



EMSO ERIC ANNUAL REPORT 2018



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EXECUTIVE SUMMARY

This Annual Report covers the EMSO ERIC activities in the period 1 January - 31 December 2018 and the major achievements.

The European Multidisciplinary Seafloor and Water Column Observatory (EMSO) is a European Research Infrastructure Consortium (ERIC) founded as of on 1 October 2016, becoming an international organization with its own legal status and Statutes published on the Official Journal of the European Union L268/113. EMSO ERIC as distributed research infrastructure is promoting scientific excellence, coordinating and integrating European deep-sea observation facilities that provide interdisciplinary scientific investigations in marine geology, geophysics, physical oceanography, marine meteorology, geochemistry, biochemistry and linked topics.

EMSO ERIC mission aims at launching a new type of large-scale infrastructure that delivers high-quality data with unprecedented time resolution to understand the Global Marine Environmental Challenges of the 21st century.

The nomination of the Director General (DG), occurred in October 2017, signified a remarkable landmark and acceleration factor of the ERIC management and organization activities. In fact, the DG outlined the 1st ERIC strategic plan (2018-2020). The full implementation of EMSO's governance structure and bodies was among the first actions developed by the DG, with particular focus on broadening the Advisory Board from an initial nucleus, and the Executive Committee. In addition, the DG completed the transition from the EMSO Eric Interim Office to the current Central Management Office (CMO).

The strengthening of the links and collaboration with other international Research Infrastructures and initiatives, mainly ONC Canada and European, like EuroGOOS and EMBRC organizations has significantly marked the year 2018, in terms of the visibility and opening of solid collaborations in the marine environmental sector.

The construction of the Science and Technology Plan was launched, and the content of the different services to be delivered, data, science, engineering and logistics, in addition to communications and access to the observatory infrastructure.

Being the service provision to scientific users and stakeholders of paramount importance in supporting the science of excellence, the main categories of Scientific Services were identified as part of the EC EMSO-Link project. The design and implementation of the services of engineering and logistics started building the service components with the promotion of best practices in ocean observation platforms design and operation, which provided important elements for the construction of the EMSO Label framework.

The EC EMSODEV project has supported the completion of the overall framework for the ERIC data management through the design and implementation of the core of the EMSO ERIC Data Management Platform (DMP). In addition the project supported the construction and testing also in real conditions of the first prototype and two replications of the EGIM(EMSO Generic Instrument Module) multi-sensor platform.

1. GOVERNANCE

ORGANISATION

The finalization of the EMSO ERIC Governance was an essential part of the activities carried out in 2018.

The basic bricks of the EMSO infrastructure are the Regional Facilities (RF) that each Member Country has offered to the ERIC through the Representing Entities and relevant national research organisations. The staff managing the RFs constitute the Regional Teams (RTs), one for each RF.

The ERIC governance is intended to reflect the distributed setting of the infrastructure, which relies upon the skill and the effort of the RTs charged with the operation of the EMSO ERIC RFs and the provision of the services. Accordingly, each RT is represented by a Regional Team Leader (RTL) in the EMSO Executive Committee (ExCom). Being the service provision an EMSO ERIC fundamental function, the ExCom includes also the Service Group Leaders, who are the representatives of each EMSO ERIC Service Group. The Service Groups are technical teams tasked with the design and implementation of the Services¹; each RT appoints its member to each SG and SG Leaders (SGLs). RTs are in charge of running the EMSO ERIC RFs and coordinating the research activities. Hence, they carry out the operational activities of EMSO ERIC. The service function, deriving from the operational activities carried out by the Regional Teams, is provided by EMSO ERIC SGs in order to produce data, technology, expertise and scientific research that is relevant to environmental policies and ensure that the RI has a positive socio-economic impact, in accordance with the EMSO ERIC core mission. The integration of activities carried out by RTs and SGs constitute part of the value proposition for EMSO ERIC and it impacts on its sustainability.

The DG devoted part of management work of the year to set up and start the operation of this organization. The first ExCom meeting was organised and chaired by the DG on April 8th, 2018.

The SGLs of the first SGs established (Science, Engineering and Logistics and the Communications) provided a fundamental contribution to the EMSO ERIC Work Programme 2019.

The set up Central Management Office (CMO) was an important objective of the DG management work in 2018. The structure of the CMO reflects the main function of the ERIC:

- Strategic planning.
- Coordination and operation (including the coordination support to the SGL and the RTL).
- Administration.

The Long-term Strategic Plan 2018-2020 and the first EMSO ERIC Work Programme (Work Programme 2019) were finalized in 2018. The Work Programme integrated the activities of the SGs and the Central Management Office (CMO) with those of the funded projects, in particular with EMSO-Link (INFRADEV-3, Implementation project), resulting in a harmonized and robust plan to pursue EMSO ERIC vision and to optimize the use of the resources. The 80% of activities and of the funding were directed to the development of the EMSO ERIC services.

¹ From the Statutes: SGs are "organisational units located in one or more countries that are tasked with specific activities of transversal interest"

Several initiatives aimed at leveraging the added-value to the EMSO RFs have been launched in 2018 and run in the following years. The value creation chain is based on a 3-phase approach:

- 1- Build a detailed informative picture of the RFs' observing capabilities, resources and services.
- 2- Identify strengths and weaknesses, and point out the gaps.
- 3- Develop and implement strategic goals leveraging the value of the RTs and overcoming the gaps.

Respect to phase 1, the RF mapping work started In October 2018 in order to support the service design in agreement with local and EMSO ERIC needs, and to enhance the current capabilities of the RFs by the integration and harmonization of the EMSO efforts across the facilities.

The CAPEX and the OPEX of the RI was updated, starting with the collection of the financial information from the RF operators and a detailed analysis of the expenditures of the EMSO SmartBay RF. This study provides an initial assessment of the CAPEX and OPEX for each of the EMSO ERIC RFs. This information was used to update the EMSO ERIC Business Plan.

In 2018 the EMSO ERIC DG gave a great impulse to strengthening coordination and co-operation with key EU and International actors.

The signature of the first Memorandum of Understanding (MoU), took place on May 7th, 2018, between Ocean Networks Canada (ONC) and EMSO ERIC (Figure 1). This MoU has further strengthened the collaboration between Canada and the EU's leading ocean observing research infrastructures. The MoU formalizes the already close collaborative relationship between ONC and EMSO ERIC at both strategic and working level, focusing on the further development of common data access methodologies, sharing of knowledge and best practices, personnel exchanges and joint training to foster ocean research excellence, with a special focus on cooperation in marine polar regions.



Figure 1 Signature of the MoU EMSO ERIC - ONC



Figure 2 Signature of the MoU EMSO ERIC - EuroGOOS

In November 2018, EMSO ERIC signed also a MoU with EuroGOOS (Figure 2) to strengthen partnership in promoting the European ocean observing efforts. Cementing the already ongoing collaboration, EuroGOOS and EMSO agree to jointly coordinate the EuroGOOS Task Team on ocean observing fixed platforms, strengthening the oceanographic research cooperation within the EOOS framework. The organizations will also jointly promote and contribute to a sustained in situ component of the Copernicus Marine Service and support the development of common operational data procedures and services, including data quality control and management.

The MoU with the European Marine Biological Resource Centre (EMBRC ERIC) was signed in December 2018 (Figure 3) to strengthen the collaboration in ocean science and technology between two Landmark European Marine Research Infrastructures in the ESFRI portfolio of world-class Research Infrastructures for EU research excellence and competitiveness.



Figure 3 Signature of the MoU EMSO ERIC - EMBRC ERIC

The DG boosted the connection with the Atlantic Ocean initiatives, also with the active participation to the Belém All-Atlantic Research Forum, held on 23-24 July 2018 in the city of Salvador, Bahia, Brazil. This event advanced the implementation of the Belém Statement and was an excellent opportunity for EMSO to discuss and plan cooperative research and innovation activities with the Atlantic Ocean Research Initiatives.

OPERATION

Services design and implementation

Science Services

Preparatory actions to build the new Science and Technology Plan were put in place in 2018, starting from the RFs. Four themes have been identified for developing Science Services as part of EMSO-Link (Geo-hazards, Operational Climate and Oceanography, Statutory Monitoring such as MSFD and integrative research). A few of the RFs provide services and data products through their own national data centres. EMSO can add value to these observations through services added at the EMSO level. This is achieved through a series of activities as outlined in this report:

- 1) Communication of data availability and standards to stakeholders.
- 2) Provision of data products and multi-node science services (Building time-series datasets).
- 3) Building synergies with other research infrastructures.
- 4) Enabling access to the infrastructure.

For each RF, the science/technology drivers, the current observation capability as well as the planned science and technology activities were depicted. This information aims to support in drawing a plan for science and technology at the RI level.

An important first step toward the science services roadmap was to identify and document the existing observatory infrastructure. The document “*A vision for EMSO Science Services and improving infrastructure access*” describes key science themes around which EMSO can develop its first set of Science Services. This recognizes several other European and international efforts that can benefit from data coming from EMSO and the ongoing ocean observing efforts around the EMSO members. Figure 4 describes the conceptual consideration of the potential Science Service workflow and value chain.

