EMODNET MedSea Checkpoint - Using ISO quality elements to assess the existing monitoring system at the Mediterranean Sea basin level

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http://www.emodnet-mediterranean.eu/

OUTLINE

- ✓ Context and aims of the project
- ✓ Project outputs
- ✓ Assessment process
- ✓ Main results
- ✓ Conclusions and way forward

Context

- ✓ The concept of sea-basin checkpoint was introduced within the « Marine Knowledge 2020 »
- ✓ Up to now observations of the seas have been made for specific purposes
- ✓ In order to save costs and improve marine knowledge, the EU is now moving to a new paradigm where data must be collected once to satisfy multiple uses
- ✓ This has led the Commission to establish a formal way of assessing these uses by launching the checkpoint concept

Context

- ✓ 6 ongoing checkpoint projects

Source : EMODnet Central portal => http://www.emodnet.eu/checkpoints

Context and aims

- ✓ **Clarify the data collection landscape** of all compartments of the marine environment and highlighting the existing programs at national, european and international level

- ✓ **Develop fitness-for-use indicators** to show the performance, the accessibility and usability of monitoring data for the production of Challenge targeted products

- ✓ **Define priorities** to make existing monitoring systems meeting present and future challenge needs

Assessment is the main objectif

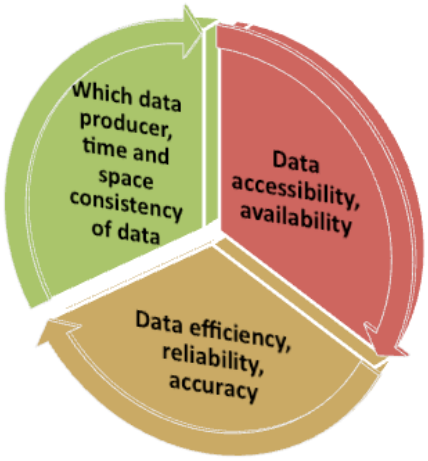
Context and aims

- ✓ To do so, a series of end-user applications (called “challenges”) of paramount importance have been selected by the DG MARE
- ✓ The purpose of these challenges is to develop innovative products from existing data sources and to assess the fitness for use of these data for these applications

Project outputs

The practical outputs of the project are:

1) A **literature survey** on the existing Mediterranean Sea monitoring systems
2) A **metadatabase** containing (Geonetwork/Sextant):
   - the catalogue of the upstream datasets
   - the catalogue of the challenge targeted products
3) A **WebGIS** allowing to discover targeted products
4) Two **Data Adequacy Reports** (DARs) on the fitness for purpose of the monitoring with respect to the 7 Challenges
5) A **website** offering direct access to checkpoint services

