registered users through an interactive catalogue available on the 'marine.copernicus.eu' website. CMEMS began operations with over 5 000 subscribers, who had already registered during its pre-operational phase.

No. of organisations connected	61
Funding mechanism	EU FP7
Contact	Pierre Bahurel, Mercator Océan
Keywords	European service for understanding marine ecosystems, in situ observating systems, satellites, state-of-the-art analyses, forecasts
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible for registered users
Predominant information types	interactive catalogue
http://marine.copernicus.eu/	**Additional link(s) to information portal.**

Data Collection Framework (DCF) for Fisheries

Data hub for European Common Fisheries Policy

Established year: **2000**	Expected lifetime:
Data hub for Common Fisheries Policy	
No. of organisations connected	28
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	EU Commission (DG-MARE)
Keywords	fisheries, aquaculture, data calls, National Programs, data dissemination platforms, coverage reports on the data, guidelines and legislation

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Ocean Literacy

US or Canadian partner interactions	none
Links to regional/international organizations	EUROSTAT, EU, JRC
Highest spatial resolution	ICES rectangle or equivalent
Data and information access	freely accessible (aggregated data)
Predominant information types	reports, metadata, aggregated data
http://datacollection.jrc.ec.europa.eu/	**Additional link(s) to information portal.**

DEVOTES

DEVelopment Of innovative Tools for understanding marine biodiversity and assessing good Environmental Status

Established year: **2012**   Expected lifetime: **2016**

The overall goal of DEVOTES is to better understand the relationships between pressures from human activities and climatic influences and their effects on marine ecosystems, including biological diversity, in order to support the ecosystem based management and fully achieve the Good Environmental Status (GES) of marine waters. DEVOTES main objectives are to: i) improve our understanding of the impact of human activities and climate change on marine biodiversity; ii) identify the barriers and bottlenecks that prevent Good Environmental Status from being achieved; iii) test indicators and develop new, innovative ones to assess biodiversity in a harmonized way throughout the 4 regional seas; iv) develop, test and validate innovative integrative modelling and monitoring tools to improve our understanding of ecosystem and biodiversity changes, for integration into a unique and holistic assessment; v) propose and disseminate strategies and measures for ecosystems' adaptive management, including the active role of industry and relevant stakeholders.

DEVOTES will address three main challenges in determining environmental status: (i) assessment of anthropogenic pressures, including climate change, to which biodiversity responds; (ii) selection of appropriate indicators to assess the status; and (iii) integration of those indicators across a number of ecological scales, into a unique biodiversity assessment.

No. of organisations connected	23
Funding mechanism	EU FP7
Contact	Angel Borja (aborja@azti.es); Maria C. Uyarra
Keywords	assessment; human activities; biodiversity; climate change; indicators; integraion; tools; good environmental status
AORA/Galway statement relevance	
Ecosystem Approach, Ocean Literacy	
US or Canadian partner interactions	Two US observers: EPA and NOAA
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	Nested Environmental state Assessment Tool; DevoMAP: site specific info on physical properties of ecosystems to communities; MY-GES: simple environmental assessment of specific sites; DEVOTOOL: catalogue of indicators; Marine regions and subregions
http://www.devotes-project.eu/	**Additional link(s) to information portal.**

E-AIMS

Euro-Argo Improvements for the GMES Marine Service
Established year: **2013**   Expected lifetime: **2016**

The main objective of E-AIMS was to conduct R&D activities on Argo float technology, Argo data centers and the design of the new phase of Argo to better answer existing and future needs of the Copernicus Marine Service. E-AIMS organized an end-to-end evaluation of new Argo floats. Float characteristics were specified and float design or sensor adaptation activities were carried out. These new floats were ordered to float manufacturers, tested, deployed at sea and a detailed analysis of their data was carried out. European Argo data centers were, in parallel, adapted so that they can handle them (data processing, quality control, data distribution). Observing System Evaluations and Simulation Experiments were also conducted to provide robust recommendations for the next phase of Argo. A real time demonstration of the utility of these new floats for the Copernicus Marine Service was finally successfully carried out.
E-AIMS thus demonstrated the capability of the Euro-Argo infrastructure to conduct R&D driven by Copernicus needs and demonstrated that procurement, deployment and processing of these new floats for Copernicus can be organized at European level. Impact on the Copernicus Marine Service was clearly evidenced. Both feasibility and utility aspects have thus been fully assessed. The Euro-Argo ERIC is now in an excellent position to agree on and start implementing the new phase of Argo that will be highly beneficial to the Copernicus Marine Service.

No. of organisations connected	16
Funding mechanism	EU FP7
Contact	Pierre Yves Le Traon, Ifremer
Keywords	Argo float technology, in situ observing systems, climate change
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem approach, Observing sytems, Ocean literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive maps, databases
http://www.euro-argo.eu/EU-Projects-Contribution/E-AIMS	**Additional link(s) to information portal.**

EMODNET: Bathymetry

European Marine Data and Observation Network: Bathymetry

Established year: **2009**   Expected lifetime:

The EMODnet Bathymetry portal is being developed by a European partnership. This comprises members of the SeaDataNet consortium together with organisations from marine science, the hydrographic survey community, and industry. The partners combine expertises and experiences of collecting, processing, and managing of bathymetric data together with expertises in distributed data infrastructure development and operation and providing OGC services (WMS, WFS, and WCS) for viewing and distribution.

In the field of bathymetry, a number of Data Centres in SeaDataNet manage bathymetric data sets, such as multibeam surveys from scientific cruises. However, there are several other parties engaged in the provision of bathymetric data. These comprise:

Hydrographic Offices, that are responsible for surveying the navigation routes, fairways and harbour approach channels and producing from these the nautical charts on paper and as Electronic Nautical Charts (ENC), that are used for navigation. The HO's are members of the International Hydrographic Organisation (IHO) that has its data policy, which supports restrictions in the delivery of high resolution data sets, mostly for safety and security reasons. Moreover, nautical charts have a legal status. Every ship captain must use certified nautical charts and the production and publication of these is an activity which must follow stringent international procedures. The latter results in a condition that HO's are careful in delivering and distributing bathymetric survey data sets.

Authorities, responsible for management and maintenance of harbours, coastal defences, shipping channels and waterways. These authorities operate or contract regular bathymetric monitoring surveys to assure that an agreed nautical depth is maintained or to secure the state of the coastal defences.

Research institutes that collect multibeam surveys as part of their scientific cruises.

Industry, especially the energy industry that contracts multibeam surveys for pipeline and cable routes (in case of windfarms) and the telecommunication industry for phone and internet cable routes.

No. of organisations connected	39
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Dick M.A. Schaap, maris@xs4all.nl, of Marine Information Service (MARIS)
Keywords	single access point to bathymetric products, surveys, data sets
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	The Baltic Sea Hydrographic Commission
Highest spatial resolution	point
Data and information access	map freely accessible; datasets freely accessible for registered users
Predominant information types	interactive map, survey data
http://www.emodnet.eu/bathymetry	**Additional link(s) to information portal.**

EMODNET: Biology

European Marine Data and Observation Network: Biology

Established year: **2009**   Expected lifetime:

The EMODnet biological data portal will provide access to different thematic databases and to several long-term national marine biological monitoring datasets from all European regional seas. The project will identify and focus on biological data types, species, species attributes, sampling methods and biological indicators to support the variety of legislations, and will create biological data products to support environmental legislations including the Marine Strategy Framework Directive.

EMODnet Biology provides access to data from a wide range of sources and actively pursues inclusion of new and historical data sets to the inventory based on careful assessment of the ease of use and fitness for purpose of the data and associated databases. The databases feeding into EMODnet Biology contain data from all regional and subregional seas of Europe, as specified by the Marine Strategy Framework Directive.

Data Contributors include:

International biogeographic datasets from the European Ocean Biogeographic data system (EurOBIS, VLIZ);

National monitoring programmes – typically these data providers have been collecting biological data, in some cases for several decades, and now make their datasets available through EMODnet;

International monitoring campaigns – databases storing data from multiples countries within the same regional European sea;

Data archaeology – datasets recovered from scientists' personal files, excel spreadsheets, paper documents and other formats that would otherwise be lost or inaccessible.

No. of organisations connected	22
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Simon Claus, VLIZ (VLAAMS INSTITUUT VOOR DE ZEE)
Keywords	single access point to marine biodiversity data, monitoring datasets, interoperability of data, environmental state of ecosystems
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES); Global Biodiversity Information Facility (GBIF); World Register for Marine Species (WoRMS); Ocean Biogeographic Information System (OBIS); SeaDataNEt
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive maps, data catalogue, maps, videos
http://www.emodnet.eu/biology	**Additional link(s) to information portal.**

EMODNET: Chemistry

European Marine Data and Observation Network: Chemistry

Established year: **2009**   Expected lifetime:

EMODNET Chemistry 2 is built on EMODNET Chemistry pilot components of the EU's maritime policy, to deliver a marine observation infrastructure that offers the most effective support to the marine and maritime economy whilst supporting environmental protection needs, launched by the Directorate-General for Maritime Affairs and Fisheries (DG MARE).