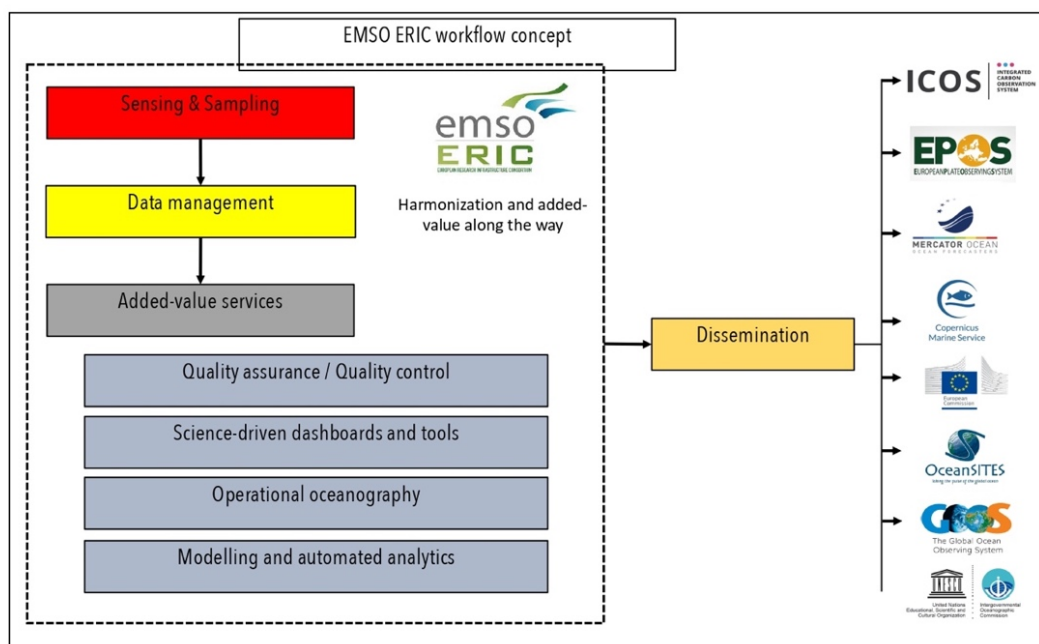


Figure 4 Conceptual consideration of the potential Science Service workflow and value chain

The current capacity of the EMSO RTs in terms of what is being measured, how and where is summarized in a matrix of the capabilities. The inventory of EMSO infrastructures and sensors reveals that the system covers a wide range of environmental settings and habitats across a wide range of GOOS-Global Ocean Observing System - EOVs. At the same time gaps were also revealed in the area of harmonizing the collection of variables across the EMSO RFs, such as between water column and seafloor settings. This document was presented at the first EMSO ERIC Science Service Group (SSG) meeting (September 5th, 2018) to enable the group to begin the planning for future SSG activities.

Engineering and Logistic services

The EMSO ERIC Engineering and Logistic services continued to be developed in 2018, the result of this huge work will be achieved in 2020.

Calibration bench for dissolved oxygen sensors

Different calibration reports (Aanderaa, MIO and IFREMER Metrology Lab.) were studied to select the most appropriate multipoint calibration for all EMSO ERIC dissolved oxygen (DO) sensors. This procedure dedicated to EMSO ERIC is associated with recommendations for the configuration of the sensors before deployment (e.g., salinity compensation, 0-100% *in situ* calibration) and recommendations for the application of corrections to the acquired data in case of sensor drift (post-processing).

The design of the calibration bench for DO sensors was approved. The selected design presents the advantage of reaching high temperature accuracy/precision, which also allows the calibration of temperature sensors (e.g., CTD-ODO). Following the optimization, the orders for the bench parts were sent and the bench monitoring software (Labview) was programmed. The installation of a customized software on the bench was also carried out. This work will continue until good functioning of the bench.

Handbook of best practices

Identifying and promoting best practices in ocean observatories design and operation is a continued effort of EMSO ERIC. The data recorded by each RF must be comparable by using harmonized procedures of sensor calibration and deployment, so that the distributed EMSO Infrastructure provides a synoptic and global view of phenomena of interest at pan-regional scale and a coherent and easy access to the data. To this end, the EMSO ERIC handbook of best practices was initiated, starting from several results achieved by past EU projects. The field is wide and EMSO ERIC chose to focus on three areas up to 2020:

- Metrology and calibration,
- Sensor Web Enablement,
- Underwater intervention on subsea observatories.

In 2018 dedicated sessions were organized at the Workshop on "Interoperability Technologies and Best Practices in Environmental Monitoring", jointly organized by EMSO ERIC, JERICO-Next, AtlantOS and ENVRI-PLUS in Brest, 10-12 October 2018. This resulted in the first two chapters of the handbook, the first on metrology and calibration and the second on the Sensor Web Enablement. The recommendations aimed at implementing EMSO ERIC data quality standards throughout the whole chain of *in situ* measurement data acquisition, aiming at bringing data quality to its highest level thus conforming to EMSO ERIC data quality standards. Detailed recommendations ranging from the choice of sensor to data quality control procedures, going through all sensor implementation steps, before, during and after deployment were defined, and clear guides on how to arrange sensor data and metadata in a standardized fashion using the Sensor Web Enablement framework was detailed.

Data management services

The data management activities in 2018 focused on the final stages of the development of the data management platform baseline and tools associated with it. The key activities also include the integration of the EGIM (EMSO Generic Instrument Module) with the data management platform, e.g., interface and tools to make EGIM data retrievable, viewable and analyzable were tested in case of an EGIM in "stand-alone" configuration and eventually implemented needed updates. More specifically, the data management platform was validated against the EGIM prototype and the Sensor Observation Service (SOS) deployed at EMSO OBSEA RF located offshore Vilanova i la Geltrú (Barcelona, Spain) at 20-m depth.

Sensor Observation Service (SOS Server)

It was required the implementation of a Sensor Observation Services (SOS) interface to write/read data from the EGIM. Specifically, SOS provides a standardized interface for managing and retrieving metadata and observations from complex sensor systems. SOS provides a broad range of interoperability for discovering, binding and querying individual sensors, sensor platforms, or sensors networked constellations in real-time, archived or simulated environments.

At this aim, the 52° North SOS implementation (version 4.x) has been chosen. The main characteristics are the following:

- it is an Open Source tool;

- the SOS offers the feature to register sensors by submitting a metadata document describing the sensor to the server, thus, the SOS can be used as an archive for the SensorML files describing the sensors developed and deployed in EGIM;
- enrichment of sensor descriptions with observed features, keywords, offerings, and other additional resources;
- observations assigned to observation offerings, i.e. groups of observations retrieved as a whole or sub-settled using spatial, temporal or thematic filters;
- complex observations (e.g., time series at a monitoring station representing different phenomena such as salinity, surface temperature) are retrieved using different spatial, temporal or thematic filters and also combinations of these filters;
- the SOS can be easily set up on top of existing observation databases to provide standardized web-based access;
- full support for transactional interface profile and, to insert many observations using a single request. Similarly, many observations are combined into a compact single complex observation;
- the SOS is equipped with an administration Graphical User Interface (GUI);
- the SOS has an installer with a GUI to configure the database connection, create a database model, and set up the configuration.

52° North SOS implements a RESTful SOS API for accessing observations in a RESTful way. The implementation is based on a plug-in to the SOS that enables the understanding of another protocol. The SOS RESTful Extension provides the means for accessing and manipulating SOS resources (i.e., observations, capabilities, offerings, sensors, and features) in a RESTful way - that means plain HTTP methods (GET, DELETE, POST, PUT) are used to interact with those resources.

In the case of a “cabled” EGIM, observation and monitoring data will be continuously sent to the SOS server. In the server where the SOS server runs, a software agent will be in charge of translating the observation data into three types of XML files (SOS data files) and then send it to the data management platform before they get consolidated within the SOS server.

On the other hand, in the case of a “not cabled” EGIM (EGIM which works either in autonomous mode or with a satellite connectivity), observation and monitoring data will be stored locally on the EGIM and later “transferred” to the SOS Server. In such a scenario, the data management platform can either retrieve the data by enquiring the SOS Server API, described in the previous section or it can receive the data once it is loaded on the SOS Server when a campaign is terminated.

Sensor Monitoring Dashboard (SMD)

The SMD (Figure 5) is a tool to help technicians to monitor in real time whether an EGIM is working properly. SMD reads all the incoming data from an EGIM and shows the information with text and graphs in a web application. The SMD implementation is based on the Open Source software named Zabbix. Thus, the technicians can control the status of the EGIM avoiding possible problems in the communications network between the SOS server and the data management platform.

The SMD was crucial for the tests performed for EGIM shallow water performance assessment and validation. When a technician enters into the EGIM SMD, he/she will see the most important parameters related to the EGIM status which helps him/her understand whether the EGIM is working properly and if there are issues. An initial configuration for the SMD that presents an interface like the ones shown below were proposed.

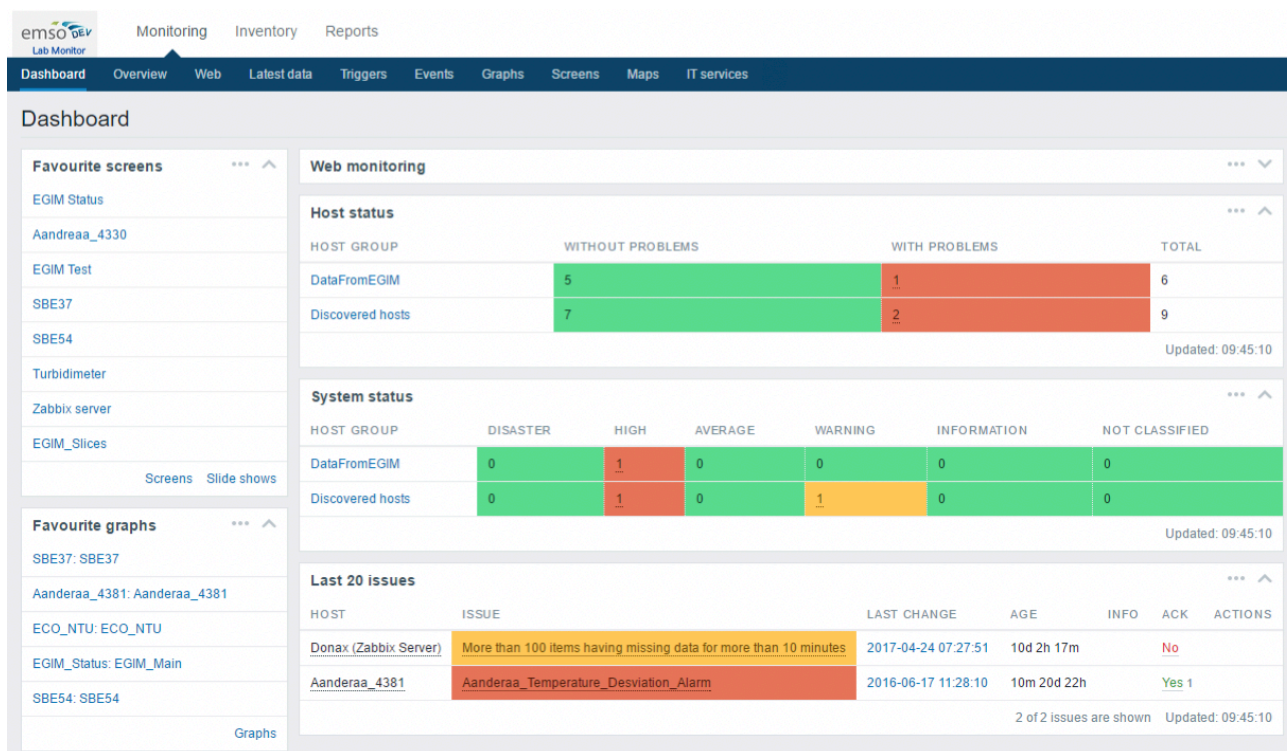


Figure 5 Sensor Monitoring Dashboard (SMD)