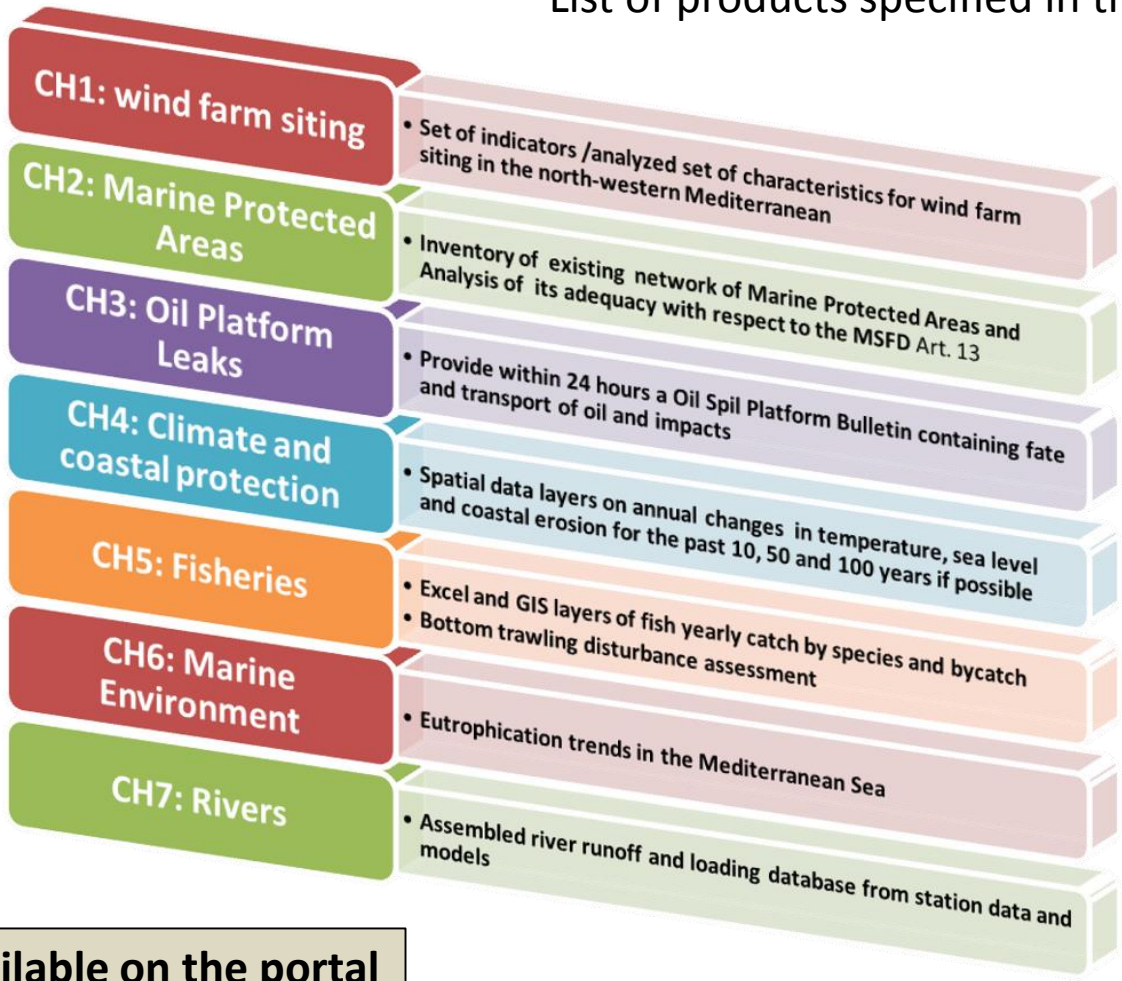


Project outputs

- ✓ The results are 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

What are the challenge targeted products?

List of products specified in the tender

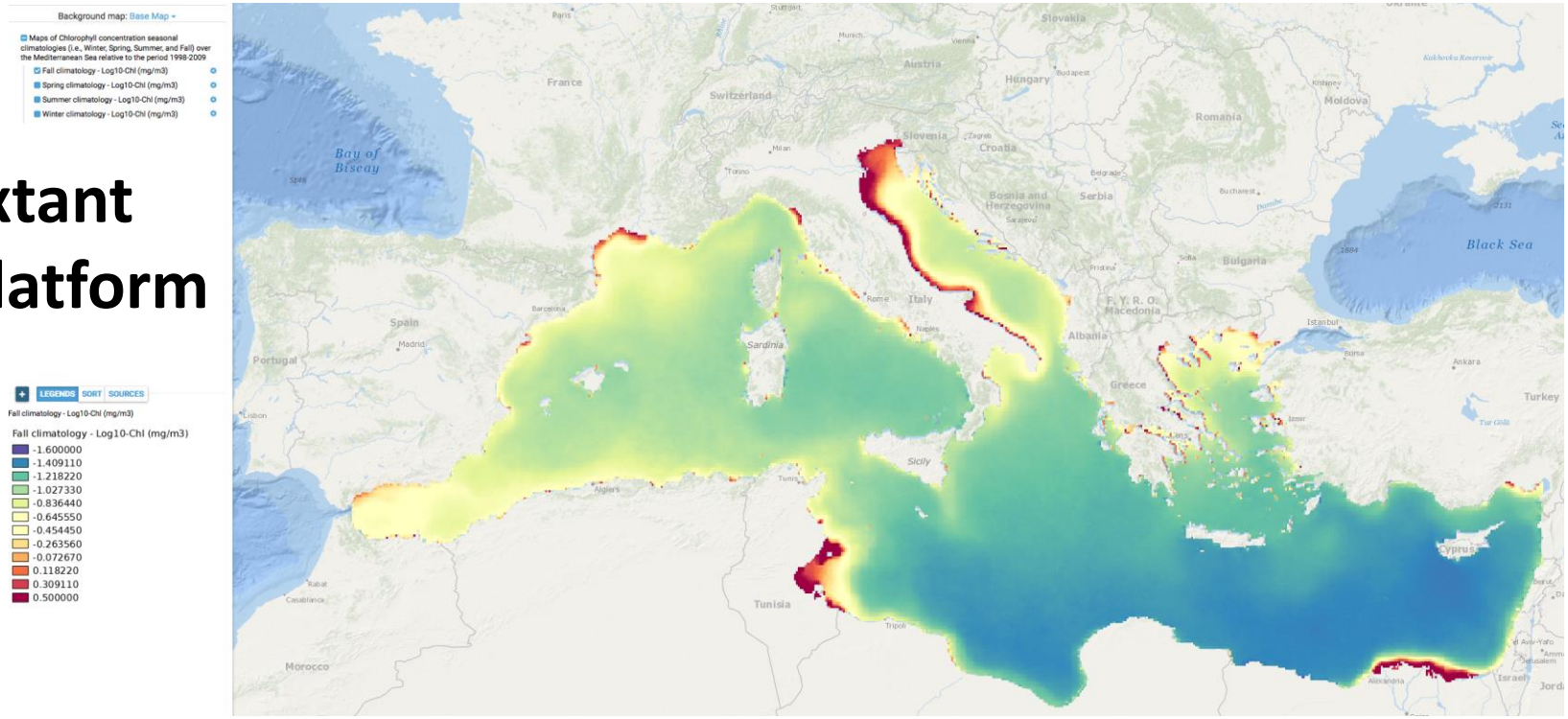


43 products available on the portal

Looking at MEDSEA_CH6_Product_1, four spatial layers represent maps of seasonal Chlorophyll (mg/m3) from CMEMS L4 satellite ocean color data for the past 10 years (2005-2014).