The portal should cover all European sea-basins: Adriatic Sea, Aegean Levantine Sea, Baltic Sea, Black Sea, Celtic Seas, Ionian Sea and Central Mediterranean Sea, Iberian Coast and Bay of Biscay, Macaronesia, Western Mediterranean Sea, Greater North Sea, Norwegian Sea.

No. of organisations connected	47
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Alessandra Giorgetti, OGS, (National Institute of Oceanography and Experimental Geophysics)
Keywords	marine chemistry data sets, Dynamic Plots, time-series data, eutrophication & contaminants, interconnected National Oceanographic Data Centres (NODCs)

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping

US or Canadian partner interactions	none
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES); IODE ASSOCIATED DATA UNIT (ADU) for International Data and Information exchange (GeoDNA)
Highest spatial resolution	subcountry
Data and information access	freely accessible for registered users
Predominant information types	interactive maps

http://www.emodnet.eu/chemistry	**Additional link(s) to information portal.**

EMODNET: Coastal Mapping

European Marine Data and Observation Network: Coastal Mapping

Established year: **2015**   Expected lifetime:

Coastal Mapping is a recent EMODnet activity, initiated in 2015 at the end of the second EMODnet development phase (Phase II). It was not part of the preparatory action which ran from 2009-2013. EMODnet Coastal Mapping is still in its early development phase. Moreover, the main objective of EMODnet Coastal Mapping project, unlike the other EMODnet portals, is not to provide data or products, but to build a coastal mapping programme.

The main objectives of the EMODnet Coastal Mapping project are to assess the current availability of digital coastal maps in the EU, to disseminate this information by EMODnet, to share experience of coastal mapping in the EU, to develop standards for best practices and to propose how a future Joint European Coastal Mapping Programme (JECMAP) could operate.

The portal will allow users to view, query and download data and metadata from public and private sources – from throughout Europe - via a single entry portal. It will also provide indications of most appropriate technique for future mapping and digital data from other organisations (EEA, other EMODnet projects).

When the portal will be fully operational, the following data will be available: Best estimate coastline, legal baseline, most appropriate technique for future mapping, intertidal area, high resolution underwater DTM, data from other organisations (EEA, EMODnet portals)

No. of organisations connected	18
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Gaël Morvan, French Hydrographic Office (SHOM)
Keywords	assessment of availability of digital coastal maps, Integrated Coastal Zone Management, best practice, Joint European Coastal Mapping Programme
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive map
http://www.emodnet.eu/coastal-mapping	**Additional link(s) to information portal.**

EMODNET: Geology

European Marine Data and Observation Network: Geology

Established year: **2009**   Expected lifetime:

Geological information is being compiled from a variety of sources, but principally from the national geological survey organisations of Europe. Harmonisation of national information is based on the principles established during the ur-EMODnet-Geology Project (2009-2013). In addition to sea-bed sediment information, EMODnet Geology is also compiling information on the Quaternary geology of the sea floor (sediments deposited during the last 2 million years approximately).

The EMODnet Geology portal provides access to project information and services and is powered by GeoNetwork open-source software. Data is made available via WMS (Web Map Service) with an associated metadata record. Links to the WMS can be used to incorporate information into a desktop GIS or other mapping application. The catalogue of available information can be searched either by listing information layers or by displaying the information on a map.

Geological data from Europe's seas is collected by national organisations using a range of tools and techniques. The main providers of data for EMODnet Geology are the national geological surveys, but other entities hold and contribute data.

The project also develops links with other initiatives and organisations collecting and holding relevant data and information. By making use of third-party sources of information, the project ensures that there is no duplication of effort and that the users of the EMODnet-Geology portal can be confident of sourcing the best information available.

EMODnet Geology data and map products contain information on the sea-bed substrate, including rate of accumulation of recent sediments, the sea-floor geology (bedrock and Quaternary geology), geological events and probabilities and minerals. Information on coastal type and behaviour will be supplemented by information on coastal erosion or sedimentation and the rate at which it occurs.

All interpretative products will be based on primary information owned by the project partners, which will be supplemented with other information in the public domain.

No. of organisations connected	36
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Alan Stevenson, agst@bgs.ac.uk, BGS (British Geological Survey)
Keywords	free access to geological &metadata, marine spatial planning, coastline protection, offshore installation design, environmental conservation, risk management and resource mapping
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive map, catalogue
http://www.emodnet.eu/geology	**Additional link(s) to information portal.**

EMODNET: Human Activities

European Marine Data and Observation Network: Human Activities

Established year: **2013**   Expected lifetime:

The main objective of EMODnet Human Activities is to make available information on the geographical position, spatial extent and attributes of a wide array of marine and maritime human activities throughout Europe. Particular attention is given to providing, when possible, historical time series to indicate the temporal variation of activities such as fishing and port traffic. Time when data was provided together with attributes to indicate the intensity of each activity will also be included.

The portal will allow users to view, query, and download data and metadata from public and private sources – from throughout Europe - via a single entry portal. It will provide access to data that has been harmonised into interoperable formats and that includes agreed standards, common baselines or reference conditions and assessments of their accuracy and precision. Human Activities is still in its early development phase. The project will last three years until September 2016, with the first two years focusing on data collection, and the third year focusing on fine-tuning. The results made available before the end of the project should be considered as provisional, as the database is still under construction. Human Activities' parameters should include the geographical position and spatial extent of a series of activities related to the sea, their temporal variation, time when data was provided, and attributes to indicate the intensity of each activity. The data are aggregated and presented so as to preserve personal privacy and commercially-sensitive information. The data also include a time interval so that historic as well as current activities can be included. Some of these data may already be assembled and maintained by European organisations. Where this is the case, the aim is to provide web-services that extract data from their databases, rather than develop one large database.

The approach adopted is that as far as possible each activity should be covered by a single source that can provide data for all EU sea basins. This makes it possible to obtain complete and already harmonised datasets, thus reducing the risk of data gaps.

No. of organisations connected	31
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	alessandro Pititto, Apititto@cogea.it
Keywords	marine & maritime human activities, free & open-source technology, historical time series, interoperability, geographical position, spatial extent and attributes of activities
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	BALTIC MARINE ENVIRONMENT PROTECTION COMMISSION (HELCOM); International Council for the Exploration of the Sea
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive map, database
http://www.emodnet.eu/human-activities	**Additional link(s) to information portal.**

EMODNET: main portal

European Marine Data and Observation Network: main portal

Established year: **2009**   Expected lifetime: **2020**

The European Marine Observation and Data Network (EMODnet) is a network of organisations supported by the EU's integrated maritime policy. These organisations work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products.

EMODnet provides access to European marine data across seven discipline-based themes: Bathymetry, Geology, Seabed habitats, Chemistry, Biology, Physics, Human activities.

For each of these themes, EMODnet has created a gateway to a range of data archives managed by local, national, regional, and international organisations. Through these gateways, users have access to standardized observations, data quality indicators, and processed data products, such as basin-scale maps. These data products are free to access and use.

EMODnet is a long term marine data initiative developed through a step-wise approach. Currently, available data are being used to create medium-resolution maps of all Europe's seas and oceans, spanning all seven disciplinary themes - these are expected to be complete in 2014. The next phase of EMODnet will involve the development of multi-resolution sea basin maps, commencing in 2015. More than 100 organisations are involved in the EMODnet programme; new contributors are welcome. EMODnet will strengthen its coordination with other marine knowledge providers, including fisheries, the marine component of the EU's Copernicus programme and the private sector, to create a common platform for marine data. User requirements are a priority in EMODnet, so a series of seabasin 'checkpoints' are envisaged, starting with the Mediterranean and North Sea in 2013. These mechanisms will identify whether the present observation infrastructure is the most effective possible, and whether it meets the needs of public or private users.

No. of organisations connected	> 110
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Jan-Bart Calewaert,janbart.calewaert@seascapeconsultants.co.uk/ janbart.calewaert@emodnet.eu
Keywords	free access to marine data, data & infrastructure sharing, long term data initiative, Marine Knowledge 2020
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES), Global Biodiversity Information Facility (GBIF),
Highest spatial resolution	point observation data
Data and information access	freely accessible
Predominant information types	interactive maps, databases, data portals
http://www.emodnet.eu/	**Additional link(s) to information portal.**

EMODNET: Physics

European Marine Data and Observation Network: Physics

Established year: **2009**   Expected lifetime:

The overall objective of EMODnet Physics is to provide access to archived and near real-time data on the physical conditions of European seas and oceans and to determine how well the data meets the needs of users from industry, public bodies, and science.