The SMD is divided into five main blocks:

- “The Favorite screens” shows graphs of the parameters of the sensors. Each parameter is shown in one graph;
- “The Favorite graphs” shows graphs with all the parameters of one sensor in the same graph. One graph per instrument; this is useful to check if a sensor returns the values of all parameters without taking care of the real meaning of the values;
- “Host status” shows the number of problems detected in the EGIM; if the technician clicks the number, the application gives more information about the problem;
- “System Status” indicates the number of problems sorted by problem type;
- “Last 20 issues” describes the last 20 issues or problems with some useful information.

The SMD installed in the image with all the software of the EGIM acquisition system contains the mentioned configuration. However, advanced technicians with admin privileges can modify the configuration and the way to see the information to adapt the SMD to their need.

Module for Ocean Observatory Data Analysis (MOODA)

The MOODA is a tool to help scientists download and analyze data coming from the EGIMs. It gives a first idea of how data looks like and provides the scientists functions to manage and analyze data easily. It is an Open Source Software developed with Python. Although the module is designed for a wide range of user expertise, medium-advanced scientific Python users could take the maximum advantage of the module capabilities.

MOODA contains modules to read data in different formats and translate them into a new data format namely Oceanobs Data Frame (OceDF). Thus, MOODA can work with data regardless of the source format no matter if the source file format is CSV, NetCDF, XML or others. OceDF contains QC Flags, so, in the translation process, QC Flags may be generated if necessary. Data in OceDF can be saved in a local computer as a binary file (".pkl") so that other analysis tools could eventually open the file if they use libraries to open pickle files.

Industry and Innovation services

A workshop dedicated to industry was organized on March 15th, 2018, inside the Oceanology International Conference. The meeting was organized by EMSO ERIC and AtlantOS aimed at making connections with industry and presenting on the current status of the EGIM technology and RI within EMSO ERIC. A training workshop entitled A “Interoperability Technologies For Sharing Ocean Instruments And Real-Time Data” was set up to promote interoperability tools in the field for ocean sensors (tested) and real-time data exchange, with an average of 50-60 attendees (Figure 6).



Figure 6 EMSO ERIC Workshop participants at the Oceanology International Conference, London 2018

Communication

The communication plan developed within EC EMSO-Link work plan, has constituted the basis to develop the EMSO ERIC communication and outreach activities. The main communication and dissemination materials and tools have been developed in 2018. The set of communication materials mainly consists of the EMSO ERIC brochure, roll-ups, PowerPoint standard presentation, poster and the EMSO ERIC website and social channels (**see Annex I**).

❖ Leaflets

Two leaflets (Figure 7) were produced to announce events:

- the “EMSO EGIM Technology Workshop”, held during the Oceanology International, London, March 2018;
- the Transnational Access (TA) Call launched in April 2018.



Figure 7 Left to right, the leaflet to announce the Technology, the one to advertise the opening of TA call

❖ EMSO ERIC Video for the Centennial Celebration of AGU - December 2018

A video was produced to emphasize the role of EMSO ERIC in providing excellent data for monitoring the physical and chemical changes in seawater from the water column to the seafloor around Europe. The video has been broadcast throughout the American Geophysical Union (AGU) Fall meeting in December 2018 and on the social media platform. The video can be found [at this link](#). Here some screenshots follow (Figure 8).



Figure 8 Some screenshots of EMSO Video for AGU Centennial

❖ EMSO ERIC Flyer

An eye-catching flyer (Figure 9) has been developed to synthesize and highlight the main information related to EMSO, including the objectives, the services and the observatories descriptions. This flyer was distributed at the conferences and exhibitions.

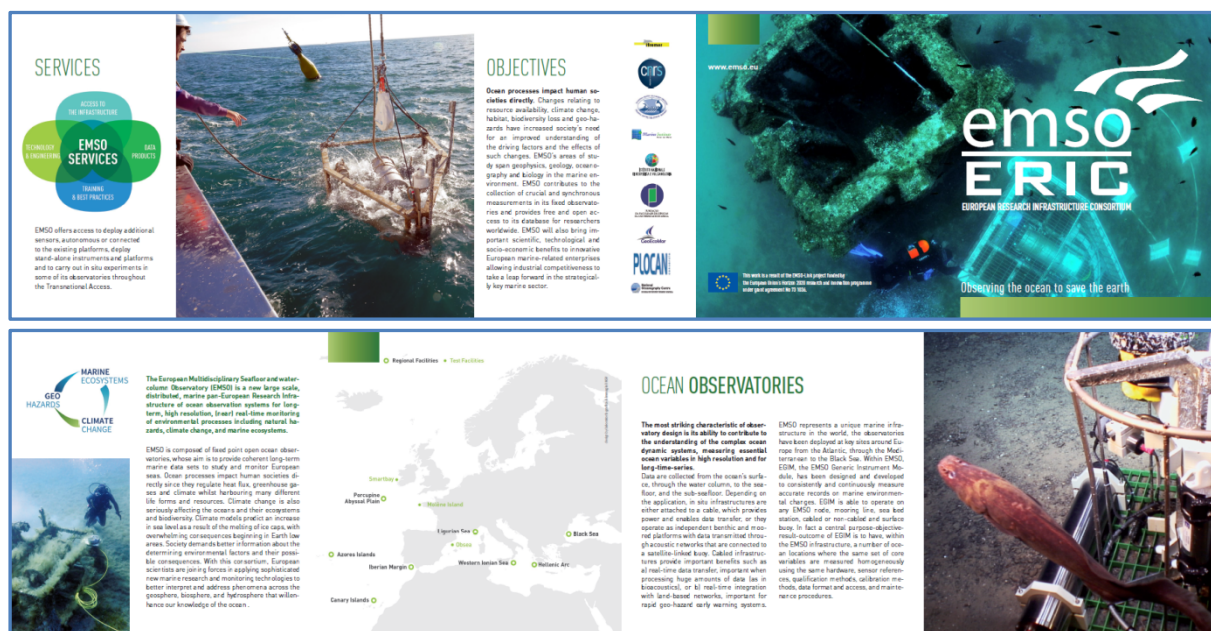


Figure 9 EMSO ERIC Flyer

A significant activity has been developed including workshops, training courses and International conference and workshops (see details in **Annex II**).

Access

Enabling infrastructure access is one of the core drivers for the formation of ERICs, including EMSO. Through the EMSO-Link project funds, EMSO ERIC launched a call of multi-site Transnational Access (TA) on April 16th, 2018 for accessing 3 EMSO ERIC RFs and was widely promoted through the networks and contacts of the EMSO ERIC and participating institutions. This webpage offered eligibility and access rules to potential applicants, details of the application process, downloadable application form and description of the three EMSO ERIC RFs:

- EMSO-PYLOS (Hellenic Arc): Located in the SE Ionian Sea at 1670 m depth, it has three major parts: water column component with a surface buoy; an autonomous seabed platform; and a cabled seabed observatory.
- EMSO-NICE (Ligurian Sea): Located 1 km offshore Nice Côte d'Azur International Airport, is situated at about 20m depth and is connected to shore via an electro-optical cable.
- EMSO-SmartBay (Ireland): Located in Galway Bay, is a cabled observatory which includes a fibre optic data and power cable; and a sub-sea sensor hosting platform located at depth of 25m depth.

The objective of this call is to offer free-of-charge access to these 3 EMSO ERIC RFs where external measuring systems can be installed, including instruments, systems, new technologies and where new procedures/experiments can be tested/take place.

Proposal evaluation and selection were based on advertised evaluation criteria, following rules of transparency, fairness and scientific merit (details in **Annex III**).

The diagram below illustrates the TA process, from the launch of the call to the project implementation (Figure 10).

