

# EMSO implementation and operation: DEvelopment of instrument module

## EGIM AND EGIM SOFTWARE PACKAGE USERS D8.2

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## 1. EXECUTIVE SUMMARY

Blue Growth is the long term strategy of the European Union to support sustainable growth in the marine and maritime sectors as a whole which have great potential for innovation. Work Package 8 (WP8) is EMSODEV's contribution to achieving the goals of the Europe 2020 strategy for smart, sustainable and inclusive growth.

The key objective and challenge for WP8 is to identify and set up activities to increase the potential for innovation of EMSODEV technological output and thus contribute to increase the innovation potential of the EMSO observatories. While many of the deep sea observatory projects have typically focussed on the science drivers behind ocean observation, it is increasingly important that commercial contributions to promising areas are fully developed. This deliverable is focused on identifying and implementing products and services relating to the EGIM in niche sectors with a high potential to impact in areas of innovation relating to the EGIM. The scope is to identify and demonstrate how the EGIM and associated software package can complement and add value to some targeted communities and stakeholders.

This deliverable reports on the results of investigation to identify niche, high value sectors for EMSO-Dev to exploit through development and delivery of the EGIM. The methods of investigation included review of market studies, trade journals and directories (e.g. Sea Technology, International Ocean Systems, Marine News, Environmental Coastal and Offshore, Ocean News and Technology, Maritime Journal, Ocean Enterprise: A Study of US Business Activity in ocean measurement, observation and forecasting, etc), attendance at marine conferences (Ocean Business 2015, Oceanology 2016, SeaTech Week 2016, Oceans of Knowledge (IMarEST), Our Ocean Wealth 2016), attendance at and organisation of workshops (Innovation Meets Industry Oceanology 2016, NERC Decommissioning Brokerage Event 2016, ESA EO4 Earth Observation for Oil and Gas Workshop), consultation with maritime clusters (Pole Mer, IMERC, Maritime UK, Marine South East, DLTM), and feedback from Trans National Access Applications to ocean and coastal observatory infrastructure.

The results of the investigation confirm that there are niche market opportunities for EGIM primarily in environmental monitoring for the oil and gas, marine renewable energy, deep sea mining, ports and harbours, aquaculture, insurance and defence sectors. There are two types of tier 2 companies that are potential customers for EGIM – providers of infrastructure for ocean observation, measurement or forecasting (e.g. Kongsberg, Fugro, AXYS Technologies, ALSEAMAR, 4H Jena Engineering, 2H Offshore, Gardline, TechWorks Marine) and integrators that make use of ocean observations as an input to the creation or enhancement of value added information products in the support of specific end users (e.g. CLS, OceanWise, Deltares, RPS, ERM, SLR). These tier 2 companies provide data, data products and services to tier 1 companies in the various sectors described above. Examples of tier 1 companies include Shell, BP, Statoil, Total, Dong, Alcatel, Technip, Munich Re, Bouygues Travaux Public, ERAMET, Nautilus Minerals Ltd, Qinetiq, and Ferme Marine de Campomoro.

The recommendations based on these findings is that a representative selection of these tier 2 providers of infrastructure and integrators will be invited to future workshops to identify the associated functionality and additional services to be added to the EGIM generic sensor package to meet the needs of these niche high impact industry sectors. The results will feed into Task 8.4 and D8.4, the Exploitation Plan.

## 2. INTRODUCTION

EGIM is defined as a module able to operate from any EMSO node, hosting a standard set of sensors providing measurements of core parameters (temperature, conductivity, pressure, dissolved O<sub>2</sub>, turbidity, ocean currents and passive acoustics) plus one or several additional sensors providing measurements of further generic variables of interest (including pCO<sub>2</sub>, pH, pCH<sub>4</sub>, Chlorophyll a, and imagery). EGIM will be able to host new sensors in the future that are currently unavailable to meet present and future science requirements.