Currently the following key services and functionality are provided for users:

Dynamic map facility for viewing and downloading: This provides the central tool for users to search, visualize and download data, metadata and products. For the near real-time (NRT) data the map facility allows viewing/retrieving, within a specified time (e.g. 60 days sliding window), measurement points, values of data and quality of data. The geographical area (space window) will define the area of interest within which the measurement points, values of data and quality of data are presented. For the previous 60 days a graph is provided with data availability over time. Information about the data originator, curator etc. is also provided. The tool also serves to visualize and retrieve data products such as time plots for specific parameters (e.g. monthly averaged temperature for data acquired during the specified time window).

Dashboard reporting service: This allows users to view and export various statistics about the data portal content and usage. The EMODnet Physics dashboard represents a valuable tool to discover data availability and monitor performances of the infrastructure behind the portal. The tool also provides KPI (key performance indicators) presenting how much data and how many platforms are made available on a daily basis, as well as extract statistics on page access and data downloads etc.

Machine-to-machine communication services: EMODnet Physics is developing interoperability services to facilitate machine-to-machine interaction and to provide further systems and services with European seas and ocean physical data and metadata. In particular EMODnet Physics is providing OCG compliant WMS and WFS layers offering information about which parameters are available from where, as well as information on the data originator etc. Furthermore EMODnet Physics is also providing SOAP-web services which allow linking of external services to the near real-time data stream and facilitate machine-to-machine data fetching and assimilation.

No. of organisations connected	63
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Antonio Novellino, antonio.novellino@ettsolutions.com, ETT
Keywords	acccess to data on the physical conditions of European seas, archived & near-real time data, integrated data streams, sea level variability, climate change, off-shore activities
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	Centre for Maritime Research and Experimentation (CMRE) - NATO
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive map
http://www.emodnet.eu/physics	**Additional link(s) to information portal.**

EMODNET: Seabed Habitats

European Marine Data and Observation Network: Seabed Habitats

Established year: **2009**   Expected lifetime:

In the first phase of the EMODnet Seabed Habitats project (2009-2012) over two million square kilometres of European seabed were mapped using levels 3 and 4 of the EUNIS (European Nature Information System) classification system to produce the broad-scale habitat map products known as "EUSeaMap". In phase 2 of the project (2013-2016), the coverage of the maps is being extended to all European seas and the existing maps are being improved.

Furthermore, the EMODnet Seabed Habitats project will continue the work started by MESH and MESH Atlantic projects of collating and making available seabed habitat maps from surveys, through the EMODnet Seabed Habitats interactive map.

EMODnet Seabed Habitats will expand Phase I EUSeaMap work to cover the remaining sea-basins by mobilising data capture from various sources. The first step is to acquire the best-available spatial data for several environmental variables. The data are organised and harmonised into raster images divided into classes. These data can be combined by 'layering' the data in GIS to create a combined output describing the habitat. The principal input layers are the type of seabed substrate and the biological zones. Depending on the basin, layers of hydrodynamic energy levels, salinity and/or temperature are also produced. For example the hydrodynamic energy layer at the seabed is divided into 'Low', 'Medium', and 'High' classes as per EUNIS requirements.

No. of organisations connected	9
Funding mechanism	European Maritime Fisheries Fund (EMFF)
Contact	Jacques Populous, Ifremer
Keywords	free seabed habitat map, species distribution modelling, monitoring programmes, maritime spatial planning, Marine Protected Area (MPA) networks
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	none
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive maps, maps, metadata search tool
http://www.emodnet.eu/seabed-habitats	**Additional link(s) to information portal.**

ESONET/EMSO

European Seafloor Observatory NETwork and the European Multidisciplinary Seafloor Observation

Established year: **0**   Expected lifetime:

The European Multidisciplinary Seafloor and water-column Observatory (EMSO) is a large scale, distributed, marine Research Infrastructure (RI). EMSO has been established by eight countries: France, Greece, Ireland, Italy, Portugal, Romania, Spain, and the United Kingdom. It will collect high-resolution data from the ocean surface, water column, seafloor and sub-seafloor, and transmit it to shore via satellites or cable connection in real or near-real time. These measurements are crucial for our understanding of climate change and its impacts, and for improving geo-hazard early warning.

No. of organisations connected	8
Funding mechanism	European Research Infrastructure Consortium (ERIC)
Contact	Paolo Favali, interim.office@emso-eu.org
Keywords	Seafloor, water-column, high-resolution data, ocean surface, water column, real or near-real time observations.

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Ocean Literacy, Seabed Mapping

US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	
Predominant information types	

http://www.emso-eu.org/site/	**Additional link(s) to information portal.**

E-SURFMAR (EUMeTNET)

Surface Marine Operational Service (Meteorological)

Established year: **2003**   Expected lifetime:

The main objective of the Surface Marine Operational Service is to coordinate, optimise and progressively integrate European activities for surface observations over the sea in support of Numerical Weather Predictions.

No. of organisations connected	19
Funding mechanism	EU Horizon 2020
Contact	Meteo-France
Keywords	Air pressure, sea surface temperature, dirfting buoys
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	Informal cooperation with third parties: NOAA (US), MSC (Canada), Puertos des Estado (Spain), MOON Community, GHRSST group
Links to regional/international organizations	JCOMM Data Buoy Cooperation Panel (DBCP) and Ship Observations Team (SOT).
Highest spatial resolution	
Data and information access	Restricted access
Predominant information types	Surface observations over the sea in support of Numerical Weather Predictions
http://www.eumetnet.eu/e-surfmar	**Additional link(s) to information portal.**

EUDAT

European Collaborative Data Infrastructure

Established year: **2012**   Expected lifetime: **2018**

EUDAT's vision is Data is shared and preserved across borders and disciplines. Achieving this vision means enabling data stewardship within and between European research communities through a Collaborative Data Infrastructure (CDI), a common model and service infrastructure for managing data spanning all European research data centres and community data repositories.

European researchers and practitioners from any research discipline can preserve, find, access, and process data in a trusted environment, as part of the EUDAT Collaborative Data Infrastructure a network of collaborating, cooperating centres, combining the richness of numerous generic and community-specific data repositories with the permanence and persistence of some of Europe's largest scientific data centres.

No. of organisations connected	36
Funding mechanism	EU Horizon 2020
Contact	CSC Finland
Keywords	Multi-disciplinary, Air, Sea, Land
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Ocean Literacy	
US or Canadian partner interactions	none
Links to regional/international organizations	
Highest spatial resolution	metadata
Data and information access	freely accessible
Predominant information types	reports, metadata, aggregated data
https://www.eudat.eu/	**Additional link(s) to information portal.**

EuroARGO

European Argo Float monitoring infrastructure

Established year: **2008**   Expected lifetime:

European part of the global, in-situ ocean observing network that provides an essential complement to satellite systems. It is now the major, and only systematic, source of information and data over the ocean's interior. It is an indispensable component of the Global Ocean Observing System required to understand and monitor the role of the ocean in the Earth's climate system.

Maintaining the array's size and global coverage in the coming decades is the next challenge for Argo, and Euro-Argo will contribute for the European component to this global network.

No. of organisations connected	25
Funding mechanism	European Research Infrastructure Consortium (ERIC)
Contact	Sylvie Pouliquen, Ifremer (project manager)
Keywords	temperature, salinity, in situ observing system, climate change

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy

US or Canadian partner interactions	Links to the global network/US NODC
Links to regional/international organizations	Links to the global ARGO network
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	Interactive map/near realtime temperature and salinity data

http://www.euro-argo.eu	**Additional link(s) to information portal.**

EURO-BASIN

EUROpean Basin-scale Analysis, Synthesis & Integration

Established year: **2010**   Expected lifetime: **2014**

The overarching objectives of the EURO-BASIN initiative are to understand and predict the population structure and dynamics of key plankton and fish species of the North Atlantic and shelf seas, and assess the impacts of climate variability on North Atlantic marine ecosystems and their goods and services.

The project will develop understanding and strategies that will ultimately contribute to improve and advance management of North Atlantic marine ecosystems following the ecosystem approach.

