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Use case of INSPIRE data models to map EMODnet nutrients data, adopting and adapting SeaDataCloud solution

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OGS BODC SYKE ISMAR MARIS

Introduction

- The Marine Strategy Framework Directive **(MSFD)** of the European Commission defines some **obligations** for the implementation of strategies for maintaining good environmental status.

- One of these obligations, described in the **Article 19(3),** prescribes that Member States shall make **data available** in accordance with the INSPIRE Directive standards and rules, to the European Environment Agency (EEA) and European Commission.

Introduction

- The **Technical Group on Marine Data** (TG-DATA) has taken actions for **improving** the MSFD Art.19(3).

- The **TG-DATA** provides **recommendations** for the publication of datasets under the MSFD Art.19(3). These guidelines propose some examples and best practices.

Recommendations for the publication of datasets under MSFD Article 19.3

- **TG-DATA proposed a series of examples to evaluate the feasibility of compliance with INSPIRE:**
  - Use of Sea Regions: example on Marine Litter (an example will be developed using an OSPAR dataset)
  - Use of Grids: example on Species distribution (species distribution and Habitats & biotopes)
  - **Example of nutrients:** use of Environmental Monitoring Facilities data models (the use case is developed by *EMODnet* in collaboration with *MEDCIS* project)

Example based on MSFD Criterion D5C1 "Nutrients concentrations in water"

- **We describe the use of data models from the INSPIRE data themes:**

  - Environmental Monitoring Facilities (EMF),
  - Oceanographic Geographical Features (OF)
  - Observations and Measurements (O&M)

to map **nutrients** (MSFD Criterion D5C1 "Nutrients concentrations in water") in the Mediterranean.

Example to be included in TG-DATA document

- **Source Data Representations (SeaDataNet Infrastructure)**

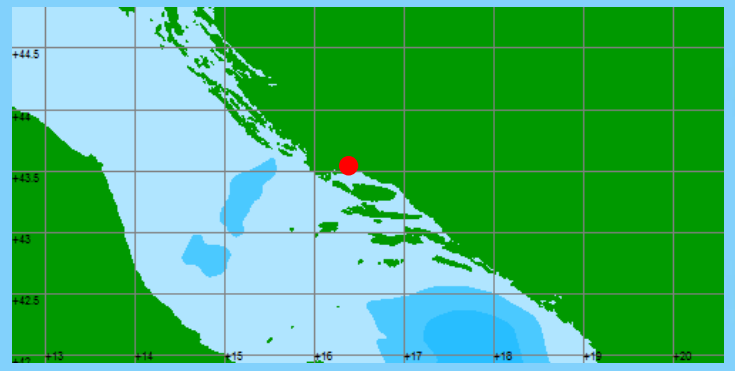
  Data used for this case study were provided by **Croatian Institute of Oceanography and Fisheries** (IOF).

  The original metadata format is the SeaDataNet **Common Data Index** (CDI), while data are provided in **Ocean Data View** (ODV) format.

  Some information are described using standard BODC vocabularies.

  For the purposes of this exercise, examples have been developed using **Nitrite** and **Phosphate** data.

  http://seadatanet.maris2.nl/v_cdi_v3/print_ajax.asp?screen=0&n_code=2581516



SeaDataCloud WP8 - Deliverable 8.6 - Part a “Review of data formats, also considering INSPIRE data models (O&M)”

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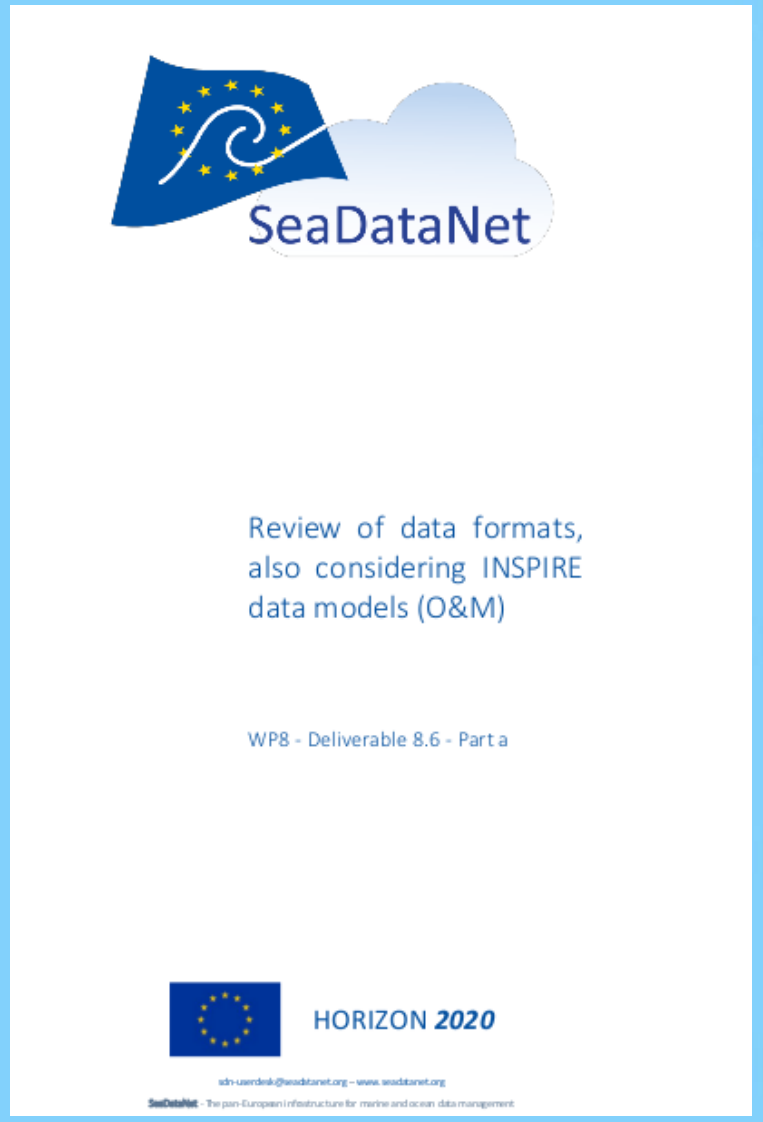
For this study, we **adopted** and **adapted** the solution developed and proposed in the **SeaDataCloud** project.