fall Chlorophyll climatology

Sextant GIS platform



Colella, S., Falcini, F., Rinaldi, E., Sammartino, M., & Santoleri, R. (2016). Mediterranean Ocean Colour Chlorophyll Trends. PloS one, 11(6), e0155756.

Assessment process

- The approach initiated by the Medsea checkpoint involves the development of information and indicators based on a common reference framework :
  - the **ISO TC 211 standards** for Data Product Specifications (ISO 19131), Data Quality (ISO 19157) and Metadata (ISO 19115-3)
  - The **Seadatanet Common Vocabularies** agreed by the oceanographic community are used. This vocabulary adopt a hierarchical approach for the classification of terms, from disciplines (PO3), to parameter discovery (P02), to parameter usage (P01)

Assessment process

- ✓ In the assessment process the quality evaluation is carried out according to a series of selected criteria

- ✓ The criteria are focused on two basic questions :
  - What is made available to the challenge?
    - ✓ **data appropriateness** => the extent to which data ("what") fits the user needs in term of "completeness", "consistency" and "accuracy"
  - How the input data sets are made available to the challenge use?
    - ✓ **data availability** => the extent to which data can be discovered and obtained by users ("how") in term of "visibility", "accessibility" and "performance"

Assessment process - Availability Indicators

Availability measures the degree to which datasets are ready for use and obtainable

Identifier	Availability indicators	Definition
AV-VI-1	Easily found	Can the data sets or series of data sets be found easily?
AV-VI-2	EU Inspire catalogue service	Level at which the data are indexed
AV-AC-1	Policy visibility	Visibility on data policy adopted by data providers.
AV-AC-2	Delivery mechanism	The services available to the user to access data
AV-AC-3	Data policy	Data policy
AV-AC-4	Pricing	Cost basis / price policy
AV-AC-5	Readiness	Format for use
AV-PE-1	Responsiveness	Ability to pro amount of time