No. of organisations connected	24
Funding mechanism	EU FP7
Contact	National Institute of Aquatic Resources (DTU-Aqua), Mike St.John
Keywords	predict; population structure; plankton; fish; North Atlantic
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	Yes
Links to regional/international organizations	European branch of the International BASIN Programme
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	publications
http://eurobasin.dtuaqua.dk/eurobasin /index/index.html	**Additional link(s) to information portal.**

EurOBIS

European Ocean Biogeographic Information System (OBIS)

Established year: **2004**   Expected lifetime:

EurOBIS – is an online marine biogeographic database compiling data on all living marine creatures. The principle aims of EurOBIS are to centralize the largely scattered biogeographic data on marine species collected by European institutions and to make these data freely available and easily accessible. All data go through a number of quality control procedures before they are made available online [see standards], assuring a minimum level of quality necessary to put the data to good use. The available data are either collected within European marine waters or by European researchers and institutes outside Europe. The database focuses on taxonomy and distribution records in space and time; all data can be searched and visualised through a set of online mapping tools. All data are freely available online and easily accessible

No. of organisations connected	155
Funding mechanism	European Maritime Fisheries Fund (EMFF), Lifewatch, National funding
Contact	VLIZ data group
Keywords	online marine biogeographic database, marine creatures, centralize largely scattered biogeographic data, marine species, data freely available

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Ocean Literacy

US or Canadian partner interactions	yes
Links to regional/international organizations	IODE (OBIS programme)
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive maps, data catalogue, animations
http://www.eurobis.eu/index	**Additional link(s) to information portal.**

EUROCEAN

EurOcean

Established year: **2007**   Expected lifetime:

EurOcean is a focal point for information on marine science and technology in Europe and its Internet portal is aiming to provide information on topics related to marine science and technology in Europe with a priority given to two main domains: marine research infrastructures and European research, technology, and development information. EurOcean contributes to the initiatives aiming to implement a Marine European Research Area and a European maritime policy.

EurOcean maintains a searchable database of all kinds of marine research infrastructures operated in Europe (> 900 facilities recorded) including Research Vessels (RV) for ocean access, underwater vehicles/instruments for deep sea operations, in-situ Observing Systems (mobile and fixed autonomous ocean platforms, coastal observatories), Marine Biology labs and Aquaculture research facilities.

No. of organisations connected	15
Funding mechanism	EurOcean members and European projects
Contact	Ned Dwyer, ned.dwyer@eurocean.org
Keywords	single access point to marine research infrastructure, in-situ obserbing systems, searchable database, marine biology, aquaculture research
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Biotechnology, Ocean Literacy, Seabed Mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	International Ocean Institute; Intergovernmental Oceanographic Commission (UNESCO)
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive map, databases
http://www.eurocean.org/np4/41	**Additional link(s) to information portal.**

EUROCEAN Marine Knowledge Gate

EurOcean Marine Knowledge Gate

Established year: **0**   Expected lifetime:

The Marine Knowledge Gate is an online management tool which provides an inventory of European and national funded Marine Science and Technology Projects and their Knowledge Outputs. The inventory possesses an advanced search functionality, is regularly updated.

No. of organisations connected	15
Funding mechanism	EurOcean members and European projects
Contact	Cristina Costa, EurOcean
Keywords	Inventory of Marine Science project funding, online management tool, research project profiles, knowledge outputs, reduce duplication
AORA/Galway statement relevance	

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Biotechnology, Ocean Literacy, Seabed Mapping

US or Canadian partner interactions	none
Links to regional/international organizations	International Ocean Institute; Intergovernmental Oceanographic Commission (UNESCO)
Highest spatial resolution	metadata
Data and information access	freely accessible
Predominant information types	online management tool
http://www.eurocean.org/np4/43	**Additional link(s) to information portal.**

EUROCEAN MRI

EurOcean Marine Research Infrastructures Database

Established year: **2014**   Expected lifetime:

The EurOcean_RID aims at offering a comprehensive list of all existing infrastructures in Europe which are dedicated to marine sciences broad range of activities. This new database was developed by EurOcean with the support of JPI Oceans, FP7 SEAS-ERA and "CSA Oceans".

The EurOcean_RID provides the first level of knowledge and characteristics for each facility, as well as the links and contact to access the further details provided by the operator. Search criteria plus an iterative map allows any targeted search of information for every type of request.

The Marine Research Infrastructures Database, launched in March 2014, is managed by EurOcean and currently contains information on 785 infrastructures.

No. of organisations connected	15
Funding mechanism	EurOcean members and European projects
Contact	Sandra Sá, EurOcean
Keywords	comprehensive list of marine sciences activities in Europe, links and contact details, in-situ observing systems, satellites, research vessels, marine data providers
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Biotechnology, Ocean Literacy, Seabed Mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	International Ocean Institute; Intergovernmental Oceanographic Commission (UNESCO)
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive map
http://www.eurocean.org/np4/43	**Additional link(s) to information portal.**

EUROFLEETS

New operational steps towards an alliance of European research fleets

Established year: **2009** Expected lifetime: **2017**

The Eurofleets project has developed the European Virtual Infrastructure in Ocean Research (EVIOR) by way of an integrated information portal, providing up-to-date information about research vessels (RV), cruise programmes, completed cruises and special equipment. This portal is operational and maintained since March 2010. The portal integrates and upgrades a number of existing database modules from the SeaDataNet pan-European marine and ocean data management infrastructure, EurOcean and POGO - Partnership for Observation of the Global Oceans. This includes:

• Research Vessel Cruise Programme database, containing planned cruises per research vessel and owner / operator;

• Research Vessel database, containing characteristics of each research vessel, owner / operator contact details and, if available, a link to the ship's web page;

• Cruise Summary Reports (CSR) database, containing details of completed cruises and providing a first level inventory of oceanographic measurements made and samples taken during the cruises.

• Large Exchangeable Instruments (LEXI) database, containing details of large exchangeable instruments from European operators and also integrating the earlier Underwater Vehicles database of EurOcean.

• Generic Cruise Planning System - DEMONSTRATOR, facilitating a more efficient and harmonised planning and improved flow of programme information from operators to the Cruise Programme database;

• Dynamic Vessel Tracking & Events System - PROTOTYPE, giving dynamic charts of the momentary position and sailing tracks of selected RVs with position, speed, and bearing as well as 24 hour Ship Summary Reports (SSR) by clicking on any position of the vessel track; the SSR includes options to retrieve the event logs for the fixed instruments on board of the RVs.

No. of organisations connected	31
Funding mechanism	EU FP7
Contact	Jacques Binot, Ifremer - French Research Institute for Exploitation of the Sea
Keywords	research vessels, Dynamic Vessel Tracking & Events System, information portal, equipment, Virtual RV Platform
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Observing systems, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive maps, databases
http://www.eurofleets.eu/np4/home.html	**Additional link(s) to information portal.**

Ferrybox

FerryBox

Established year: **2002**   Expected lifetime:

The EU project FerryBox (2002-2005) amply demonstrated they can provide oceanographic data in a highly cost effective manner over a wide range of time and space scales. In Europe FerryBox output is now an integral part of the vision (EMODNET European Marine Observation and Data Network) for the gathering of data streams together into a pan European system for assimilating data in to the marine management cycle. Practically is this beginning to evolve through systems such as EMECO (European Marine Ecosystem Observatory) which will link national system such as COSYNA (Coastal Observation System for Northern and Arctic Seas). This will enhance the provision of much needed data to reduce the degree of aliasing that can be present in the small data sets that have previously been used in assessments such as the OSPAR Common Procedure looking at for example eutrophication.

The FerryBox concept is already in use globally in Australia, Japan and the USA for example. It has considerable potential for expansion particularly for the study of inputs from the world's major riverine in puts such as the Amazon and those flowing into the China Seas. This aspect of the work should be strongly encouraged. Similarly it has the potential to provide key information on changing levels of productivity helping fisheries science in many areas of the world.

No. of organisations connected	19
Funding mechanism	EU FP6
Contact	Dr. Wilhelm Petersen, wilhelm.petersen@hzg.de, Helmholtz-Zentrum Geesthacht
Keywords	Integrated monitoring, ships of opportunity, sensors, eutrophication, plankton productivity
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	EMODnet, EuroGOOS, Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research Institute for Coastal Research/BONUS
Highest spatial resolution	transect/point
Data and information access	freely accessible for registered users
Predominant information types	water quality data and visualization tools
http://www.ferrybox.org/	**Additional link(s) to information portal.**

FIXO3

Fixed point Open Ocean Observatory

Established year: **2013**   Expected lifetime: **2016**

The Fixed point Open Ocean Observatory network (FixO3) seeks to integrate European open ocean fixed point observatories and to improve access to these key installations for the broader community. These will provide multidisciplinary observations in all parts of the oceans from the air-sea interface to the deep seafloor. Coordinated by the National Oceanography Centre, UK, FixO3 will build on the significant advances achieved through the FP7 programmes EuroSITES, ESONET and CARBOOCEAN. Started on 1st September 2013 with a budget of 7 Million Euros over 4 years the Network includes 29 partners drawn from academia, research institutions and small and medium enterprises (SME). In addition 12 international experts from a wide range of disciplines comprise an Advisory Board. The programme will be achieved through: 1. Coordination activities to integrate and harmonise the current procedures and processes. Strong links will be fostered with the wider community across academia, industry, policy and the general public through outreach, knowledge exchange and training. 2. Support actions to offer a) access to observatory infrastructures to those who do not have such access, and b) free and open data services and products. 3. Joint research activities to innovate and enhance the current capability for multidisciplinary in situ ocean observation. Open ocean observation is currently a high priority for European marine and maritime activities. FixO3 will provide important data on environmental products and services to address the Marine Strategy Framework Directive and in support of the EU Integrated Maritime Policy. The FixO3 network will provide free and open access to in situ fixed point data of the highest quality. It will provide a strong integrated framework of open ocean facilities in the Atlantic from the Arctic to the Antarctic and throughout the Mediterranean, enabling an integrated, regional and multidisciplinary approach to understand natural and anthropogenic change in the ocean.