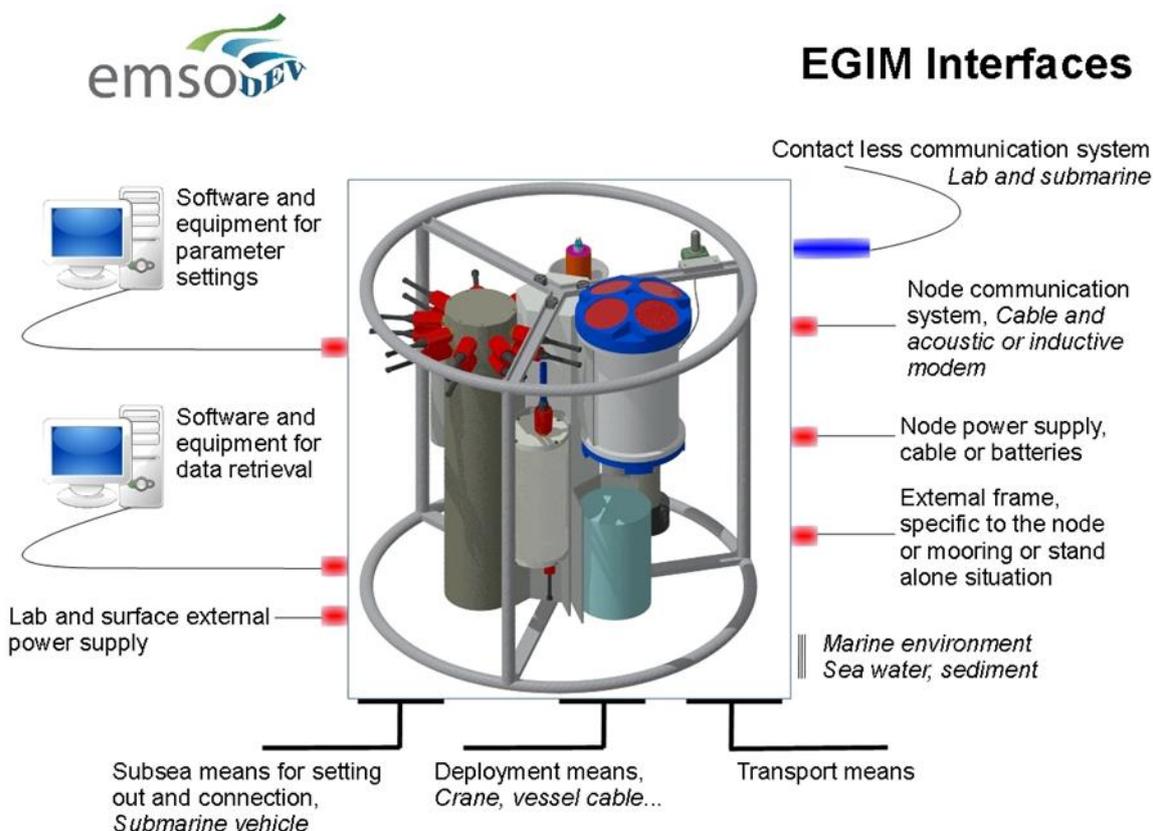


Figure 1 EGIM concept with general interfaces

While a large number of business sectors have been identified as potential end users of ocean observatory data it is important that near to mid-term opportunities to commercialise ocean observatory technology are exploited early. This report demonstrates how the EGIM and associated software package can deliver added value products and services to niche end users who are already advanced in their service delivery and have identified markets and specific customers for ocean observatory data, data products and services that can be delivered by EGIM.

### 3. METHODOLOGY AND FINDINGS

Previous studies as part of ESONET, FixO<sub>3</sub>, NeXOS and Jerico identified a large number of potential end users of ocean observatory data. This task 8.2 user profiling identifies the niche sectors and associated companies that present near and mid-term opportunities for EGIN to deliver data, products and services. Using the list of commercial sector contacts identified in D5.1 of FixO<sub>3</sub> and the EGIN concept design SLR consulted trade journals (e.g. Sea Technology, International Ocean Systems, Marine News, Environmental Coastal and Offshore, Ocean News and Technology, Maritime Journal etc) to identify invitations to tender and contract awards by companies that were relevant to ocean observation products and services. This gave an indication of the active market sectors and potential target companies.