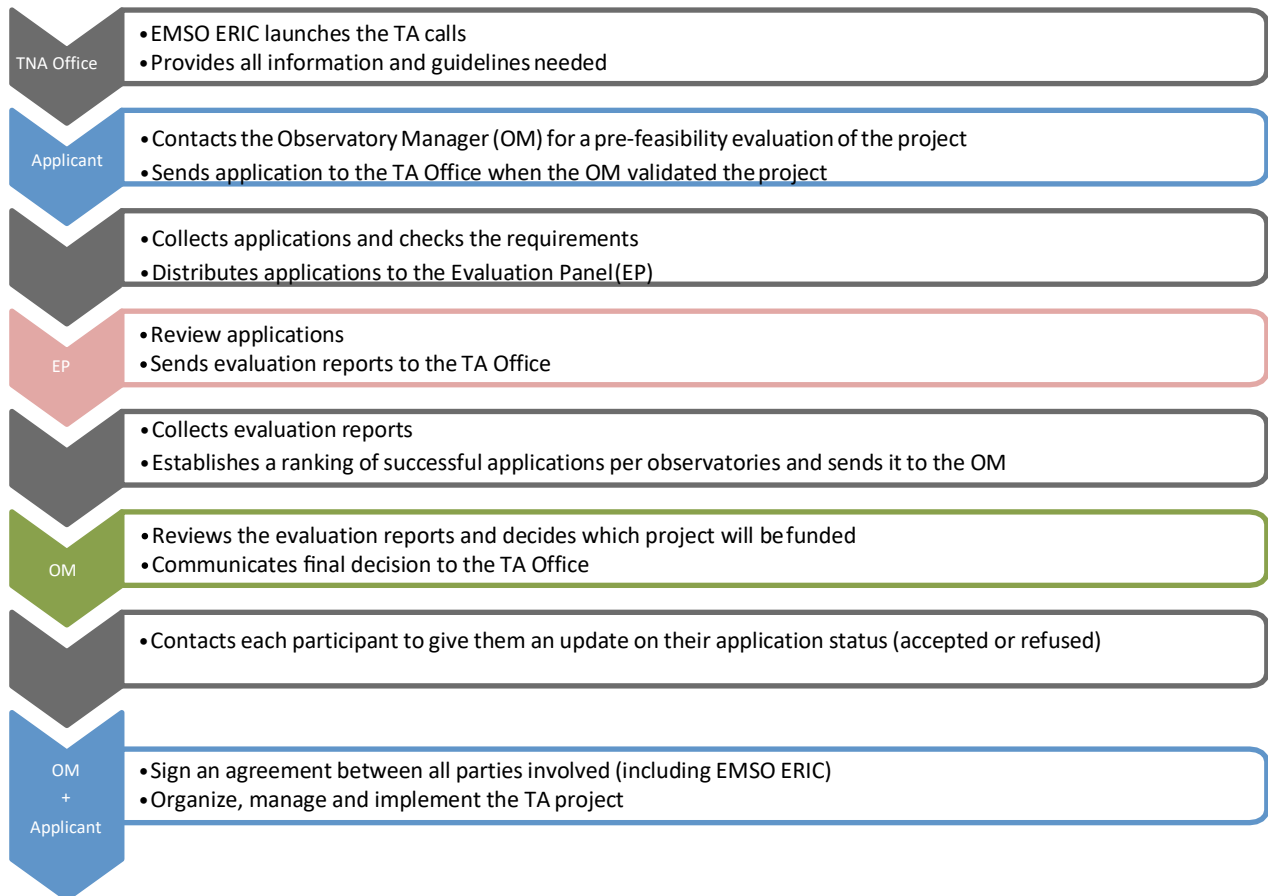


Figure 10 Process to the access to the EMSO ERIC RFs

Training

The key objective of the EMSO ERIC training is to train both the EMSO staff and EMSO users in order to promote the integration and the diffusion of the technical and scientific knowledge between RFs) and across disciplines, and to achieve the EMSO ERIC long-term sustainability. The aim of the training plan is to develop synergies between the different disciplines in the EMSO personnel and among users of EMSO data and infrastructure, to attract new members and new users of EMSO ERIC, and to promote the rise of the next generation of marine observation scientists and engineers. A secondary goal is to reach out to a wider public as a mean to promote awareness of marine sciences and technologies.

Two main categories of training events are identified:

- 1- *ad hoc* trainings for EMSO personnel and users; and
- 2- recurrent training milestones: yearly “sensor to users” Best Practices workshops and biennial Time-series Conferences.

The *ad hoc* training events address all aspects of EMSO activities and respond to specific needs expressed or relayed by the ERIC bodies, particularly the ExCom and the SGs, by the RTs, by the community of EMSO users, and by the marine science and technology community. The recurrent training milestones also address these needs but within the format of yearly or biannual recurrent meetings which we hope will become training milestones for all.

The yearly preparation of the training plan is coordinated by the SSG, based on suggestions and recommendations from the ExCom.

Three training events were organized in 2018 (details in **Annex IV**).

2. FINANCIALS

NOTES TO THE FINANCIAL STATEMENTS

1. Foreword

On September 29th, 2016 the European Commission launched the European Research Infrastructure “*The European Multidisciplinary Seafloor and Water Column Observatory through the establishment of the EMSO ERIC - European Research Infrastructure Consortium*”. Members of the Consortium, together with Italy, as hosting country, are France, Greece, Ireland, Portugal, Romania, Spain and the United Kingdom. The registered office of the Consortium is in Rome and is currently hosted c/o *Istituto Nazionale di Geofisica e Vulcanologia* (INGV), that is the Italian hosting organization.

EMSO ERIC is a not-for-profit legal entity/international organization undertaking mainly non-economic activities which relate to research activity.

2. Accounting criteria

The present annual Financial Statements have been compiled in conformity with the international accounting standards IPSAS (International Public Sector Accounting Standards) issued by the International Public Sector Accounting Standard Board (IPSASB) and in view of being adopted by the European Commission within the meaning of Council Directive No 2011/85/EU of 8 November 2011 on requirements for budgetary frameworks of the Member States.

The decision to voluntarily adopt an accounting system that can be connected to international principles is consistent with the process of harmonization started some time ago within the EU Commission, not yet completed. For this purpose, it is relevant to recall the “Report from the Commission to the Council and the European Parliament towards implementing harmonised public sector accounting standards in Member States. The suitability of IPSAS for the Member States”, published on March 2013.

The IPSAS, in general, can function as a basis for harmonised accrual-bases accounting standard passing through their transformation into EPSAS (European Public Sector Accounting Standards). The EU above mentioned Directive states that “by 14 December 2018 the Commission shall public a review of the suitability of the Directive (see art.16).

EMSO ERIC is set up as an international organization with scopes of general interests typical of an Entity referable to the Public Sector. Therefore, EMSO ERIC should be able to relate to its Members in different countries in a common language. This should be adopted in all matters and at all levels and thus also in the model of presentation of economic-financial topics, which support the annual accounts and budgets.

The use of the International Accounting Standards referable to Public Sector, taking into account the specific character and scopes of EMSO-ERIC, adequately conformed to the legal characteristics of the Entity and to its functions and scope, can allow the development of well-defined best practices, whose impact on the financial aspects is measurable and effective. The use of international accounting standards, in fact, allows information on the financial statements to be presented in a common way for users/stakeholders of different nationalities.

In this way we can ensure that:

- the information is relevant, reliable, comparable and understandable;
- the terminology used is common, appropriate and explanatory among members and for similar international organizations outside Europe;
- the financial statements are auditable by International Standard of Audit by auditors from different nations;
- a host country change - and thus any site change - is not relevant for the comparability of information and models, books, records of the accounting system;
- the accounting system is able to present the in-kind contribution model, to provide analytical accounting for projects and separate accounting for economic activities.

The aim of the annual financial statements is to provide information on the assets and liabilities, the profit or loss and changes in the financial structure of the Consortium, useful to a wide range of users. The financial statements are prepared within a general-purpose framework.

The financial statements have been compiled in accordance with the principles of clarity and transparency and provide a correct and exhaustive framework of information on ownership relations, as well as economic and financial relations implemented by the Consortium in carrying out its activities.

It has been compiled considering International Accounting Standards for Public Sector, integrated in order to be consistent with the legal and effective structure and scopes of EMSO.

The Consortium, in compliance with IPSAS n.1, has chosen to present the layout of the balance sheet, distinguishing between current and non-current items, and the layout of the profit and loss account, classifying expenses by their nature.

In its drawing-up, the following principles have been observed:

- ✓ The items have been evaluated prudently, taking into account the perspective of the continuity of the activities, as well as the economic function of assets or liabilities;
- ✓ Only incomes and expenditures related to the financial year have been accounted, independently of the day of encashment or payment;
- ✓ The risks and losses related to the financial year have been accounted, on an accrual basis, even if known after the end of the financial year.

These notes have been compiled in order to clarify, complete and analyse the information contained in the assets and liabilities balance sheet and in the profit and loss account, in addition to providing information on the applied evaluation criteria, on the movements that have taken place and the changes in various assets and liabilities.

The notes are an integral part of the financial statements and provide descriptive and schematic information with particular reference to the ownership aspects, as well as economic and financial aspects of the overall management.

The financial statements comprise the following parts:

- Balance sheet, assets and liabilities statement;
- Profit and loss account;
- Cash Flow Statement;
- Explanatory notes;
- Management report.

The Cash Flow Statement has been introduced in this Financial Statements as at December 31st, 2018 following the provisions of IPSAS n.1 and compared with the data of Balance Sheet as at December 31st, 2017.

3. Evaluation criteria

The financial statements have been compiled in accordance with the principles of clarity and transparency and provide a correct and exhaustive framework of information on ownership relations, as well as economic and financial relations implemented by the Consortium in carrying out its activities. They have been compiled taking into account IPSAS, according and conforming to the legal characteristics of a not for profit international institution and the specific scope of EMSO.

Balance sheet

The items in the balance sheet are classified into non-current/current.

Assets

“Non-current” assets are long-term investments where the full value will not be realized within the accounting year. Examples of noncurrent assets include intangible assets such as intellectual property, property, plant and equipment.

The assets have been classified as “current” assets when:

- They have been realized during the normal operating cycle of the institution;
- They are cash or equivalent complement not restricted in its use.

The non-current assets may include tangible assets (such as computers and other minor electronic tools), intangible assets (such a license and in general all assets not related to the operating cycle and realizable after 12 months from the balance sheet date).

Liabilities

“Non-current” liabilities are long-term financial obligations that are not due within the present accounting year.

Liabilities have been considered as “current” liabilities when:

- They are extinct in the course of the normal operating cycle of the institution;
- The extinction is due within 12 months from the balance sheet date.

Other liabilities, i.e., those not related to the operating cycle and all other non-commercial liabilities, are classified as current if their extinction is due within 12 months from the balance sheet date.