No. of organisations connected	41
Funding mechanism	EU FP7
Contact	Richard Lampitt, r.lampitt@noc.ac.uk, National Oceanography Centre, UK,
Keywords	data sharing, coordination, in situ observing systems, multidisciplinary, infrastructures,
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive map
http://www.fixo3.eu/	**Additional link(s) to information portal.**

GEOSEAS

European Infrastructure for geophysical and geological data

Established year: **2009**   Expected lifetime: **2013**

The overall objective of the Geo-Seas project is to implement a distributed e-infrastructure of interconnected marine geological and geophysical data centres in Europe. This will facilitate locating, accessing, and delivering federated marine geological and geophysical data and data products from national geological surveys and research institutes in Europe to various user communities through a single common data portal.

Examples of primary datasets and data products that can be delivered by Geo-Seas to the user communities are bathymetric data and digital terrain models, lithological data, sediment grain-size data and geotechnical data. These types of data are important inputs to predictive modelling systems, and environmental monitoring and management networks.

No. of organisations connected	30
Funding mechanism	EU FP7
Contact	Project Coordinator Helen Glaves (hmg@bgs.ac.uk) of NERC-BGS; Technical Coordinator Dick M.A. Schaap (dick@maris.nl) of MARIS.
Keywords	infrastructure, inter-operability, geophysical data, geological data
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	freely accessible for registered users
Predominant information types	Common Data Index (CDI) service
http://www.geo-seas.eu	**Additional link(s) to information portal.**

GreenSeas

Greenseas - Development of global plankton data base and model system for eco-climate early warning

Established year: **2011**   Expected lifetime: **2013**

The GreenSeas project (Development of global plankton data base and model system for eco-climate early warning) aims to advance the knowledge and predictive capacities of how marine ecosystems will respond to global change. This is needed in order to understand the consequences of changes in climate, biogeochemical cycles, and human resource use, and mitigate their impacts on the marine ecosystem. GreenSeas combines observation data, numerical model simulations and cross-disciplinary analysis at ocean basin scales to develop a global, high quality, harmonized and standardized plankton and plankton ecology data inventory and information service. GreenSeas will deliver both contemporary and historical plankton data and information products including error-quantified numerical simulations to scientific users. New plankton data will be collected in the Southern Ocean and a latitudinal transect from the Arctic to the Southern Ocean.

No. of organisations connected	9
Funding mechanism	EU FP7
Contact	Johnny A. Johannessen (johnny.johannessen@nersc.no); Kjetil Lygre (kjetil.lygre@nersc.no)
Keywords	phytoplankton, bacterioplankton; zooplankton; data inventory; information service
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	Copernicus
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	new and histroical plankton data and information products
http://www.greenseas.eu/home	**Additional link(s) to information portal.**

ICES DOME

ICES biological community, contaminants, biological effects and micro plastics

Established year: **1998**   Expected lifetime:

The ICES Data Centre manages a number of thematic datasets that are used for regional assessment by OSPAR, HELCOM, and the EEA

The majority of data – covering the Northeast Atlantic, Baltic Sea, Greenland Sea, and Norwegian Sea – originate from national institutes that are part of the ICES network.

The Database on Oceanographic and Marine Environment (DOME) contains datasets on:

Biological community;

Contaminants and biological effects;

Fish disease;

Marine plastics;

Ocean chemistry.

No. of organisations connected	>100
Funding mechanism	ICES own funding, OSPAR, HELCOM
Contact	Neil Holdsworth, ICES
Keywords	Hazardous substances, micro particles, biological effects of contaminants, fish disease, plankton and benthic
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	none
Links to regional/international organizations	ICES, AMAP, HELCOM, OSPAR, EEA
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive maps, datasets, metadata catalogue
http://ices.dk/marine-data/dataset-collections/Pages/default.aspx	**Additional link(s) to information portal.**

ICES FISHERIES PORTALS

ICES Fisheries dependent and fisheries independent data

Established year: **1904**   Expected lifetime:

ICES is the main scientific advisory body for fisheries in the NE Atlantic, and therefore is a substantial user and collater of information and data in this area

No. of organisations connected	>50
Funding mechanism	ICES own funding, EU H2020, and MoU with European Commission
Contact	Neil Holdsworth, ICES
Keywords	Commercial fisheries, biological and acoustic surveys, catch statistics, eggs and larvae, fish stomach datasets, stock assessment results

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy

US or Canadian partner interactions	yes
Links to regional/international organizations	FAO, EUROSTAT, EU, NEAFC, NAFO
Highest spatial resolution	ICES sub-rectangle
Data and information access	some collections need login, rest are freely accessible
Predominant information types	interactive maps, datasets, metadata catalogue

http://ices.dk/marine-data/data-portals/Pages/default.aspx	**Additional link(s) to information portal.**

ICES MAIN PORTAL

ICES Thematic Data portals gateway

Established year: **2002**   Expected lifetime:

The ICES Data Centre manages a number of large dataset collections related to the marine environment.

The majority of data – covering the Northeast Atlantic, Baltic Sea, Greenland Sea, and Norwegian Sea – originate from national institutes that are part of the ICES network.

The ICES Data Centre provides marine data services to ICES member countries, expert groups, world data centres, regional seas conventions (HELCOM and OSPAR), the European Environment Agency (EEA), Eurostat, and various other European projects and biodiversity portals.

Dataset collections are organized around specific thematic data portals as well as an overarching data warehouse. The current dataset portals provided by ICES are:

Biological community;

Contaminants and biological effects;

Eggs and larvae;

Fish predation (stomach contents);

Fish trawl survey;

Historical plankton;

Ocean physics and chemistry;

Underwater noise;

Vulneable marine ecosystems.

No. of organisations connected	> 200
Funding mechanism	National Contributions to ICES core budget
Contact	Neil Holdsworth, ICES
Keywords	commercial fisheries, biological and acoustic trawl survey, oceanographic, environmental, biodiversity, underwater noise, marine litter, Data Collection Framework

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	ICES, IOC, WOC, FAO, EUROSTAT, EEA
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive maps, datasets, metadata catalogue

http://ices.dk/marine-data/data-portals/Pages/default.aspx	**Additional link(s) to information portal.**

ICES OCEAN

ICES hydrographic datasets

Established year: **1965**   Expected lifetime:

The ICES Data Centre manages a number of thematic datasets that are used for regional assessment by OSPAR, HELCOM and the EEA

The majority of data – covering the Northeast Atlantic, Baltic Sea, Greenland Sea, and Norwegian Sea – originate from national institutes that are part of the ICES network.

The current OCEAN dataset portal provided by ICES contains:

Ocean physics and chemistry;

Nutrients and Chlorophyll a

No. of organisations connected	>150
Funding mechanism	ICES own funding, OSPAR, HELCOM
Contact	Neil Holdsworth, ICES
Keywords	Physical ocean parameters, Chl a, Nutrients
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	yes
Links to regional/international organizations	ICES, IODE, IOC, WOC
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive maps, datasets, metadata catalogue
http://ices.dk/marine-data/data-portals/Pages/ocean.aspx	**Additional link(s) to information portal.**

i-Marine

Data e-Infrastructure Initiative for Fisheries Management and Conservation of Marine Living Resources

Established year: **2011**   Expected lifetime: **2014**

iMarine is an open and collaborative initiative aimed at supporting the implementation of the Ecosystem Approach to fisheries management and the conservation of living marine resources.The data e-infrastructure enables a cost-effective and facilitated retrieval, access, collaborative production, and sharing of information and tools.

By interconnecting all concerned actors operating in different domains around common data, information and multidisciplinary knowledge-building, iMarine facilitates the emergence of a more unified and effective Ecosystem Approach Community of Practice (EA-CoP).

iMarine (Data e-Infrastructure Initiative for Fisheries Management and Conservation of Marine Living Resources) is co-funded by the European Commission, DG Connect Unit, under Framework Programme 7 and involves thirteen international partners. The project was launched in November 2011 and will end in April 2014. The ultimate goal of iMarine is to contribute to sustainable environmental management with invaluable direct or indirect benefits to the future of our planet, from climate change mitigation and marine biodiversity loss containment to poverty alleviation and disaster risk reduction.

iMarine provides an e-infrastructure that facilitates open access and the sharing of a multitude of data, collaborative analysis, processing and mining processing, as well as the publication and dissemination of newly generated knowledge. This is a complex process because it requires coordination with many actors and initiatives across different scientific and operational domains. It is also important to tackle data heterogeneity while relying on a multitude of resources and technologies, some of which are not yet ripe or powerful enough to meet the given requirements.