VISIBILITY

ACCESSIBILITY

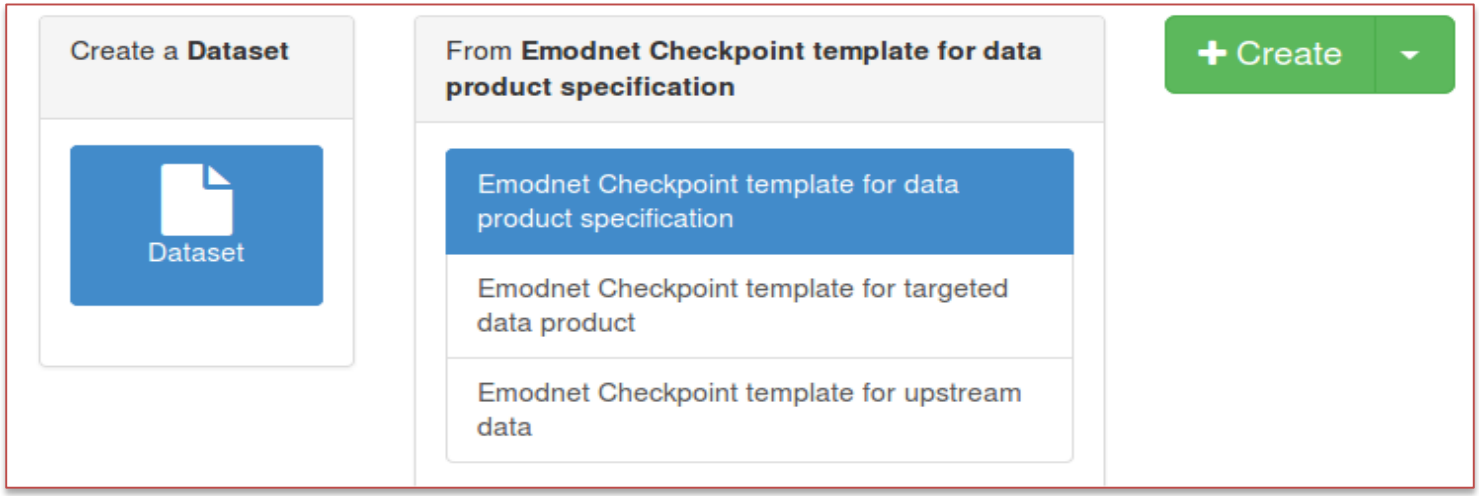
PERFORMANCE

Assessment process – Appropriateness indicators

ISO 19157			MEDSEA		
Quality Elements	**Selected Sub-Elts**	**Definitions**	**Rank and Identifier XXX being DPS,TDP, or UD**		**Quality Measures (QM)**
Completeness	Omission	The degree of absence of data in a dataset	1	XXX.AP.1.1	**Horizontal Spatial Coverage**
			2	XXX.AP.1.2	**Vertical Spatial Coverage**
			3	XXX.AP.1.3	**Temporal Coverage**
Logical consistency	Conceptual consistency	Adherence to rules of the conceptual schema	4	XXX.AP.2.1	**Number of Characteristics**
Thematic accuracy	Classification correcteness	The classification correctness of the smallest object or event that can be resolved	5	XXX. AP.3.1	**Horizontal resolution**
			6	XXX.AP.3.2	**Vertical resolution**
			7	XXX.AP.3.3	**Temporal resolution**
	Quantitative attribute accuracy	Closeness of measurements to values accepted as or known to being true	8	XXX.AP.3.4	**Thematic accuracy**
Temporal quality	Temporal validity	Validity of data with respect to time	9	XXX. AP.4.1	**Temporal validity**

Assessment process – metadatabase

- ✓A catalogue for upstream data (298 entries)
- ✓A catalogue for targeted product (being filled by challenges)



Assessment process for appropriateness

- ✓ STEP 1 : Create metadata for DPS (ISO 19131:2007)
  - ✓ General informations : date/abstract/purpose/contact…
  - ✓ Quality measures for DPS (how the product should be?)

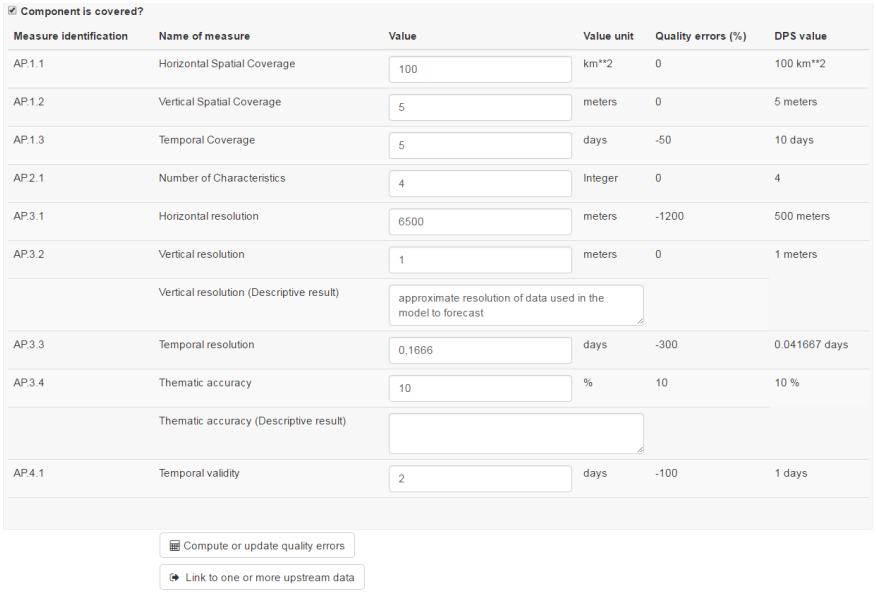
Measure identification	Name of measure	Value	Value unit
AP.1.1	Horizontal Spatial Coverage	1000000	km**2
AP.1.2	Vertical Spatial Coverage	200	meters
AP.1.3	Temporal Coverage	7300	days
AP.2.1	Number of Characteristics	20	Integer
AP.3.1	Horizontal resolution	50	meters
AP.3.2	Vertical resolution	1	meters
	Vertical resolution (Descriptive result)		
AP.3.3	Temporal resolution	0,041667	days
AP.3.4	Thematic accuracy	70	%
	Thematic accuracy (Descriptive result)		
AP.4.1	Temporal validity	7300	days

Ideal product

Assessment process for appropriateness

Product created

- ✓ STEP 2 : Create metadata for TDP
  - ✓ General information : date/abstract/purpose/contact…
  - ✓ Quality measures for TDP and computation of Quality errors
    - ✓ TDP QE_i= (DPS QM_i – TDP Qm_i)x 100 / DPS QM_i
  - ✓ Link the TDP to the corresponding DPS
  - ✓ Link the TDP to UD used to create this TDP