Otherwise they are recognized as non-current liabilities.

Deferred incomes and accrual expenses

This item includes the amount of funds received for the year 2018 and not yet fully used, following the accrual basic principle, by December 31st, 2018 for the purposes they were intended. They will therefore be used in coming years for the same purposes.

This item represents the carry-over for balances of subsequent years to that under review.

In-kind contributions

Contributions in kind have been acquired in the financial statements on the basis of the details contained in the document entitled "Methodology for Defining the Values Involved in the EMSO-ERIC Activities, and to Detail the In-kind Contributions", when available, under the conditions specified therein. In these financial statements in kind contribution from INGV and CSIC attributed to EMSO are accounted for, using valuation criteria at cost as stated by contributors, without any comparison procedure between local auditors (entrusted by the Representing Entities/Partner Facility) and EMSO auditors.

Profit and loss account

The drawing-up of the profit and loss account is regulated by the IPSAS, integrated and conformed to be consistent with the characteristics and scopes of EMSO.

Incomes

Incomes are increases of the benefits connected to the administrative year.

Costs/Expenses

Costs/expenses are decreases of the economic benefits of the administrative year. The analysis of costs has been explained in the overview of the profit and loss account using a classification based on their nature.

4. In-kind contributions

The Financial Statement includes "In-kind" (non-monetary) contributions from the Members evaluated on the basis of the cost of the production factors related (exhausting their utilities during the ordinary cycle). The Financial Statement does not include in-kind contributions strictly related to cover investments (in tangible and intangible assets).

5. General information

The data of 2018 represents the third financial year of EMSO.

6. Assets

Non-current assets

Total non-current assets:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
9.971	32.177	22.206

Intangible assets

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
2.145	1.073	(1.072)

Tangible assets

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
7.826	31.104	23.278

Current assets

Total current assets:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
1.707.891	1.601.334	(106.557)

Long-term credits

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
5.150	12.060	6.910

The composition of the amount as at December 31st, 2018 is as follows:

Description	After 12 months	Total
Deposit for real estate rent	11.700	11.700
Deposit for utilities	360	360
Total	12.060	12.060

“Deposit for real estate rent” refers to the caution deposit (security) paid for the Director General's accommodation.

Short-term credits

Total short-terms credits:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
40.266	59.962	19.696

The composition of the amount as at December 31st, 2018 is as follows:

Description	Within 12 months	Total
Credits for Members' statutory contribution in cash	-	40.000
Other current credits and receivables	59.962	59.962
Total	59.962	99.962

This item "Credits for Members' statutory contribution in cash" represents the credit by Members in order to fulfil to their obligation to grant monetary contribution to EMSO as detailed in Annex 3 and 4 of the Statute and in compliance with General Assembly first resolution.

In fact, the General Assembly fixed the contribution by Members for 2018, in a part of the entire contribution, in order to cover costs of the third financial year until December 31st, 2018. The contribution related to the entire year is equal to € 465,000 (of which € 220,000 from the Hosting Country and € 245,000 from the other Members).

Cash and cash equivalents

The balance represents cash at the bank (ordinary and additional dedicated to UE ongoing Projects account) and in hand and thus the existing cash at the end of the financial year. The balance represents the liquid assets and the existing cash at the end of the year. Cash is held at the Bank Crédit Agricole CARIPARMA. In addition to the ordinary account, a dedicated account was opened, at the same Bank, for EMSO-Link EC project of which EMSO is coordinator.

Description	Balance as of 31/12/2017	Balance as of 31/12/2018	Difference
Bank deposits	1.660.989	1.525.248	(135.741)
Cash	51	129	78
Total	1.661.040	1.525.377	

Accrued income and prepayments

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
1.435	3.935	2.500

In general the item measures expenses calculated on accrual basis irrespectively from cash or documentary. This amount mainly represents prepaid expenses related to costs for services and other minor expenses.

7. Equity and liabilities

EQUITY

Capital and other permanent contributions from Members

No values are entered for in this item.

Reserves

No values are entered for in this item (with the exception of rounding).

Accumulated surplus

No values are entered for in this item.

Non-current liabilities

Total non-current liabilities:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
-	3.044	3.044

Long-term financial debts and loans

No values are entered for in this item.

Other long-term debts and liabilities

No values are entered for in this item.

Employee's severance indemnity

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
-	3.044	3.044

Current liabilities

Total current liabilities:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
1.717.862	1.630.467	(87.395)

Detailed as follows.

Short-term financial debts

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
947.256	954.881	7.625

This item includes the contribution quotas due to the Partners for their participation to EMSO-LINK Project.

Advance payments for project externally funded

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
363.984	115.196	(248.788)

This item includes the residual prepayment received from EU for participation to EMSO-LINK Project.

Other short-term debts and liabilities

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
66.710	91.179	24.469

Detailed as follows:

Description	31/12/2017	31/12/2018	Difference
Account payables	63.081	59.772	(3.309)
Payables to employees	-	10.096	10.096
Payables to social security institutions	-	3.221	3.221
Withholding taxes	1.017	3.115	2.098
Tax payables	310	6.709	6.399
Other payables	2.302	8.266	5.964
TOTAL	66.710	91.179	

Debts are valued at their nominal value and the expiration of the same is as follows:

- "Account payables" includes liabilities for purchases of services;
- "Tax payables" includes liabilities for taxes and, for the year 2018, represents IRAP (regional tax) and intra-UE VAT;
- "Other payables" includes remaining debts of different nature.

Accrued expenses and deferred income

These items are related to incomes and costs referring to the period calculated on an accrual basis.

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
339.912	469.211	129.299

The item is related to deferred income, as detailed as follows.

Description	Amount 2017	Amount 2018
Deferred income to carry-over 2016	104.124	104.124
Deferred income to carry-over 2017	235.788	235.788
Deferred income to carry-over 2018	-	129.299
TOTAL	339.912	469.211

The annual monetary contribution by Members was fixed in the amount equal to 465.000; the resources deferred to following years as carry over are € 129.299.

8. Income statement, Profit and loss account

Revenues

Contributions for operating expenses

Contributions items identify:

- the portion of the cash contribution for the financial year allocated by the Members for the Consortium's starting activities to cover the ordinary operating expenses (€ 335,701);
- the 2018 cash contribution from EU for the participation to the projects:
 - EMSO-Link (€ 214,377)
 - DANUBIUS-PP (€ 16,255)
 - ENVRI-PLUS (€ 25,392);
- the 2018 *una tantum* cash contribution from Italian R.E. INGV (€ 33,100);
- the 2018 in-kind contribution for staff cost made available by R.E. INGV (€ 97,793)
- the 2018 in-kind contribution for staff cost made available by CSIC (€ 84,256)

Furthermore, there are refunds of costs for € 501.

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
496.954	807.375	310.421

These amounts are detailed as follows:

	2017	2018
Contribution in cash	258.771	624.825
Contribution in kind	238.183	182.049
	496.954	806.874

Costs

Operating costs

Total operating costs:

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
494.430	791.633	297.203

Detailed as follows.

Costs for raw materials, supplies, consumables and goods

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
1.214	2.405	1.191

This item includes: costs incurred for the supply of consumables and tangibles of small amount.

Service costs

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
254.893	507.240	252.347

It has been decided to detail the item services, to facilitate fair presentation of the budget determined by the operating characteristics of the Consortium.

Description	31.12.2017	31.12.2018	Difference
General Director - lump sum	15.000	60.000	45.000
General Director - accomodation	4.417	26.796	22.379
General Director - travel cost	2.272	37.592	35.320
Transition Manager	70.664	-	(70.664)
Financial Officer	-	57.096	57.096
Project Coordinator	37.646	71.476	33.830
Project Management	5.000	10.092	5.092
Support to project manager	14.300	5.500	(8.800)
Innovation and external relations office	29.167	107.466	78.299
Executive Assistant	3.504	7.006	3.502
Data Manager Consultant	6.250	-	(6.250)
Support to strategic plan	3.079	7.524	4.445
Translations	1.238	375	(863)
Conference organization	-	28.873	28.873
Fee for conference and issues	-	1.876	1.876
Graphic drawings and texts	260	650	390
Real estate brokerage costs	1.700	2.640	940
Telephone and communication utilities	665	8.525	7.860
Other services for the premises	-	8.570	8.570
IT support	-	2.408	2.408
Publicity, procurement	5.575	191	(5.384)
Auditor fees	5.000	5.000	
Fiscal and administrative consultancy and accounting services	12.792	11.228	(1.564)
Legal consultancy	6.760	-	(6.760)
Travel costs for employees, collaborators, and social organs	27.849	33.161	5.312
Staff training	-	10.000	10.000
Licenses	903	-	(903)
Insurance	-	774	774
Postage	25	520	495
Bank charges	827	1.466	639
others		435	435
Total	254.893	507.240	

Costs for services available in kind

Description	31.12.2017	31.12.2018	Difference
Back office activity	92.140	-	(92.140)
Aom IT delegate and Secretary	1.941	-	(1.941)
Headquarters facilities	28.669	-	(28.669)
Total	122.750	-	

In-kind resources by hosting country (R.E. INGV).

Staff costs

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
115.433	251.262	135.829

At December 31st, 2018 EMSO has two people hired with the status of employee (€ 69,213); the cost of € 97,793 represents the staff contributed in-kind by the Hosting Country (R.E. INGV), while the cost of € 84,256 represents the staff contributed in-kind by CSIC.

Staff

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
-	69.213	69.213

Staff disposable in kind by hosting country

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
94.127	97.793	3.666

The cost of € 97.793 represents the estimated in-kind contribution from INGV (Italy) for the secondment of the following collaborators:

Professional profile	In kind contribution
Grant and Project Officer	43.394
Science Officer / Liason with Hosting Institution	42.547
Liason with Hosting Institution	4.698
Graphic designer	7.154
	97.793

Staff disposable in-kind by members

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
21.306	84.256	62.950

The cost of € 84,256 represents the estimated in-kind contribution from CSIC (Spain) for the secondment of the Director General.

