

EMODnet MedSea Checkpoint for Blue Economy efficiency and environment protection

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The EMODNET checkpoints is a wide monitoring system assessment activity aiming to support the sustainable Blue Growth at the scale of the European Sea Basins by:

- 1) **Clarifying the observation landscape of all compartments of the marine environment including Air, Water, Seabed, Biota and Human activities**, pointing out to the existing programs, national, European and international
- 2) **Evaluating fitness for use indicators** that will show the appropriateness and availability of observation and modeling data sets and their roles and synergies based upon applications selected by the EU Directorate-General of Maritime Affairs and Fisheries (also known as DG MARE) to determine how the current infrastructure is compliant to the overarching aim of “collect once and use many times” philosophy of “Marine Knowledge H2020”.
- 3) **Prioritizing the needs to optimize the overall monitoring Infrastructure** (in situ and satellite data collection and assembling, data management and networking, modeling and forecasting, geo-infrastructure) and release recommendations for evolutions to better meet the application requirements in view of sustainable Blue Growth

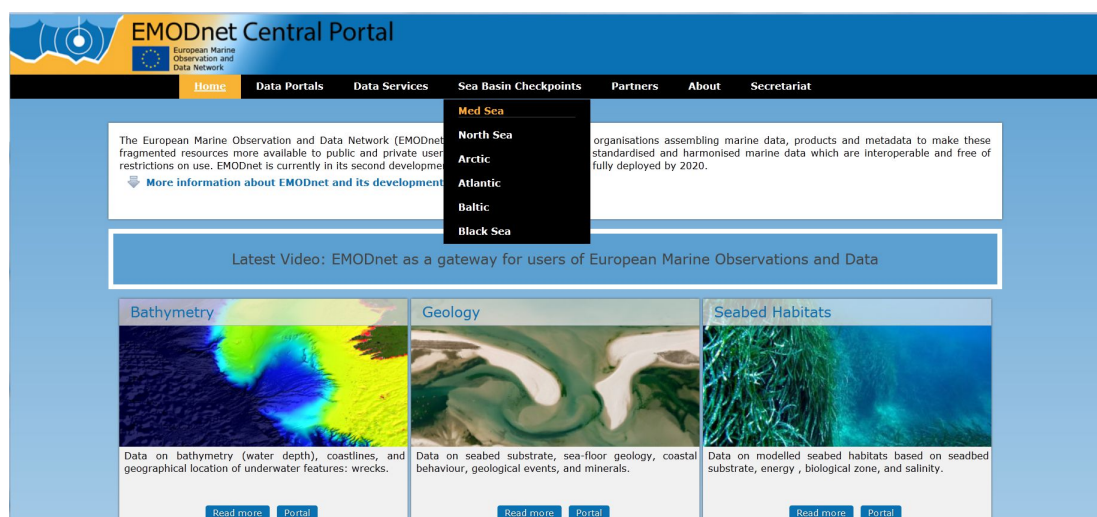


Figure 1: EMODnet Central portal (<http://www.emodnet.eu/>): Sea Basin checkpoints

The assessment is designed for:

- Institutional stakeholders for decision making on observation and monitoring systems
- Data providers and producers to know how their data collected once for a given purpose could fit other user needs
- End-users interested in a regional status and possible uses of existing monitoring data

The assessment is based on the development of selected end-user applications (“challenges”) which are of paramount importance for: (i) the Blue Economy sector (offshore industries, fisheries); (ii) marine environment variability and change (eutrophication, river inputs and ocean climate change impacts); (iii) emergency management (oil spills); and (iv) preservation of natural resources and biodiversity (Marine Protected Areas).

These applications have generated innovative products based on the existing observation landscape. The Medsea Checkpoint (<http://www.emodnet-mediterranean.eu/>) has attempted to base the fitness for use assessment of the input data used to build them on a more objective, quantitative and repeatable approach.

To do so, the Medsea checkpoint has based its approach on the ISO standards for Geographic Information (ISO 19157 Data Quality, ISO 19131 Data product specifications and ISO 19115 Metadata).

These standards provide not only the concept of quality but also a model - applicable both by data producers and data users - under which all differences of a dataset and a universe of discourse (the world of interest stated in specifications of production for a given purpose or of selection for a given use) can be:

- categorized
- evaluated
- recorded
- reported

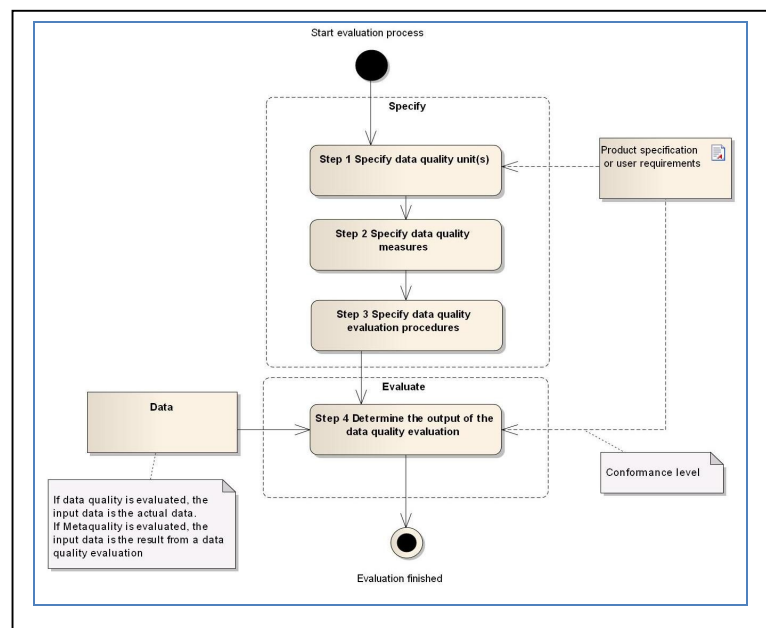


Figure 2: Assessment work flow according to ISO 19157

The fitness for use of the input datasets are assessed using 2 categories of criteria to determine how these datasets fits the user requirements which drive them to select a data source rather than another one and to show performance and gaps of the present monitoring systems :

- data appropriateness i.e. the extent to which data (“what”) fits the user needs
- data availability i.e. the extent to which data can be discovered and accessed by users (“how”).

The most relevant quality criteria to evaluate the fitness for use of input data in term of appropriateness have been selected among the ISO 19157 quality elements according to the product specifications provided by the partners of each “challenge” (application). A series of quality measures corresponding to these criteria have been specified according to the standard. They are common to the applications of the checkpoint.

The output of the evaluation is a series of indicators which are derived automatically from the differences between expected values provided in the specifications of the product and the values determined from the actual product and from the input data sets used to build it.

9 quantitative indicators of the fitness for use of input data in term of “**completeness**”, “**consistency**” and “**accuracy**” have been defined for the Medsea checkpoint input data. These indicators allow to give an overview of the extent to which input data fit the user needs in term of:

- observations (parameters),

- spatial and time coverage,
- spatial and time resolution,
- thematic accuracy
- temporal validity.

A similar process is applied to determine the fitness for use in term of data availability.

All information including product and input data selection specifications, quality measure and indicator definitions and values, are stored in a GIS platform in line with the ISO 19115/ISO19157 standards (Figure 2) and made available by the means of front-end Web interfaces to discover:

- the input data used by the challenges (Input Datasets Catalogue),
- the innovative products generated by the challenges (Target Product Catalogue)
- the assessment indicators and adequacy information of each product and input data sets
- the Data Adequacy Reports which integrate both quantitative and non-quantitative – expert knowledge based - information - on the fitness for use of the input data.

The adoption of the SeaDataNet Common Vocabularies - governed by a combined SeaDataNet and MarineXML Vocabulary Content Governance Group - for the input data classification allows to display the results by discovery parameter relevant to the oceanographic and wider community.

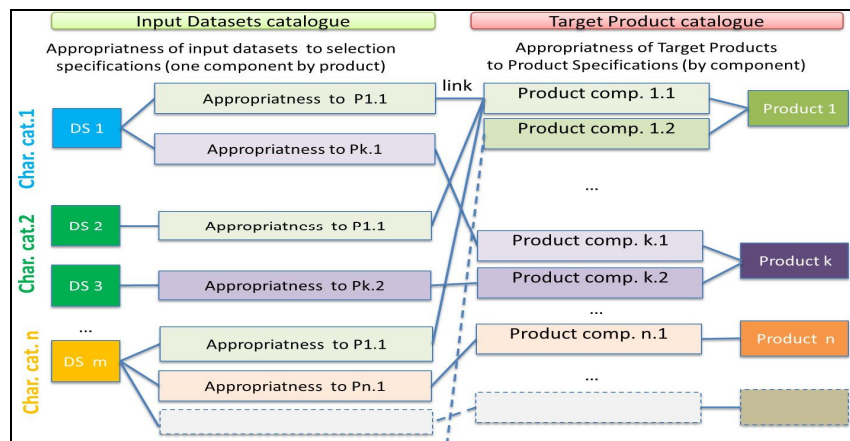


Figure 3: data quality information in database. Fitness for use of input data are recorded by product and by application (challenge). Collection of input data are described by “characteristic” (parameter).

In conclusion, the application of the ISO based methodology for data quality assessment and of the SeaDataNet Common Vocabularies provides a reference framework to measure and to compare in a more objective way the ‘data adequacy’ from one application to another one and from one Checkpoint to another.

This initial Checkpoint Service paves the way for the creation of a virtuous loop to optimize the monitoring systems in function of user needs, to recycle the existing input data sets, in all basins in Europe and to further a global assessment: Atlantic and Black Sea Checkpoints have adopted the same methodology.