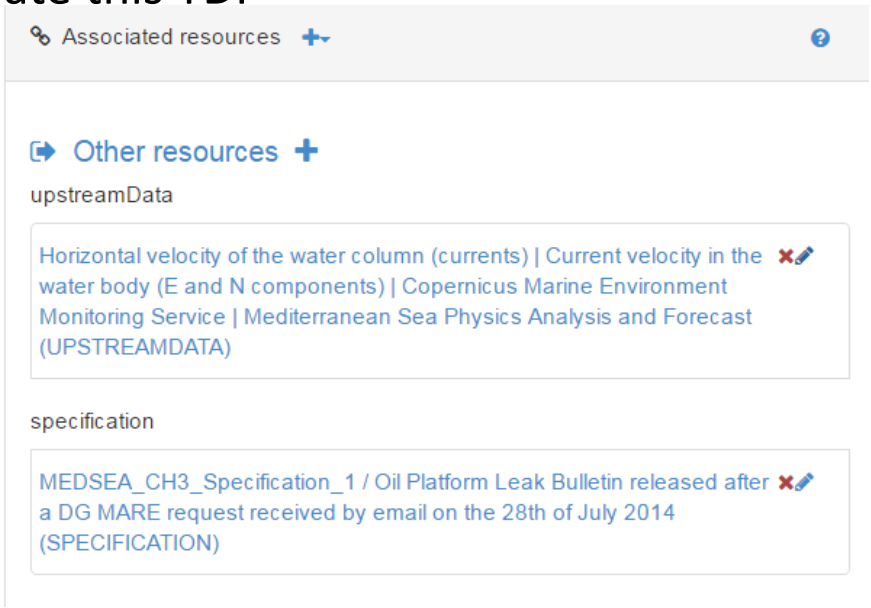


Component is covered?

Measure identification	Name of measure	Value	Value unit	Quality errors (%)	DPS value
AP.1.1	Horizontal Spatial Coverage	100	km**2	0	100 km**2
AP.1.2	Vertical Spatial Coverage	5	meters	0	5 meters
AP.1.3	Temporal Coverage	5	days	-50	10 days
AP.2.1	Number of Characteristics	4	Integer	0	4
AP.3.1	Horizontal resolution	6500	meters	-1200	500 meters
AP.3.2	Vertical resolution	1	meters	0	1 meters
	Vertical resolution (Descriptive result)	approximate resolution of data used in the model to forecast			
AP.3.3	Temporal resolution	0,1666	days	-300	0.041667 days
AP.3.4	Thematic accuracy	10	%	10	10 %
	Thematic accuracy (Descriptive result)				
AP.4.1	Temporal validity	2	days	-100	1 days

Compute or update quality errors

Link to one or more upstream data



Associated resources

Other resources

upstreamData

Horizontal velocity of the water column (currents) | Current velocity in the water body (E and N components) | Copernicus Marine Environment Monitoring Service | Mediterranean Sea Physics Analysis and Forecast (UPSTREAMDATA)

specification

MEDSEA_CH3_Specification_1 / Oil Platform Leak Bulletin released after a DG MARE request received by email on the 28th of July 2014 (SPECIFICATION)