*Table 1 List of Relevant Contract Awards*

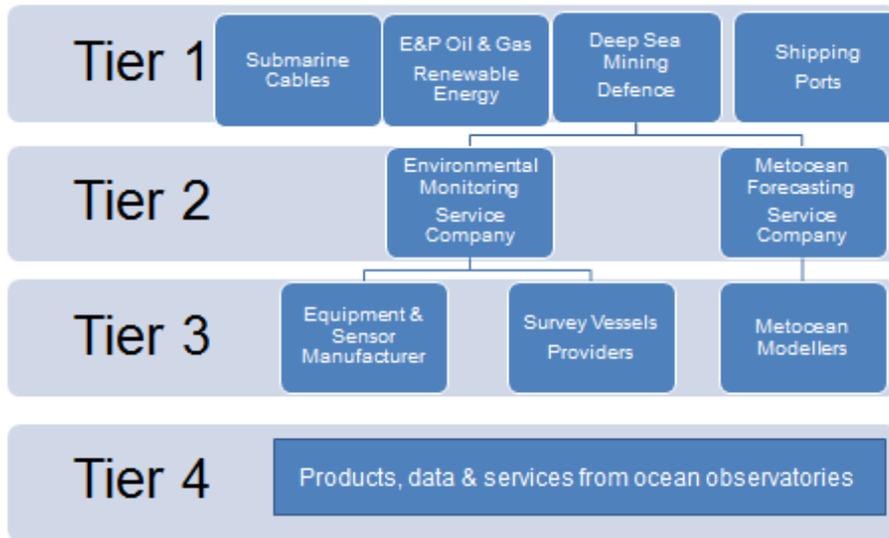
<b>Contracting Entity</b>	<b>Main Activity</b>	<b>Description of Equipment &amp; Contractor Services</b>	<b>Contractor</b>
<b>UK Maritime and Coastguard Agency</b>	Surveying, hydrographic, oceanographic and hydrological instruments and appliances	Survey computers, on-line survey software, multibeam processing software, seabed classification software, network server and removable storage device, velocity dips, tidal observation equipment, land survey equipment (for establishing tide stations)	NetSurvey Ltd
<b>European Commission, Directorate-General for the Environment, SRD.2</b>	Assisting the European Commission in setting up a Web-based European clearing house enhancing information structuring and sharing on climate change	Developing the concept, functionalities, scope, information sources, data structure and Web user interface of the clearing house, on the basis of a concept note drafted by the European Commission;	Alterra — Stichting Dienst Landbouwkundig Onderzoek
<b>Brazilian Naval Commission (BNC)</b>	National Navy	Supply of three oceanographic and meteorological data collection buoys	AXYS Technologies, Inc.
<b>Chevron North Sea Ltd</b>	Oil Exploration Company	900m mooring comprising a combination of TRDI 75kHz Longranger ADCP, several Nortek Aquadopp single point current meters and an RBR water level recorder	Metocean Services International
<b>U.S. Naval Facilities Engineering</b>	Marine Renewable	Develop critical system components and designs for an OTEC pilot plant,	Lockheed Martin

<b>Contracting Entity</b>	<b>Main Activity</b>	<b>Description of Equipment &amp; Contractor Services</b>	<b>Contractor</b>
<b>Command</b>	Energy	which leverages the temperature difference between warmer water at the ocean's surface and colder water below to produce clean power.	
<b>Far Eastern Regional Hydrometeorological Research Institute (FERHRI)</b>	Research Institute	Production and delivery of Tsunami Buoy (STB) system	Science Applications International Corporation
<b>MeyGen Limited</b>	Marine Renewable Energy	Conducting both baseline and operational noise measurements from prototype tidal devices to assess the potential effects of underwater noise on marine life	Kongsberg Maritime Ltd
<b>US Department of Defence</b>	Defence	Engineering services, repair and training support for the Navy's MK18 unmanned underwater vehicle family of systems.	Hydroid Inc
<b>Pacific Marine Environmental Laboratory (PMEL). NOAA</b>	Marine Renewable Energy	Provide acoustic release transponders and associated equipment	EdgeTech
<b>PEMEX</b>	Oil Exploration	Ultra deep water geotechnical and pilot hole (drilling and logging)	Fugro
<b>Statoil</b>	Oil Exploration	Seabed engineering, trenching, cable laying etc for permanent reservoir monitoring	DeepOcean UK, Ltd

It is clear from the list of contract awards above that the public sector is a major funder of ocean observation activities. The public sectors include research and defence including naval defence. If we exclude the public sector, **marine renewable energy** and **oil exploration** are the major tier 1 companies that are currently funding ocean observation activities.

A review of market survey reports indicates that there are now companies emerging who can best be described as “integrators” or “intermediaries” who make use of ocean observations as an input to the creation or enhancement of value added information products in the support of specific end users (e.g. CLS, OceanWise, Deltares, RPS, ERM, SLR). These are tier 2 service companies engaged in marine environmental monitoring and metocean forecasting (Figure 2). The providers of infrastructure for ocean observation, measurement or forecasting (e.g. Kongsberg, Fugro, AXYS Technologies, ALSEAMAR, 4H Jena Engineering, 2H Offshore, Gardline, TechWorks Marine) are tier 3 companies. The EGIM fits at tier 4 delivering products data and services to tier 3 and tier 2 companies that ultimately supply the tier 1 companies. The tier 1 end users companies for ocean observatory products and services, identified from market survey reports, operate in the following sectors shipping, ports, defence, submarine cables, deep sea mining, offshore oil and gas exploration and production, offshore renewable energy, fisheries/aquaculture and tourism. However our review

of contract awards identifies **marine renewable energy** and **oil exploration** as the major tier 1 companies that are currently funding ocean observation activities.