No. of organisations connected	14
Funding mechanism	EU FP7
Contact	Donatella Castelli (CNRS)
Keywords	sustainable environmental management, data sharing, e-infrastructure, fisheries, marine living resources
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Aquaculture, Biotechnology, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	European Organisation for Nuclear Research (CERN), Food Agriculture Organisation (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), North East Atlantic Fisheries Commission (NEAF)
Highest spatial resolution	unknown
Data and information access	freely accessible for members
Predominant information types	virtual research environments; interactive data catalogues
http://www.i-marine.eu/pages/Home.aspx	**Additional link(s) to information portal.**

INSPIRE

INSPIRE Geoportal - Enhancing access to European spatial data

Established year: **2010**   Expected lifetime:

This European Spatial Data Infrastructure will enable the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe, and assist in policy-making across boundaries. INSPIRE is based on the infrastructures for spatial information established and operated by the Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications. The Directive came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2021.

No. of organisations connected	> 400
Funding mechanism	EU Commission funded via JRC
Contact	Unknown
Keywords	European Spatial Data Infrastructure, environmental spatial information, public sector organisations, public access, Europe, Directive

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing Systems, Aquaculture, Ocean Literacy, Seabed Mapping

US or Canadian partner interactions	none
Links to regional/international organizations	EU, JRC, EEA
Highest spatial resolution	variable
Data and information access	freely accessible
Predominant information types	interactive maps, metadata, web feature and map services
http://inspire.ec.europa.eu/	**Additional link(s) to information portal.**

JERICO

Novel European eXpertise for coastal observaTories

Established year: **2011**   Expected lifetime:

The aim of JERICO is to deliver the building blocks from which a future pan-European network of coastal observatories can be shaped: convergent practices, common standards, and a shared vision of the technical and operational future of coastal monitoring in Europe. The emergence of such a network will also facilitate interactions with and contributions to related initiatives, such as the Pan-European Infrastructure for Ocean and Marine Data Management (SeaDataNet) and the European Global Ocean Observing System (EuroGOOS).

No. of organisations connected	27
Funding mechanism	EU FP7
Contact	Patrick Farcy, patrick.farcy@ifremer.fr
Keywords	pan-European network, observing systems, coastal observations, best practice, infrastructures

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping

US or Canadian partner interactions	none
Links to regional/international organizations	none
Highest spatial resolution	subcountry
Data and information access	freely accessible
Predominant information types	interactive maps, databases

http://www.jerico-fp7.eu/	**Additional link(s) to information portal.**

JRC EMIS

JRC Environmental Marine Information System

Established year: **2010**   Expected lifetime:

The Marine Geoportal EMIS relies on biological and physical variables generated from both hydrodynamic models and satellite remote sensing.

A number of these variables and advanced products are available as raster datasets to the scientific and environmental managerial community through various tools (GIS Viewer, EMIS-R, Marine Analyst, Maps) which enable the user to conduct regional assessments.

Among these datasets are:

Chla: Sea surface Chlorophyll concentration,

SST: Sea Surface Temperature,

Kd490: data discovery.

PAR: Surface Chlorophyll a concentration,

PP: Primary Production,

IOPs: adg, aph and bbp,

No. of organisations connected	
Funding mechanism	EU Horizon 2020
Contact	Nicolas Hoepffner, European Commission, Water Resources Unit
Keywords	geo-portal application, satellites, remote observation, numerical modelling, marine maps, data catalogue, Marine Protected Areas
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	none
Links to regional/international organizations	
Highest spatial resolution	point ? (2km & 4km)
Data and information access	freely accessible
Predominant information types	interactive maps, datasets
http://mcc.jrc.ec.europa.eu/emis/	**Additional link(s) to information portal.**

MARE-ATLAS

Euopean Atlas of the Sea

Established year: **2010**   Expected lifetime:

The European Atlas of the Sea was developed to raise awareness of Europe's oceans and seas, in the context of the EU's integrated maritime policy. The data displayed in the atlas have been collected from European Commission departments, EU agencies, and international organisations. The atlas offers information about Europe's seas, for example, about:

Sea depth and underwater features
Coastal regions geography and statistics
Blue energies and maritime resources
Tide amplitude and coastal erosion
Fishing stocks, quotas and catches
European fishing fleet
Aquaculture
Maritime transport and traffic
Ports' statistics
Maritime protected areas
Tourism
Maritime policies and initiatives
Outermost regions

No. of organisations connected	
Funding mechanism	Internal Commission Service
Contact	Anne France Westyn (DGMARE), The European Commission's Directorate-General for Maritime Affairs and Fisheries (project leader)
Keywords	integrated maritime policy, marine data, range of topics (e.g. Marine Protected Areas, sea depth, Fishing stocks, Human activities)

AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Aquaculture, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	Food and Agriculture Organization (FAO); United Nations Educational, Scientific and Cultural Organization (UNESCO); International Hydrograhpic Organization (IHO); International Aquarium Forum;
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	interactive map (atlas)

http://ec.europa.eu/maritimeaffairs/atlas/index_en.htm	**Additional link(s) to information portal.**

MEECE

Marine Ecosystem Evolution in a Changing Environment

Established year: **2008**   Expected lifetime: **2013**

MEECE is a European FP7 Integrated Project which has increased ecosystem modelling predictive capacities. Furthering knowledge of marine ecosystem processes is vital to improving marine management. MEECE project has gathered experts in the field to develop and create model based tools to support understanding of the current state, and likely future evolution, of European marine ecosystems. The policy driver for this work is the Marine Strategy Framework Directive (2008/56/EC) (MSFD) which requires member states to develop strategies to achieve a healthy marine environment and make ecosystems more resilient to climate change in all European marine waters by 2020 at the latest. The strategies must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes.

A key goal of MEECE is to provide input to the development of innovative tools for assessing Good Environmental Status and to facilitate understanding of the implications and in turn inform strategies for dealing with the effects of change.

Following a logical process starting with targeted data synthesis, experimentation and ecosystem model development, project scientists used advanced ecosystem models forced by a range of scenarios to address the full set of drivers. Information derived from models was then fed into a suite of decision making tools in support of policy and management of the marine environment.

No. of organisations connected	22
Funding mechanism	EU FP7
Contact	Icarus Allen (JIA@pml.ac.uk); Jessica Heard (jessh@pml.ac.uk)
Keywords	tools; assessment; good environmental status; models
AORA/Galway statement relevance	
Ecosystem Approach, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	password required; unclear data access
Predominant information types	models; climate and ecosystem response scenarios
http://www.meece.eu/default.html	**Additional link(s) to information portal.**

NeXOS

The NeXOS Project: Next Generation Web-Enabled Sensors for the Monitoring of a Changing Ocean

Established year: **2013**   Expected lifetime: **2017**

a major challenge is to support the development of a truly integrated and sustainably funded European Ocean Observing System. This will be achieved with more long-term measurements of key parameters but is impaired by the costs and lack of reliability of ocean sensors in general. The NeXOS project aims to improve the temporal and spatial coverage, resolution and quality of marine observations through the development of cost-efficient innovative and interoperable in-situ sensors deployable from multiple platforms, and Web Services for key domains and applications.

This will be achieved through the development of new, low-cost, compact, and integrated sensors with multiple functionalities including the measurement of key parameters useful to a number of objectives, ranging from more precise monitoring and modelling of the marine environment to an improved assessment of fisheries. Seven new compact, cost-efficient senors will be developed, based on optical and acoustics technologies, addressing a majority of descriptors identified by the Marine Strategy Framework Directive for Good Environmental Status. Two of the new sensors will specifically contribute to the Common

Fisheries Policy with variables relevant for an Ecosystem Approach to Fisheries. All new sensors will respond to multiplatform integration, sensor and data interoperability, quality assurance and reliability requirements. These will be specified for each new sensor system. All new sensors will be calibrated, integrated on several types of platforms, scientifically validated and demonstrated. One of the main objectives of NeXOS will finally be to enhance the competitiveness of European SMEs in the ocean sensor market. To this end, sensor requirements and specifications will be assessed at an early phase of the project for market penetration.