Assessment process for appropriateness

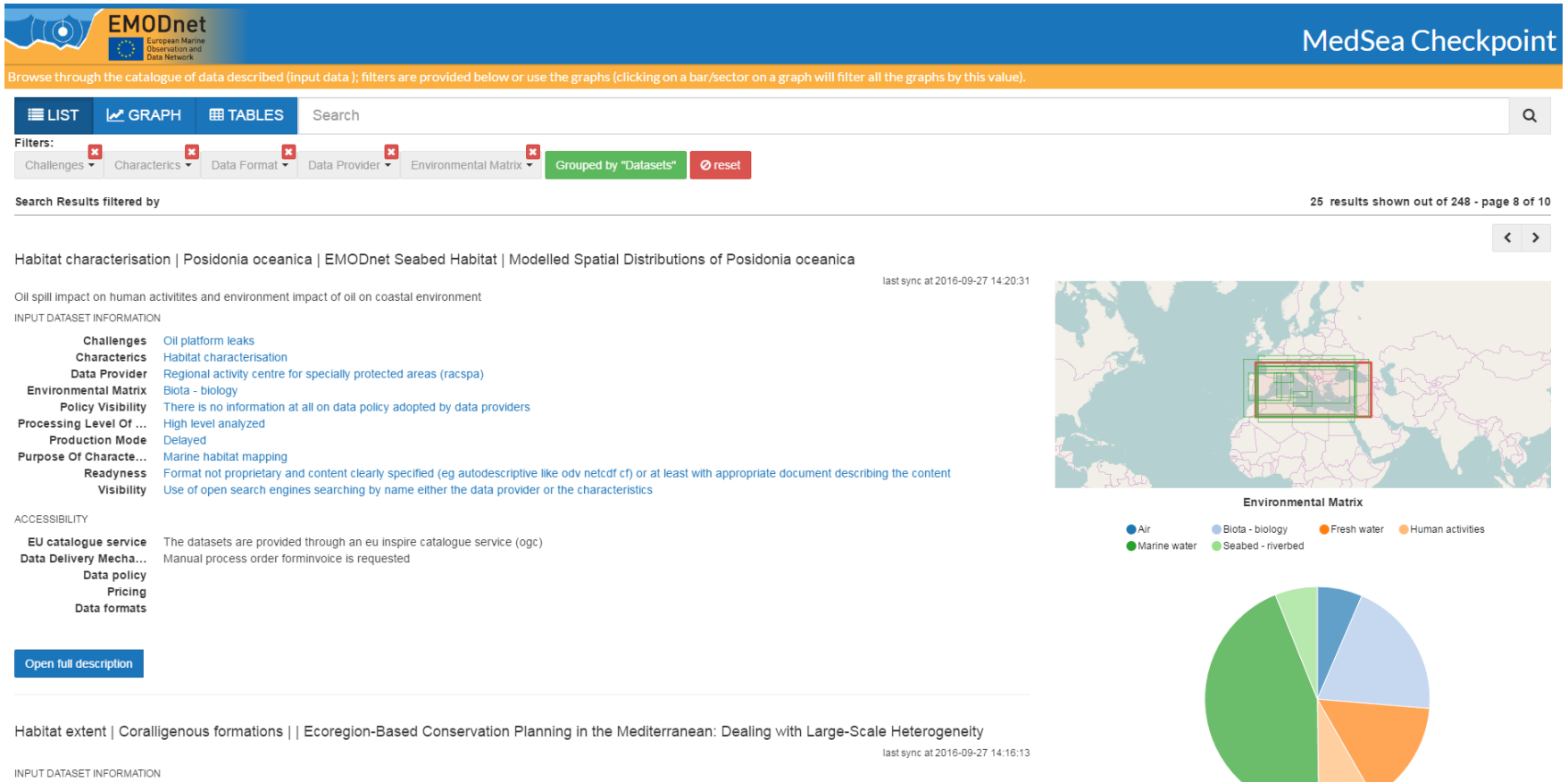
- ✓ STEP 3 : Create metadata for Upstream data
  - ✓ General information : Characteristics/Data sources/Overview…
  - ✓ Availability information : visibility/accessibility/performance
  - ✓ Quality measures for UD and computation of Quality errors
  - ✓ The **fitness for use** (usability class of ISO) for UD is determined by the aggregation of the criteria selected as relevant to evaluate the ability of the dataset to satisfy challenge needs

Measure identification	Name of measure	Value	Value unit	Quality errors (%)	Fitness for use	DPS value	TDP value
AP.1.1	Horizontal Spatial Coverage	2500000	km**2	2499900	0	100 km**2	100 km**2
AP.1.2	Vertical Spatial Coverage	4000	meters	79900	0	5 meters	5 meters
AP.1.3	Temporal Coverage	10	days	0	0	10 days	5 days
AP.2.1	Number of Characteristics		Integer	NaN	NaN	4	4
AP.3.1	Horizontal resolution	6500	meters	-1200	-849	500 meters	6500 meters
AP.3.2	Vertical resolution		meters	NaN	NaN	1 meters	1 meters
	Vertical resolution (Descriptive result)	model resolution is varying with depth.					