*Figure 2 Simplified Supply Chain Diagram for Ocean Observatory Products & Services*

A number of market survey reports were consulted, ERISS Corporation 2016 and Society of Marine Industries 2015, to verify the findings from contract awards and identify the market sectors where ocean enterprise companies are winning business. The marine science and technology business contributes £2 billion per annum to the UK economy, with more than a third of this in exports, and delivers into a number of market sectors (Society of Marine Industries, 2015). In the USA business activity in ocean measurement, observation and forecasting is worth \$7 billion per annum (ERISS Corporation, 2016). Ocean observatory products and services are targeting this market. There are many customers for these products and services in ocean measurement, observation and forecasting but **environmental monitoring** comes out on top (Figure 3).

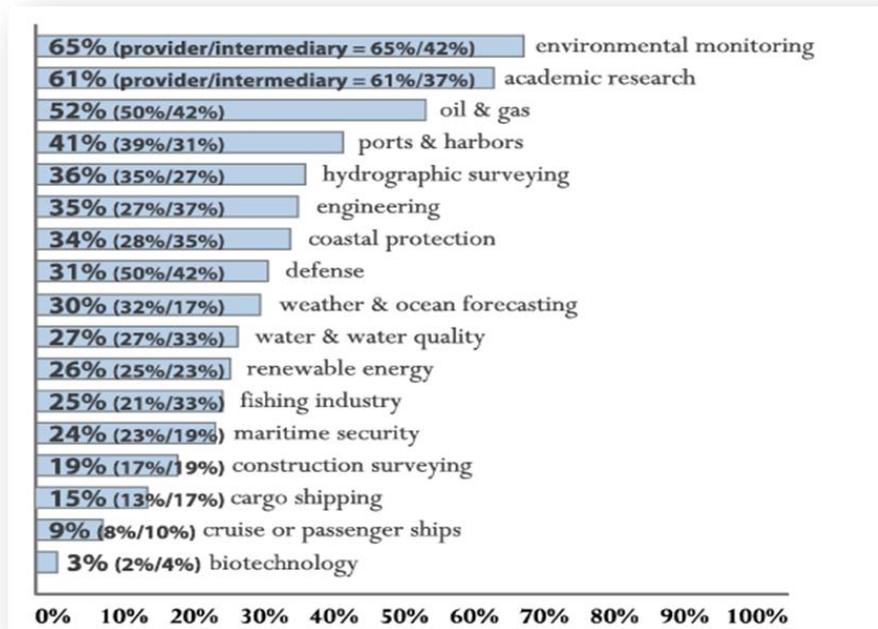


Figure 3 Market Sectors (from ERISS Corp 2016)

Given government GHG emission reduction targets, particularly since the COP21 Paris meeting, and the acknowledgement by citizens that climate change is a societal challenge, companies must safeguard and future proof their marine operations through rigorous environmental monitoring. They need to understand better the marine environment in which they operate and mitigate any adverse environmental impacts that their operations cause.

SLR conducted a number of workshops with end users to develop the business case for ocean observatories. Fifty eight (58) people attended the “Innovation Meets Industry” workshop and twenty three (23) people attended the “Technology Cluster Workshop” at Oceanology International in March 2016. Two main business drivers were identified:

- de-risking commercial operations in the marine sector by improving metocean and climate change modelling and
- developing new cost effective sensors, power systems, high bandwidth communications, data processing and data interpretation.



*Figure 4 Attendance at Innovation Meets Industry Workshop 15th March 2016*

The workshop identified how the existing observatories and the EGIM can help marine sector business by providing:

- data that de-risks marine operations;
- standardisation and interoperability that reduces costs; and
- test beds to obtain cost effective technology qualification.

The target market within the marine science and technology business for the EGIM is ocean environmental monitoring. The key segments within that sector are Autonomy & Sensors (sensor technologies, biofouling & robotics) and Marine Information & Computing Technologies.

The cost benefit of environmental monitoring is that it will reduce a project lifecycle by supporting regulatory compliance and therefore deliver early revenue in, for example, oil and gas offshore operations, aquaculture, port development and offshore renewable energy generation. Environmental monitoring will also be an enabler to access new resources in deep water including the Polar Regions and the Pacific.

#### **4. RECOMMENDATIONS**

The recommendations based on these findings is that

- A selection of tier 2 companies targeting environmental monitoring companies will be made from the Oceanology International 2016 Event Catalogue of Exhibitors, the Ocean Business 15 Show Catalogue following consultation with the existing marine cluster organisations PoleMer, IMERC, Maritime UK, DLTM, and Marine SE.
- EGIM will be demonstrated to the selected tier 2 environmental monitoring companies at Ocean Business 2017 in April 2017 at Southampton
- a representative selection of these tier 2 providers of infrastructure and integrators will be invited to future workshops to identify the associated functionality and additional services to be added to the EGIM generic sensor package to meet the needs of these niche high impact industry sectors.
- The results will feed into Task 8.4 and D8.4, the Exploitation Plan.