No. of organisations connected	21
Funding mechanism	EU FP7
Contact	NeXOS Coordinator: Eric Delory, Deputy Coordinator: Ayoze Castro, Project Manager: Simone Memè. Plataforma Oceánica de Canarias
Keywords	multiplatform integration; sensor interoperability; sensor anti-fouling; acoustic sensors; optical sensors; ecosystem approach to fisheries
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	publications, leaflets, video
http://www.nexosproject.eu/	**Additional link(s) to information portal.**

ODIP

Ocean Data Interoperability Platform

Established year: **2012**   Expected lifetime: **2018**

The Ocean Data Interoperability Platform (ODIP) contributes to the removal of barriers hindering the effective sharing of data across scientific domains and international boundaries. ODIP includes all the major organisations engaged in ocean data management in EU, US, and Australia. ODIP is also supported by the IOC/IODE who participates in its implementation and operation, closely linking this activity with its ODSBP project.

The ODIP platform organises international workshops to foster the development of common standards and develop prototypes to evaluate and test selected potential standards and interoperability solutions.

The ODIP partnership also provides a forum to harmonise the diverse regional systems, while advancing the European contribution to the global system. The products and services developed by ODIP are actively promoted at the international level through IOC/IODE, the Research Data Alliance and GEOSS striving for global interoperability beyond the ODIP partners.

ODIP not only facilitates the dissemination of best practice and the transfer of technology, through the development of international co-operation, it also leads to the application of the results of EU projects to the broader international community. This helps strengthen the role of the EU on the international stage while contributing at the integration and strengthening of the European Research Area (ERA).

No. of organisations connected	37
Funding mechanism	EU Horizon 2020
Contact	Helen Glaves, British Geological Survey, NERC-BGS
Keywords	interoperability of ocean and marine data management infrastructures, data sharing& management, international cooperation
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	Intergovernmental Oceanographic Commission (IODE)
Highest spatial resolution	metadata
Data and information access	freely accessible for members
Predominant information types	documents
	Additional link(s) to information portal.

http://www.odip.eu/content/content.asp?menu=0010000_000000

OPEC project

Operational Ecology Marine Ecosystem Forecasting

Established year: **2012**   Expected lifetime: **2014**

Co-ordinated by Plymouth Marine Laboratory, OPEC will use the EU's Global Monitoring for Environment and Security Marine Service as a framework and feed directly into the research and development of innovative global monitoring products or applications. This in turn will advise policies such as the European Marine Strategy Framework Directive and Common Fisheries Policy, as well as the continued monitoring of climate change and assessments of mitigation and adaptation strategies. The programme will focus on four European regional seas (North-East Atlantic, Baltic, Mediterranean and Black Seas) and plans to implement a prototype ecological Marine Forecast System, which will include hydrodynamics, lower and higher trophic levels (plankton to fish) and biological data assimilation.

Products and services generated by OPEC will provide tools and information for environmental managers, policymakers and other related industries, laying the foundations for the next generation of operational ecological products and identification of knowledge / data gaps.

No. of organisations connected	9
Funding mechanism	EU FP7
Contact	Plymouth Marine Laboratory
Keywords	operational ecology; marine forecast; monitoring
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	
http://marine-opec.eu/default.html	**Additional link(s) to information portal.**

OSPAR-ODIMS

OSPAR Data and Information System

Established year: **2016**   Expected lifetime:

ODIMS is an online tool providing a single point of access to all the data and information gathered through OSPAR's Joint Assessment and Monitoring Programme across the different thematic work areas of the Convention. It will help ensure that data is readily accessible for OSPAR assessments, but also help a broad range of users to find data held by OSPAR, to facilitate access to it and make use of it.

No. of organisations connected	>16
Funding mechanism	Contracting party contributions
Contact	OSPAR Secretariat
Keywords	environmental data, assessment, policy, marine management, hazardous substances, marine litter, human activities, ecosystem, biodiversity, radioactive substances

AORA/Galway statement relevance

Shared Access to Research Marine Infrastructures, Ecosystem Approach, Ocean Literacy, Seabed mapping

US or Canadian partner interactions	none
Links to regional/international organizations	ICES, AMAP
Highest spatial resolution	point
Data and information access	freely accessible
Predominant information types	meta data, catalogues, inventory, datasets

http://odims.ospar.org/	**Additional link(s) to information portal.**

SEADATACLOUD

Pan-European infrastructure for Ocean and Marine data management

Established year: **2016**   Expected lifetime: **2019**

SeaDataCloud is the follow-up project to SeaDataNet (FP6 and FP7); it aims to further the services offered by SeaDataNet and specifically to capitalise on cloud computing and services

No. of organisations connected	56
Funding mechanism	EU Horizon 2020
Contact	Micele Fichaut, IFREMER
Keywords	managing large data sets, in situ observing systems, remote observation, infrastructure network, cloud services

AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES); JOINT RESEARCH CENTER - IES; United Nations Educational, Scientific and Cultural Organization (UNESCO)
Highest spatial resolution	point
Data and information access	85% of data freely acessible for registered users
Predominant information types	databases, catalogues, inventory
http://www.seadatanet.org/	**Additional link(s) to information portal.**

SEADATANET

Pan-European infrastructure for Ocean and Marine data management

Established year: **2006**   Expected lifetime: **2015**

SeaDataNet has developed an efficient distributed Marine Data Management Infrastructure for the management of large and diverse sets of data deriving from in situ and remote observation of the seas and oceans.

Professional data centres, active in data collection, constitute a Pan-European network providing on-line integrated databases of standardized quality.

The on-line access to in-situ data, meta-data and products is provided through a unique portal interconnecting the interoperable node platforms constituted by the SeaDataNet data centres. The development and adoption of common communication standards and adapted technology ensure the platforms interoperability. The quality, compatibility, and coherence of the data issuing from so many sources, is assured by the adoption of standardized methodologies for data checking, by dedicating part of the activities to training and preparation of synthesized regional and global statistical products from the most comprehensive in-situ data sets made available by the SeaDataNet partners.

Data, value added products, and dictionaries serve wide uses: e.g. research, model initialisation, industrial projects, teaching, marine environmental assessment.

No. of organisations connected	56
Funding mechanism	EU FP7
Contact	Micele Fichaut, IFREMER
Keywords	managing large data sets, in situ observing systems, remote observation, infrastructure network
AORA/Galway statement relevance	
Shared Access to Research Marine Infrastructures, Ecosystem Approach, Observing systems, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	yes
Links to regional/international organizations	International Council for the Exploration of the Sea (ICES); JOINT RESEARCH CENTER - IES; United Nations Educational, Scientific and Cultural Organization (UNESCO)
Highest spatial resolution	point
Data and information access	85% of data freely acessible for registered users
Predominant information types	databases, catalogues, inventory
http://www.seadatanet.org/	**Additional link(s) to information portal.**

STAGES

Science and Technology Advancing Governance on Good Environmental Status

Established year: **2012**   Expected lifetime: **2014**

The purpose of the STAGES project has its origins in the research questions addressed in the European Coordination and Support Action "The Ocean of Tomorrow" programme topic (ENV.2012.6.2-5). This topic aims to improve the scientific knowledge base to support the implementation of the Marine Strategy Framework Directive (MSFD). The STAGES project will connect science to policy to help achieve a Good Environmental Status (GES) in marine waters. To achieve this objective, the project will bridge the MSFD science-policy gap and improve the current scientific knowledge base to allow Member States to achieve GES. This involves: Identifying, extracting and synthesising the knowledge generated through EU and national research funded activities relating to the MSFD, and making this information widely accessible to policy makers and MSFD stakeholders. Establishing where further research needs to be conducted to improve the scientific knowledge underpinning implementation of the MSFD. Providing pragmatic and ready-to-use recommendations to establish an effective European science-policy platform to support GES research and implementation of the MSFD.

No. of organisations connected	8
Funding mechanism	EU FP7
Contact	Marisa Fernández Cañamero, Centro Tecnologico del Mar (CETMAR),
Keywords	MSFD; policy; science
AORA/Galway statement relevance	
Ecosystem Approach, Ocean Literacy	
US or Canadian partner interactions	
Links to regional/international organizations	ICES, JRC
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	publications, online tools, leaflets, video
http://stagesproject.eu/	**Additional link(s) to information portal.**

VECTORS

VECTORS of Change in European Marine Ecosystems and their Environmental and Socio-Economic Impacts

Established year: **2011**   Expected lifetime: **2015**

VECTORS was an integrated, multidisciplinary, large-scale European Project which aimed to improve our understanding of how environmental man-made factors are impacting marine ecosystems now and how they will do so in the future. VECTORS has examined how these changes may affect the range of goods and services provided by the oceans, the ensuing socio-economic impacts and some of the measures that could be developed to reduce or adapt to these changes.