Note: formula are not correct right now

Main results - 1

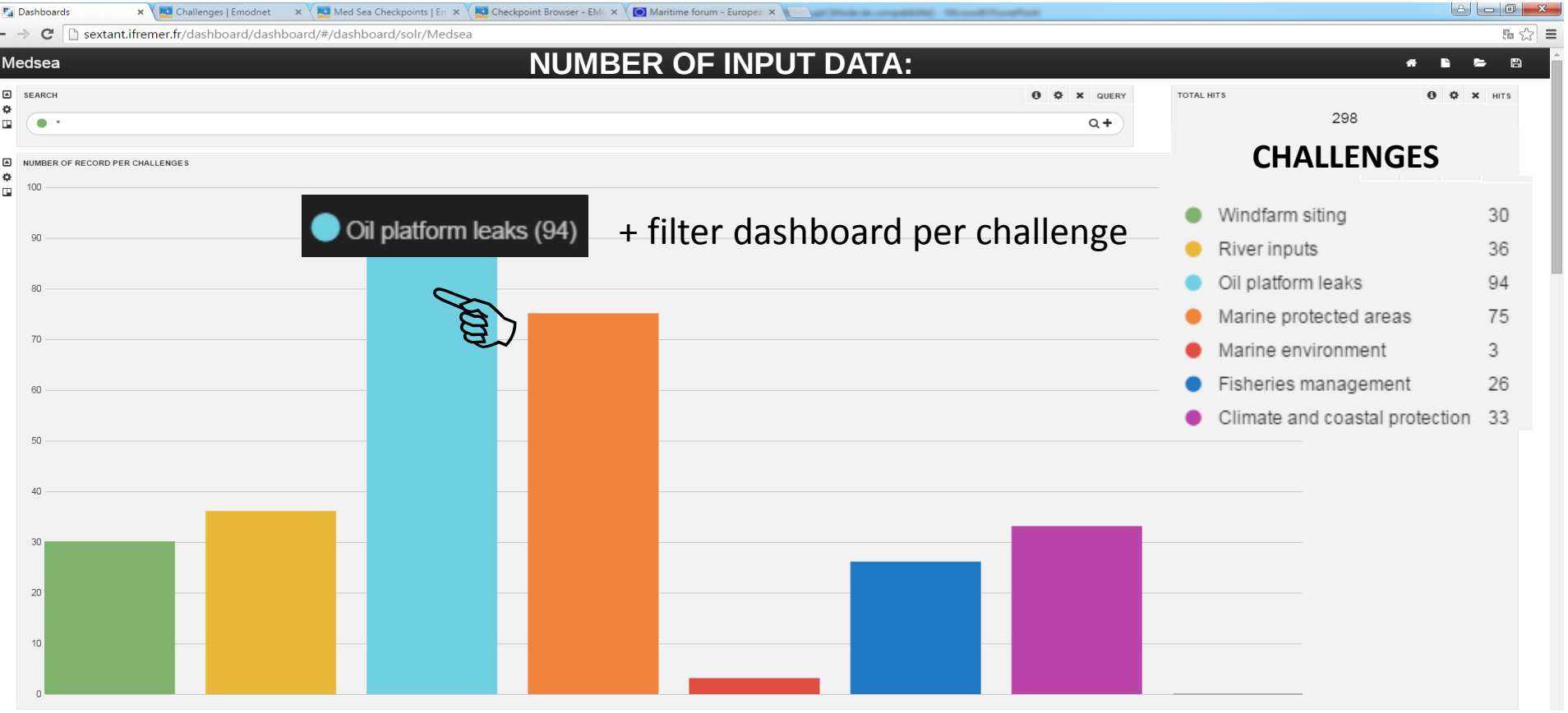
- ✓ A catalogue describing almost 300 upstream data



Main results - 2

Dashboard on availability indicators. They are constructed directly on the metadatabase of upstream datas

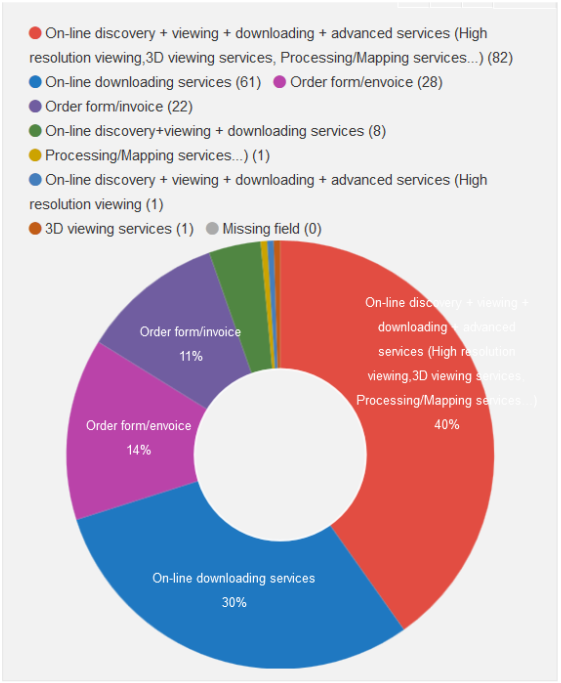
Metadata fields are used to release indicator information !