Costs of rents, concessions and royalties for trademarks

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
-	28.061	28.061

The cost of € 28,061 represents:

- € 25,700 for the fee for the rent of the office of Via Resti from 1st April 2018;
- € 2,361 for the cost for licences of the software.

Other operating costs

Balance as at 31/12/2017	Balance as at 31/12/2018	Difference
140	2.665	2.525

Other operating costs consist of costs for stationery and other administrative costs.

Amortization/Depreciation of intangible and tangible assets

Description	Initial cost	Investment (disinvestments)	Amortization/De preciation	Amortization/ Depreciation fund	Residual value
Intangible Assets					
Software	3.218	-	1.073	2.145	1.073
Tangible Assets					
Office equipment	6.681	26.054	4.035	4.703	28.032
Mobile phones	2.309	2.770	1.512	2.007	3.072
Other minor tangible assets	179	2.337	2.337	2.516	-
Total	12.387	31.161	8.957	11.371	32.177

Depreciation in charge refers both to tangible and intangible assets.

Financial income and expenses

Description	31.12.2017	31.12.2018	Difference
Bank interest income	227	114	(113)
Exchange rate losses	-41	(166)	(125)
Exchange rate income	16	9	(7)
Total	202	(43)	

Financial income refers to bank interest income; financial expenses refers to exchange rate differences.

Taxation

current tax	31/12/2017	31/12/2018	Difference
IRAP	310	6.742	6.432
Total	310	6742	

The current taxation on personnel (collaborators or freelance) is equal € 6,742.

It is stated that the Consortium, in the context of purchases realized and within the limits following the Statute, may use VAT exemptions granted on the basis of Article 143(1)(g) and Article 151(1)(b) of Council Directive 2006/112/EC, and in accordance with Articles 50 and 51 of Implementing Regulation (EU) No. 282/2011 of the Council.

MANAGEMENT REPORT

9. Foreword

The present Management Report is integral part of the financial statements and provides descriptive and schematic information with particular reference to the economic and financial performance and on the overall ERIC management.

The financial statements comprise the following parts:

- Balance sheet, assets and liabilities statement;
- Profit and loss account;
- Cash Flow Statement;
- Explanatory notes;
- Management report.

10. EMSO ERIC SUSTAINABILITY

The 2018 Balance Sheet and Income Statement of EMSO ERIC has been prepared by Aleardo Furlani, EMSO ERIC Financial Officer - under the supervision of the DG - with the support of the EMSO ERIC CMO, the CPA Studio Pinto , while the voluntary revision has been carried out by BDO an International Auditing Firm. The activities carried out by EMSO ERIC in 2018 are fully aligned with the scopes and the statute of EMSO ERIC. The DG and the CFO of EMSO ERIC yearly illustrate the 2018 Balance sheet and the Income statement and the other documents to the Assembly of Members foreseen on April 16th, 2019 following the statutory rules and procedures.

The Balance sheet and the Income Statement Report provide to the Assembly of Members of the EMSO ERIC the financial and economic overview of EMSO ERIC as of December 2018 and some relevant insights for 2019.

The capacity of EMSO infrastructure to be financially self-sustainable in 2018 and - prospectively - 2019 has been ensured through 4 different sources of income:

- the contributions of the Full Members; following the completion of the set-up phase (year 3) the contributions from Members should be revisited, to pursue the objectives of EMSO ERIC for broader scopes and long term period².
- During the Set-Up Phase (2016-2017) EMSO ERIC already obtained additional funding under EMSO-Link and DANUBIUS-PP EC projects, and additional funds have been leveraged from the European Union under the Cohesion Policy and Horizon 2020 during 2018 through projects approved by the European Commission (ENVRI-PLUS, ERIC FORUM, ENVRI-FAIR, Eurofleets+).
- An additional cash contribution of € 33,100 provided by INGV.
- the in-kind contributions provided by the host organization (INGV-Italy) and (CSIC-Spain).

² EMSO ERIC Statutes, art. 9

11. EMSO ERIC 2019 BUDGET

By taking a rigorous management control approach to the RI deployment, EMSO ERIC in 2018 made substantial progress towards the full deployment of the activities showing a +144% (€ 625,326 vs € 256,000) increase of volume of activities represented by cost with respect to 2017.

EMSO ERIC budget is an annual financial statement presenting the revenues and spending for the next financial year. This document estimates the anticipated EMSO ERIC revenues and expenditures for the ensuing (current) financial year. It should be highlighted that only the revenues which are certain may be considered.

The projected 2019 budget pattern shows a consolidation of the growth trend (+27%), following the tight spending controls policy, effective participation to European calls, and better-than- anticipated revenue results due to growth.

On the basis of the foreseen activity the 2019 budget assumptions have been based on three major factors:

- A. The new hiring. Personnel costs make up the majority of the EMSO ERIC expenses, at approximately 66% in 2018 and 77% in 2019. In fact, during the first quarter of 2019, three key professional profiles are being hired. The selected personnel will have an impact on personnel cost (+48%) but, due to their international background and high professional competences will be very suited to effectively serve at EMSO ERIC. The three profiles being hired are the following:
 - The Director of Information Technology & Data Services
 - The Technology Officer
 - The Program Manager.
- B. The growth of revenues: (+18%) from 2018 to 2019. EMSO ERIC R&D projects and Membership fees are the main EMSO ERIC revenues. EMSO ERIC revenues are expected to increase in 2019 without increasing the financial burden on Member State by increasing fees. As EMSO Eric continues to grow, the projects revenues are estimations carried out on the ground of the recently approved- and above mentioned - R&D projects. The 2019 revenues assumptions have been made on the basis of the available personnel and the activities to be presumably carried out according to the work plan.
- C. Finance and Control. Even as revenues grow, EMSO ERIC continues to deploy the structural management policies necessary to keep its expenditures in check and its finances sustainable. EMSO ERIC achieved substantial savings in 2018 by properly managing travel plans and costs, including savings from efficient use of In-kind contributions provided by Italy and Spain members. EMSO ERIC also plans to consolidate the information technology infrastructure: the deployment of the data access infrastructure is also expected to generate returns in terms of revenues and will enable EMSO ERIC to pursue a number of new initiatives and make valuable technology investments.

12. FINANCIAL PERFORMANCE INDICATORS

The sources of income listed in PAR. 2, jointly with a prudent management of cash and expenses accounts, generated also for a 2018 a cash carry-over of € 129,2991 (-46% with respect to 2017) which, due to the non-profit nature of EMSO ERIC, has been fully retained in the fiscal year 2018. The 2018 revenues are € 754,625.00 - net of the in-kind contributions: +51.8% (2017= € 496,954); the operational cost are € 625,326: +145% (2017=€ 254,893).

The ratio between cash carryover and activities/cost was still over 1 in 2017 but it is moving to a stable 70% in 2018 and 2019 (estimates) and the figures are as follows:

- 2017= 132%
- 2018= 76%
- 2019= 70%

The figures above show that EMSO ERIC sustainability will be approximately based on a 2/3 ratio between own resources and activities, which is a fair indicator of financial stability and should be kept as a KPI of future financial performance and sustainability.

As a matter of fact, due to the intensification of activities after the appointment of the DG as of October 1st 2017, the cash investment patterns increased due to the take-up of EMSO ERIC Infrastructure set-up and development operations. The volume of activities from 2017 to the end of 2019 are expected to grow by 70% and – following the finalisation of the on-going Vacancy Calls (Technology Officer and EC Programme manager) to be finalised by May 2019, the overall operational staff structure will be in fully in place as of June 1st 2019.

It should be highlighted that, thanks to the availability from the Government of Spain, an agreement has been signed in September 2017 between EMSO ERIC and CSIC which allowed the detachment of the new Director Prof. Juanjo Dañobeitia. This agreement generated a significant outcome in terms of efficient use of EMSO ERIC resources and a stronger involvement of CSIC in supporting EMSO ERIC deployment.

13. NEXT STEPS

The activities foreseen for the next 8 months will include the following tasks:

- Finalisation of 2019-2020 in-kind contributions and 2020 membership fees
- Launch of Calls:
 - Quality Certification (ISO 9001)
 - International audit firm
- Consolidate the 2019 Accounts and finalise the 2019 Audit certification
- Additional In-kind contributions from Host Country(office space)
- Consolidation of the administrative staff; 2017-2019: +300%
- 2019 Balance sheet and Income Statement draft by December 30th 2019
- EMSO ERIC staff definitive and sustainable cost structure.

3. Annexes

Annex I Communication & Outreach

❖ EMSO ERIC visual identity

Standardized templates have been developed for communication and dissemination purpose and they have to be used by the members of the EMSO ERIC consortium for all the documents related to EMSO ERIC.

Letterhead Template



Figure A1 Letterhead Template

Power Point Template



Figure A2 Power point Template

Poster Template

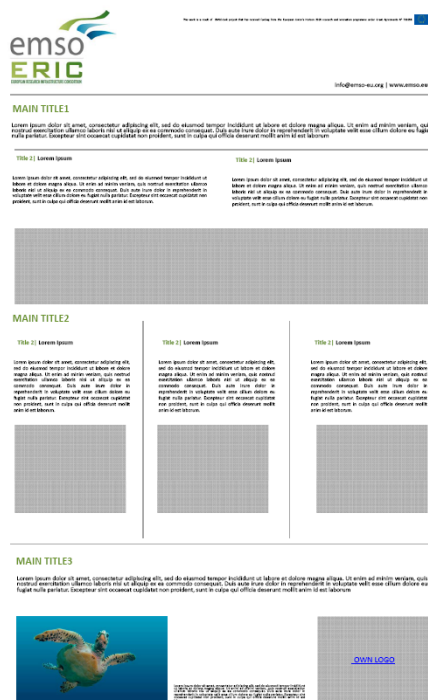


Figure A3 Poster Template

Badge Template for workshop and conference



Figure A4 Badge Template

❖ EMSO ERIC roll-ups

The EMSO ERIC roll-ups have been developed and used during events and fairs to promote EMSO ERIC. The roll-ups are available for all EMSO ERIC Members to be used at their conference or at useful conference for EMSO ERIC. The printable roll-ups are also available.