No. of organisations connected	31
Funding mechanism	EU FP7
Contact	Plymouth Marine Laboratory: Melanie Austen, Project Coordinator, Jennifer Lockett, Project Manager
Keywords	Ecosystem services; marine management; good environmental status; MSFD; EU Directives; Multi-disciplinary approach
AORA/Galway statement relevance	
Ecosystem Approach, Observing systems, Aquaculture, Biotechnology, Ocean Literacy, Seabed mapping	
US or Canadian partner interactions	
Links to regional/international organizations	
Highest spatial resolution	
Data and information access	freely accessible
Predominant information types	Publications
http://www.marine-vectors.eu/	**Additional link(s) to information portal.**

Catalogue part 2: European Atlantic Coastal states Infrastructure (Data and Information portals)

In this section, each portal or system is presented as a short table grouped by each country.

Belgium

VLIZ	
Flanders Marine Institute	
Funding mechanism	National funding
Host country and geographical scope	Belgium
URL	
http://www.vliz.be/en/measurement-network-flemish-banks	

MUMM	
Mathematical Unit of the North Sea Mathematical Models	
Funding mechanism	National funding
Host country and geographical scope	Belgium
URL	
https://www.naturalsciences.be/en/science/do/538/scientific-research/research-programmes/98	

MEETNETVLAAMSEBANKEN	
Meetnet Vlaamse Banken	
Funding mechanism	National funding
Host country and geographical scope	Belgium
URL	
http://www.meetnetvlaamsebanken.be/	

Marine regions	
Marine Regions Gazetteer	
Funding mechanism	National funding
Host country and geographical scope	Belgium: Global
URL	
http://marineregions.org/	

WoRMS	
World Register of Marine Species	
Funding mechanism	National funding
Host country and geographical scope	Belgium: Global
URL	
http://www.marinespecies.org/	

Denmark

DMI	
Danish Meteorological Institute	
Funding mechanism	National funding
Host country and geographical scope	Denmark
URL http://www.dmi.dk/en/hav/#danmark	

NAUTILUS/SISMER

Nautalis Sismer

Funding mechanism	National funding
Host country and geographical scope	France

URL
http://www.ifremer.fr/sismer/index_UK.htm

Oceanographic Data Portal (France)

Portail des données marines

Funding mechanism	National funding
Host country and geographical scope	France

URL
http://data.ifremer.fr

CORIOLIS

Corolis Operational Oceanography

Funding mechanism	National funding
Host country and geographical scope	France: Atlantic

URL
http://www.coriolis.eu.org/

CERSAT (Satellite observations)

Laboratoire d'Oceanographie Spatiale

Funding mechanism	National funding
Host country and geographical scope	France: Global

URL
http://www.ifremer.fr/cersat/en/data/download/download.htm

EUMETSAT Ocean & Sea Ice Satellite Application Facility

Osi Saf Ocean and Sea Ice

Funding mechanism	National funding
Host country and geographical scope	France: Global

URL
http://www.osi-saf.org/

Mercator Ocean

Mercator Ocean Forecasters

Funding mechanism	Private funding
Host country and geographical scope	France: Global

URL
http://www.mercator-ocean.fr/en/

DOD (German Oceanographic Data Centre)

German Oceanographic Data Centre

Funding mechanism	National funding
Host country and geographical scope	Germany

URL
http://www.bsh.de/en/Marine_data/Observations/DOD_Data_Centre/index.jsp

Geoseaportal

GeoSeaPortal

Funding mechanism	National funding
Host country and geographical scope	Germany

URL
http://www.bsh.de/de/Meeresdaten/Geodaten/index.jsp

MDI

Marine Data Infrastructure

Funding mechanism	National funding
Host country and geographical scope	Germany

URL
www.mdi-de.org

COSYNA

COSYNA - Coastal Observing System for Northern and Arctic Seas

Funding mechanism	National funding
Host country and geographical scope	Germany: Atlantic, Arctic

URL
http://www.hzg.de/institutes_platforms/cosyna/index.php.en

Deutscher Wetterdienst (DWD)

German weather service

Funding mechanism	National funding
Host country and geographical scope	Germany: Global

URL
http://www.dwd.de/

PANGAEA

Publishing Network for Geoscientific & Environmental Data

Funding mechanism	National funding
Host country and geographical scope	Germany: Global

URL
http://www.pangaea.de/

Marine Institute Data Portal

The Marine Institute Data Portal	
Funding mechanism	National funding
Host country and geographical scope	Ireland
URL http://data.marine.ie/	

Marine Institute Data Centre

Marine Institute Data Centre	
Funding mechanism	National funding
Host country and geographical scope	Ireland
URL http://www.marine.ie/Home/site-area/data-services/marine-data-centre	

Digital Ocean

Ireland's Digital Ocean	
Funding mechanism	National funding
Host country and geographical scope	Ireland
URL http://www.digitalocean.ie/	

NODC /The Netherlands

National Oceanographic Data Centre

Funding mechanism	National funding
Host country and geographical scope	Netherlands

URL

http://www.nodc.nl/

Rjkswaterstaat

Rijkswaterstaat Ministerie van Infrastructuur en Millieu

Funding mechanism	National funding
Host country and geographical scope	Netherlands

URL

http://www.rws.nl/water/waterdata-en-waterberichtgeving/waterdata/index.asp

IMR Data Centre

Institure of Marine Research National Oceanographic Data Centre

Funding mechanism	National funding
Host country and geographical scope	Norway

URL
http://www.imr.no/forskning/forskningsdata/en

NMDC

Norwegian Marine Data Centre (Connecting ca. 20 data disseminating institutes)

Funding mechanism	National funding
Host country and geographical scope	Norway

URL
htttp://nmdc.no/

Norwegian Meteorological Institute

Meteorologisk Institutt

Funding mechanism	National funding
Host country and geographical scope	Norway

URL
http://www.met.no/English/Ocean_and_Ice/

MAREANO

Marine areal database for Norwegian waters

Funding mechanism	National funding
Host country and geographical scope	Norway: Barents sea, Norwegian sea

URL
http://www.mareano.no/en

BarentsWatch

Comprehensive monitoring and information system for large parts of the world's northern seas

Funding mechanism	National funding
Host country and geographical scope	Norway: Barents sea, Norwegian sea, Arctic

URL
https://www.barentswatch.no/en/

Portuguese Hydrographic Monitoring Network

Portuguese Hydrographic Monitoring Network	
Funding mechanism	National funding
Host country and geographical scope	Portugal
URL	
http://www.hidrografico.pt/previsao-mares.php	

Bóias Ondógrafo

Wave measurements	
Funding mechanism	National funding
Host country and geographical scope	Portugal
URL	
http://www.hidrografico.pt/boias-ondografo.php	

World Data Center (WDC) for Oceanography (Russia)

All-Russian Research Institute of Hydrometeorological Information - World Data Center

Funding mechanism	
Host country and geographical scope	Russia: Global
URL http://meteo.ru/mcd/ewdcoce.html	

Spain

IEO	
Spanish Institute of Oceanography	
Funding mechanism	National funding
Host country and geographical scope	Spain
URL http://www.ieo.es/en/home	

Puertos del Estado	
Puertos del Estado	
Funding mechanism	National funding
Host country and geographical scope	Spain
URL http://www.puertos.es/en-us	

BODC

British Oceanographic Data Centre

Funding mechanism	National funding
Host country and geographical scope	UK

URL
http://www.bodc.ac.uk/data/online_delivery/nodb/

MEDIN

Marine Environmental Data and Information Network

Funding mechanism	National funding
Host country and geographical scope	UK

URL
http://www.oceannet.org/

NEODAS: Satellite data

Neodas Satellite Images

Funding mechanism	National funding
Host country and geographical scope	UK: Atlantic

URL
http://www.sat.dundee.ac.uk/freeimages.html

AMT

Atlantic Meridional Transect

Funding mechanism	National funding
Host country and geographical scope	UK: Atlantic

URL
http://www.amt-uk.org/

PSMSL

Permanent Service for mean sea level

Funding mechanism	National funding
Host country and geographical scope	UK: Global

URL
http://www.psmsl.org/

RAPID-MOC

Meridional Overturning Circulation, part of the RAPID service

Funding mechanism	National funding
Host country and geographical scope	UK: North Atlantic

URL
http://www.rapid.ac.uk/

CPR

Sir Alistair Hardy Foundation (SAHFOS) Continuous Plankton Survey

Funding mechanism	National funding
Host country and geographical scope	UK: North Atlantic
URL http://www.sahfos.ac.uk	

Porcupine Abyssal Plain (PAP Site)

National Oceanography Centre	
Funding mechanism	National funding
Host country and geographical scope	UK: North Atlantic
URL http://noc.ac.uk/pap	

Annex 1: full tables and graphs for European catalogue for the Knowledge Sharing Platform

Embedded spreadsheet – click on icon below

European-inventory-NOVEMBER-2016(1).x

Acknowledgements

This Report was produced by the Atlantic Ocean Research Alliance Co-Ordination and Support Action.