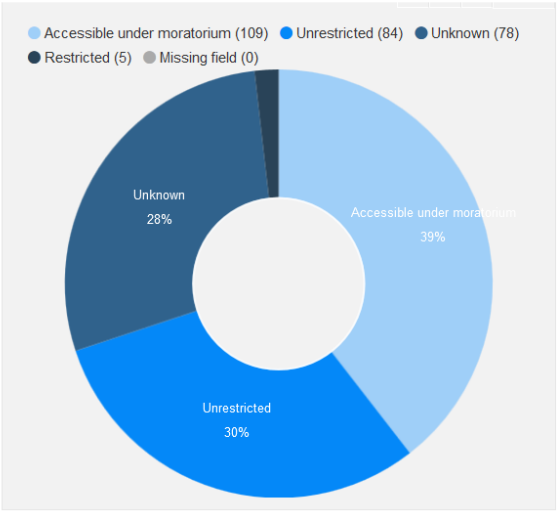
Main results - 2

Dynamic plots displaying availability indicators

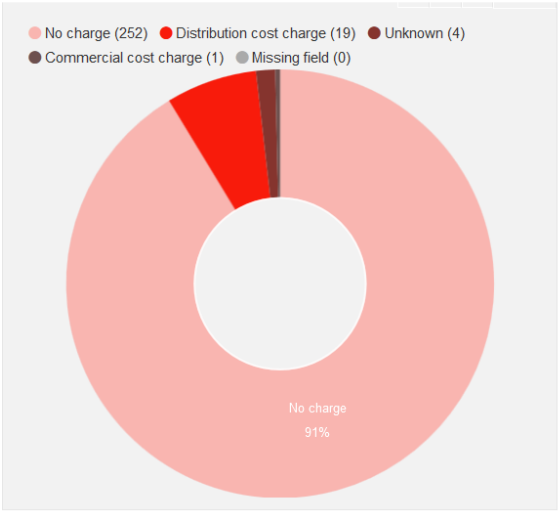
Delivery mechanism



Data policy



Pricing

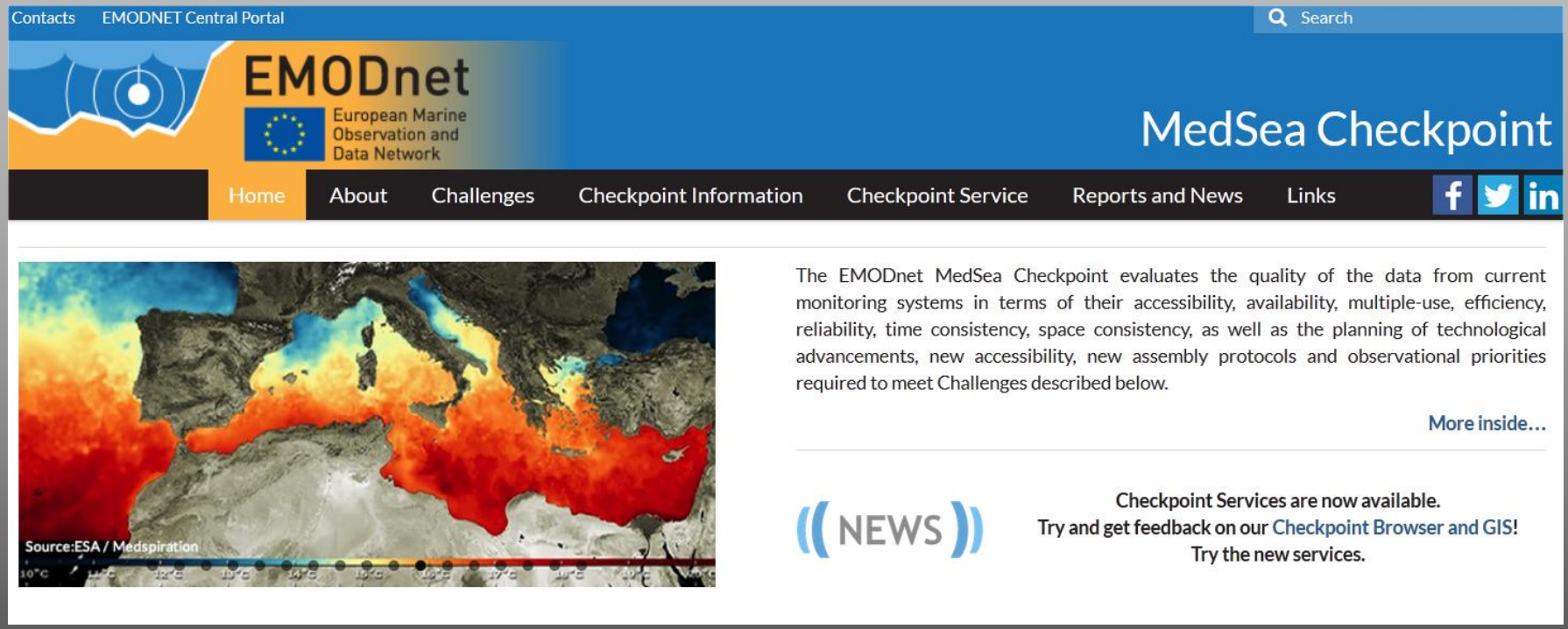


Preliminary conclusions

- ✓ The **originality of the Med CheckPoint approach** is to adopt a new method to assess monitoring systems *by end-users* based on the quality principles of the ISO standards. We also offer a visual representation of metadata catalogue allowing a non expert to easily assess the fitness for use without spending a lot of time looking at metadata and reports.

- ✓ This is in line with the INSPIRE Directive to establish the European Spatial Data Infrastructure and takes benefit of the efforts made by data centres and networks such as SeaDataNet to implement the Directive (Catalogues based on ISO19115/ISO19139).

- ✓ **Way forward: develop the Checkpoint Service for all input data sets, in all basins in Europe and make a global assessment => Atlantic and Black Sea Checkpoints are implementing the same methodology.**



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