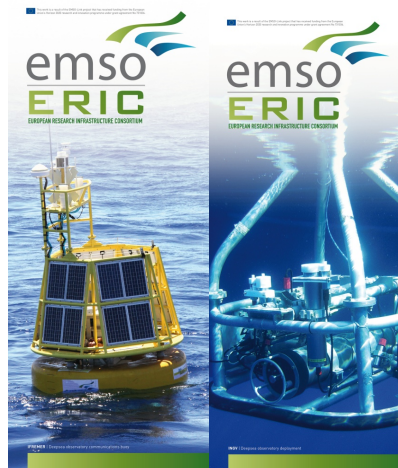


Figure A5 Roll-ups

❖ EMSO ERIC PowerPoint presentation

A PowerPoint presentation on EMSO ERIC has been developed for the Members with the aims to be used to improve EMSO ERIC visibility in face-to-face events. The PowerPoint has been created with the aims that the speaker can tailored it to the event where it will be presented, adding or removing some slides.





Figure A6 EMSO ERIC PowerPoint presentation

❖ EMSO ERIC poster

A standard EMSO ERIC Poster (90 x 142 cm) has been created to show the main pillar of EMSO ERIC and some activities conducted in the EMSO ERIC nodes dedicated to a non-specialized audience.

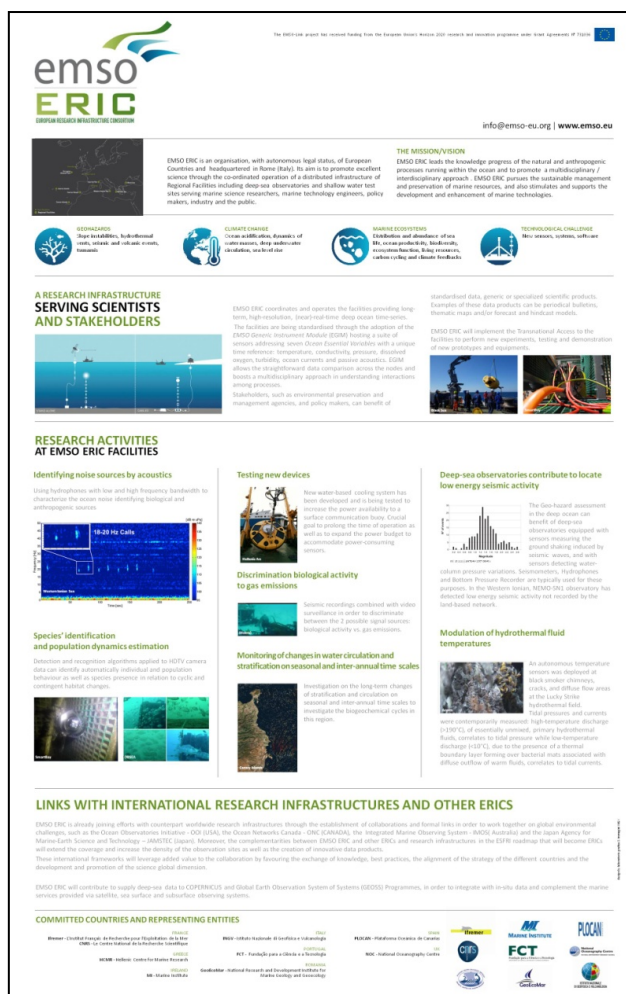


Figure A7 EMSO ERIC Poster

❖ EMSO ERIC website

A new EMSO ERIC website has been developed (www.emso.eu). It is a living tool to describe the EMSO ERIC and all-related projects, objects, results, activities and events.

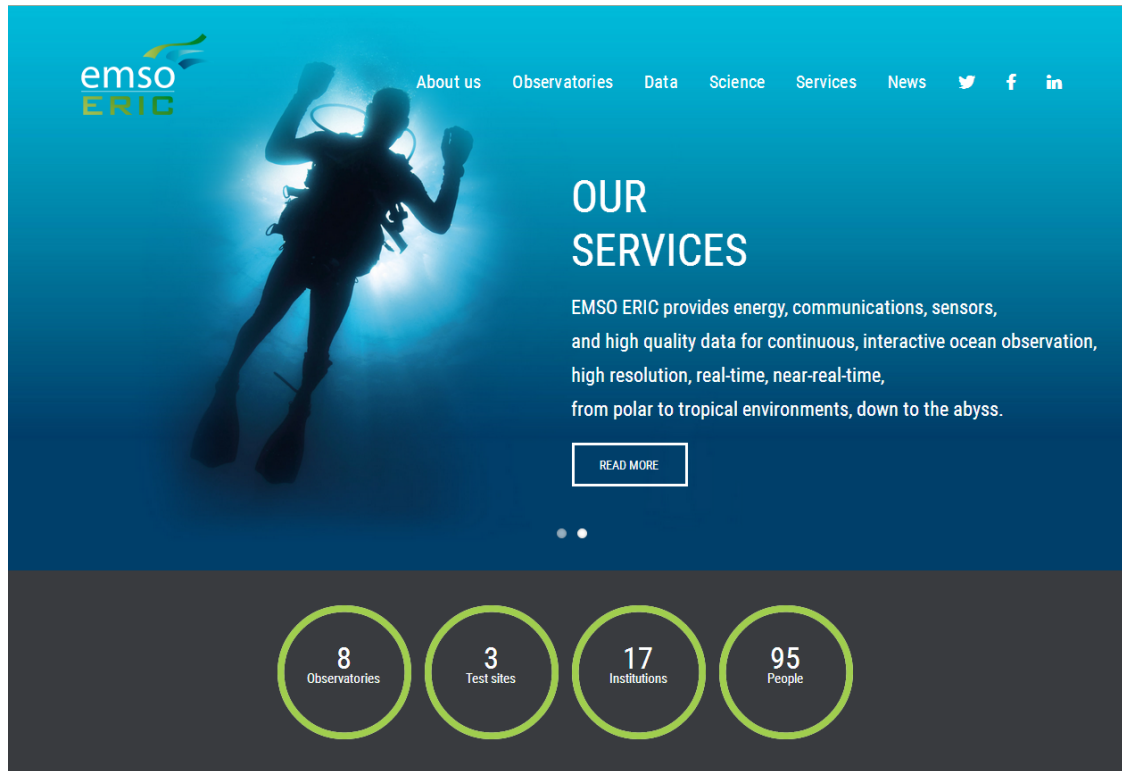


Figure A8 Screenshot of Website homepage

The website has to be considered as a living instrument. During 2018 it was regularly updated also with the creation of new and relevant sections.



Figure A9 web section dedicated to the Transnational Access (TA)

❖ EMSO ERIC social media channels

The EMSO social media channels, Facebook, Twitter and LinkedIn were permanently updated to share information about EMSO ERIC.

❖ Exhibitions and Trade fairs

To ensure active promotion in the scientific community, in end-user sectors the EMSO exposure has been developed also through the organization of EMSO booths at international events and co-participating in ENVRI booths at some other relevant events.

Here below the list of the developed activities:

- *Visit of the Italian Republic President at INGV - EMSO Booth (24/01/2018, Rome, Italy);*
- *Commonwealth Heads of Government Showcase (09/03/2018, Southampton, UK);*
- *EGU 2018 - ENVRI booth (8-13/04/2018, Wien, Austria);*
- *Sea Tech Week 2018 Exhibition - EMSO ERIC booth (7-12/10/2018, Brest, France).*



Figure A10 Some posts made during the activities

Annex II Workshops and Conferences

❖ Workshops

Here below the list of the workshops and trainings organized in 2018:

- **EMSO EGIM Technology Workshop**, MI, 03/04/2018, Glasgow, UK
- **Interoperability Technologies for sharing Ocean instrument and Real-Time Data**, HCMR, 15/03/2018, London, UK
- **Operations and function of the monitoring systems, in particular equipment used by Black Sea EMSO ERIC node**, GeoEcoMar, 2-7/07/2018, Costanta, Romania
- **Workshop on Interoperability Technologies and Best Practices in Environmental Monitoring**, IFREMER, 10-12/10/2018, Brest, France
- **Dissolved oxygen: seafloor and water column data, from sensor to users** (last day of Workshop on Interoperability Technologies and Best Practices in Environmental Monitoring) CNRS, 12/10/2018 Brest, France
- **Martech Oporto**, UPC, 01/12/2018, Porto, Portugal.

❖ International conferences

EMSO ERIC has been very active in submitting contributions to international events and here below they are listed:

- **EGU General Assembly 2018** - 8-13/04/2018, Vienna, Austria
 - Dañobeitia, J.J. et al., *“Development of a Strategic Plan for a pan-European Distributed Research Infrastructure”*, 20th EGU General Assembly, EGU2018, Proceedings from the conference held 4-13 April, 2018 in Vienna, Austria, p.11974
 - Fredella, M.I. et al., *“EMSO ERIC strategy towards integration of seafloor and water column observatories”*, 20th EGU General Assembly, EGU2018, Proceedings from the conference held 4-13 April, 2018 in Vienna, Austria, p.18906
 - Materia, P. et al., *“Active engagement in distributed Research Infrastructures”*, 20th EGU General Assembly, EGU2018, Proceedings from the conference held 4-13 April, 2018 in Vienna, Austria, p.1887
 - Decaro, M. et al., *“Observations of T-waves recorded at the Western Ionian deep seafloor”*, 20th EGU General Assembly, EGU2018, Proceedings from the conference held 4-13 April, 2018 in Vienna, Austria, p.17165.
- **OOI Deep Ocean Observing Strategy** - 27-29/08/2018 Seattle, WA, USA
 - H. Ruhl, Introduction to Essential Ocean Variable concepts & Biology and Ecosystems theme of GOOS.
- **AGU Fall Meeting 2018** Washington, USA
 - Dañobeitia, J.J. et al., *“EMSO ERIC - European Multidisciplinary Seafloor and water-column Observatory European Research Infrastructure Consortium Management a distributed marine Research Infrastructure for improving scientific services and social demands based on environmental multidisciplinary high-resolution and high-quality data”*, American Geophysical Union, Fall Meeting 2018, abstract #PA23F-1041.

In addition, EMSO ERIC widely presented the RI activities in EU and International Initiatives. It is worth a mention the invited talk given by Juanjo Dañobeitia on the EMSO ERIC distributed infrastructure, at the International School of Scientific Journalism and Communication on 24-29 June 2018 in Erice (Italy), with an average of 80-90 attendees.

Annex III TA access procedure

❖ Create list of potential experts for the Evaluation Panel

In June and July 2018, while the call was open, a panel of expert reviewers was assembled covering expertise in the key areas of EMSO ERIC science including Geo-hazards, Climate and Oceanography, Biogeochemistry and Marine Ecosystems. The TA Office produced a list of ~20 potential members composed of external international experts across the EMSO and the EU ocean community. The assembled panel was gender balanced. The role of the Evaluation Panel was to provide advice on the technical feasibility of the proposals submitted to the call, and incorporate their peer-reviews into a final ranking of proposed projects. The principles of transparency, fairness and impartiality were applied. The Evaluation Panel assessed the suitability of the proposed access for the suggested user groups that would benefit from access free of charge. The process also valued proposals from user groups who have not previously used the infrastructure, are working in countries where no such research infrastructures exist or have no prior experience accessing such infrastructures, in accordance with the TA principles set down by the EC. The selection process started as soon as the TA call was launched: the applicant was asked to contact the Observatory Manager for a pre-feasibility evaluation of their project. The applicant needed to include a confirmation letter/letter of support from the Observatory Manager as part of their application submission to the EMSO TA Office.

❖ Check application eligibility and pre-feasibility

When submissions were received the TA Office provided acknowledgment of receipt and carried out an initial review of the proposals. Applicants were informed of any missing documents as necessary, and their proposal checked against eligibility criteria as stated in the call text:

- a) *The user group leader and the majority of the users must work in an institution, SME or industry established in EU Member States, Associated Countries and Third Countries;*
- b) *the user group leader and the majority of the users must work in a country other than the country(ies) where the legal entity(ies) operating the infrastructure is(are) established.*

In the call text and before submitting the proposal, applicants were requested to contact the Observatory Manager (OM) in order to get a pre-feasibility letter, duly signed to show the availability of the observatory for the proposed project. This letter was mandatory to validate the submission.

❖ Screen and transmit proposals to the Evaluation Panel

After the closing date of the call, the proposals were transmitted to the Evaluation Panel. From the list of evaluators available, 12 people were screened, depending on the field of expertise necessary for each proposal, and one application was assigned to each of them, along with the evaluation template containing the evaluation guidelines for review and scoring. Each proposal was reviewed by three members of the expert panel. The Evaluation Panel reviewed the applications and established ranking based on the evaluation criteria below (Table A1) during the entire month of October 2018. Final scores were determined by adding the average score across the three evaluations.

Evaluation Criteria (& maximum number of pages)	Max score	Threshold
Scientific and technical objectives (Potential interest to the research/service provider community; Originality and innovation, European relevance) – 2 pages	5	3
Quality of the methodology and implementation: clarity, adequacy in relation to set objectives, work plan, adequacy with the infrastructure (incl. e.g. prior scientific, technical or logistical arrangements, risk table) – 2 pages plus risk table	5	3
Scientific and/or technical excellence of user group – 2 pages	5	3
Links or potential for seeding links with Industry (e.g., European enterprises interested in the measurements, participating to the project, e.g. testing new measuring systems or methods, etc.) – 1 page	3	...
Applications from Member States where similar infrastructures are not available as well as from user groups with no prior experience accessing an infrastructure	2	...
Total score	20	...

Table A1 Description of the Evaluation Criteria

❖ Selection process

A virtual consensus meeting was organized to discuss each proposal. These meeting took place in the first week of November 2018 after the evaluations were complete. The evaluation panel and access providers were asked for input on profiling the selection process (e.g., upon the suitability of technical assessment of proposals, specific eligibility thresholds, scientific merit and any aspect relevant to optimizing the process). Outcomes of the evaluation were then relayed to Observatory Managers and Applicants to make final arrangements. The consensus meeting and subsequent discussions with observatory managers revealed that some of the proposals required an additional step of responding to evaluators' key points. This was requested to be completed by December 15th, 2018 before final confirmation of the TA award and the start of arrangements for deployments could begin. The final decision was then communicated to the applicants with the status of their project (accepted or rejected). The list of the selected projects is shown in Table A2.

TNA Observatory	Obs Manager	Affiliated Institution	Proposal Name	Proposal Description
EMSO- NICE	Xavier Bompais	IFREMER	MODAL	<p>Monitoring seafloor Deformation and Assessing Landslide hazards associated with pressures (Nice slope)</p> <p>Theme: Geohazards & Geological Processes</p>
EMSO- PYLOS	George Petihakis	HCMR	DISAG	<p>Detection of Increased Seismic Activities by Gradients</p> <p>Theme: BioGeoChemistry & Geohazards</p>
			IMAPOCEAN	<p>Integrated Multilevel Active and Passive Oceanographic Current Education Advancement Network.</p> <p>Theme: Physical Oceanography</p>
EMSO- SmartBay	Allan Berry	MI	SmartLobster	<p>Norway lobster (<i>Nephrops norvegicus</i>) population dynamics from automated video-monitoring at SmartBay cabled underwater observatory</p> <p>Theme: Ecology & photo/video time series</p>

Table A2 Selected TA projects

Annex IV Training courses

❖ EGIS school, 6-7 June 2018, Catania, Italy

In 2018, EMSO training activities have started with an "EGIS school" on the 6-7 June 2018 at INFN (*Istituto Nazionale di Fisica Nucleare*) harbor lab, Catania, Italy. It was addressed EMSO personnel, mostly engineers, by invitation. Twenty persons participated to the school and were theoretically and practically trained on the use of EGIS.

Before the school, the participants were provided with:

- the EGIS user manual (participants were also asked to provide feedback on it before/during the school);
- the COSTOF2 (Communication and Storage Front-end – 2nd generation); which can power and control submarine observation station sensors and retrieve their data in real time) user manual;
- the SSDK (Data storage on μ SD and back up) user manual.

The EGIS user manual explains the different steps to follow to operate the EGIS during a deployment that can be used, to guide the user from the installation through operations to the data recovery.



Figure A11 Photos of the EGIS school of the 6-7th June at INFN, Catania, Italy (photos courtesy of Sofia Alexiou)

After the event, the participants were asked to fill a feedback form.

❖ Online training course on Intellectual Property, September 3rd, 2018

A half-day online training course on "IPR-Intellectual Property Rights" on September 3rd, 2018, the trainer was an IP expert. This course was addressed with priority to EMSO ERIC RT Leaders, but also to SG members.

A total of 26 participants registered for the training course, amongst them 5 RT Leaders, and 11 members of the SGs.

❖ **Training-best practices event “Dissolved oxygen: seafloor and water column data, from sensor to users”, October 12th, 2018, Brest, France**

The third training/best practices event “Dissolved oxygen: seafloor and water column data, from sensor to users” took place on the last day of the workshop on “Interoperability Technologies and Best Practices in Environmental Monitoring” in the case of coastal and open sea observatories (10-12th October 2018, Brest, France), an event organized jointly between EMSO ERIC in the framework of EMSO-Link, JERICO-next, AtlantOs and ENVRI-plus projects. This event was addressed to engineers and scientists from the marine observatories’ community, EMSO or non-EMSO. Sixty-nine participants registered.

For this event, the acquisition, processing and use of time-series marine observatory data, oxygen in this case, was a high priority topic that we identified with the other organizers, because it is widely measured at marine observatories, let it be EMSO or non-EMSO, and fixed-point or mobile observatory. Besides, oxygen was also a topic of interest during the previous days of this best practices workshop, thus this was an opportunity to gather all the concerned specialists at one time and one place.

The morning focused on presentations by specialists on topics such as scientific purposes of oxygen measurement, data oxygen acquisition in different marine settings (seafloor, water column) and configuration (fixed-point, mobile), sensors for oxygen measurement.

The afternoon was initially planned as a practical session on best practices regarding data analysis, however, due to the high number of participants (69), instead, an open session was proposed in order to discuss any issue about best practices related to oxygen. The yearly “sensor to user” training-oriented best practices workshops will focus each year on a different type of data, and gather key international actors with expertise on science, sensor technologies, and data management. These best practice workshops are specifically designed to address the need of the community of users in terms of the quality and the pertinence of EMSO data, and in terms of data quality control, metadata and data products. The first such workshop was organized in October 2018 around dissolved oxygen data (entitled “Dissolved oxygen: seafloor and water column data, from sensor to users”, Section **Errore. L'origine riferimento non è stata trovata.**). The oxygen parameter was chosen because it is a key environmental parameter, and one that is measured at several EMSO RFs. The “Sensors to users” session was part of a longer best practice workshop, organized within the frame of EMSO-Link project, and that also addressed key technical aspects of dissolved oxygen measurements in the ocean, including sensor calibration procedures. It thus allowed to gather a community of people from different horizons and particularly engineers and researchers in the field of marine observatories, EMSO or non-EMSO. We plan to reproduce as much as possible the format of this successful meeting in future “Sensors to users” Best Practice workshops:

- schedule with more technically-oriented best practice sessions on the same category of data,
- and co-organize with other European and international initiatives that collect the same category of data.