For the purposes of this exercise, examples have been developed using **Nitrite** and **Phosphate** data.

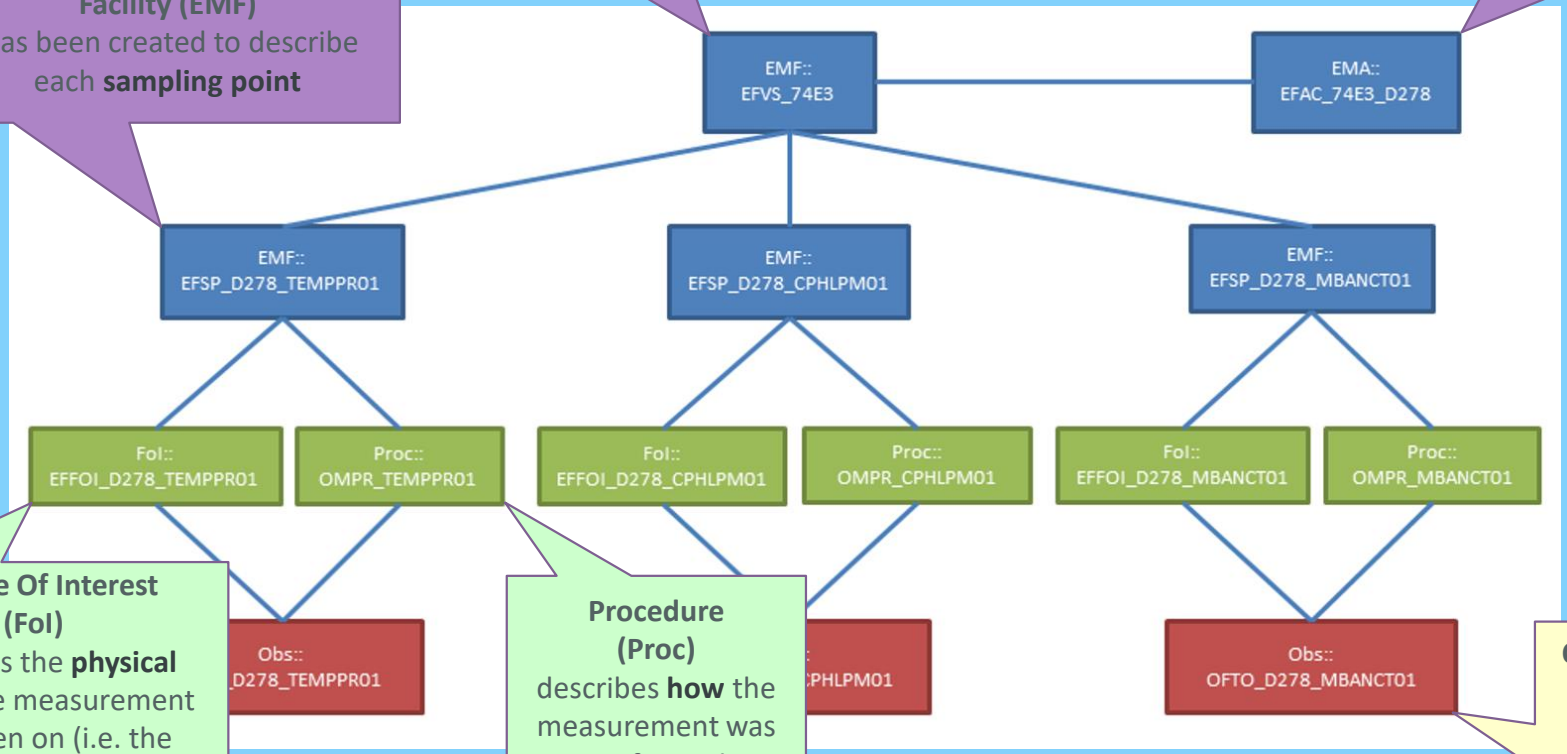


SeaDataCloud …dels:

Environmental Monitoring Facility (EMF)
provides data on the **platform** (e.g. Marine Vessel) at which the data provided was assigned

Environmental Monitoring Activity (EMA)
can be seen as corresponding with a vessel **cruise**

Environmental Monitoring Facility (EMF)
has been created to describe each **sampling point**

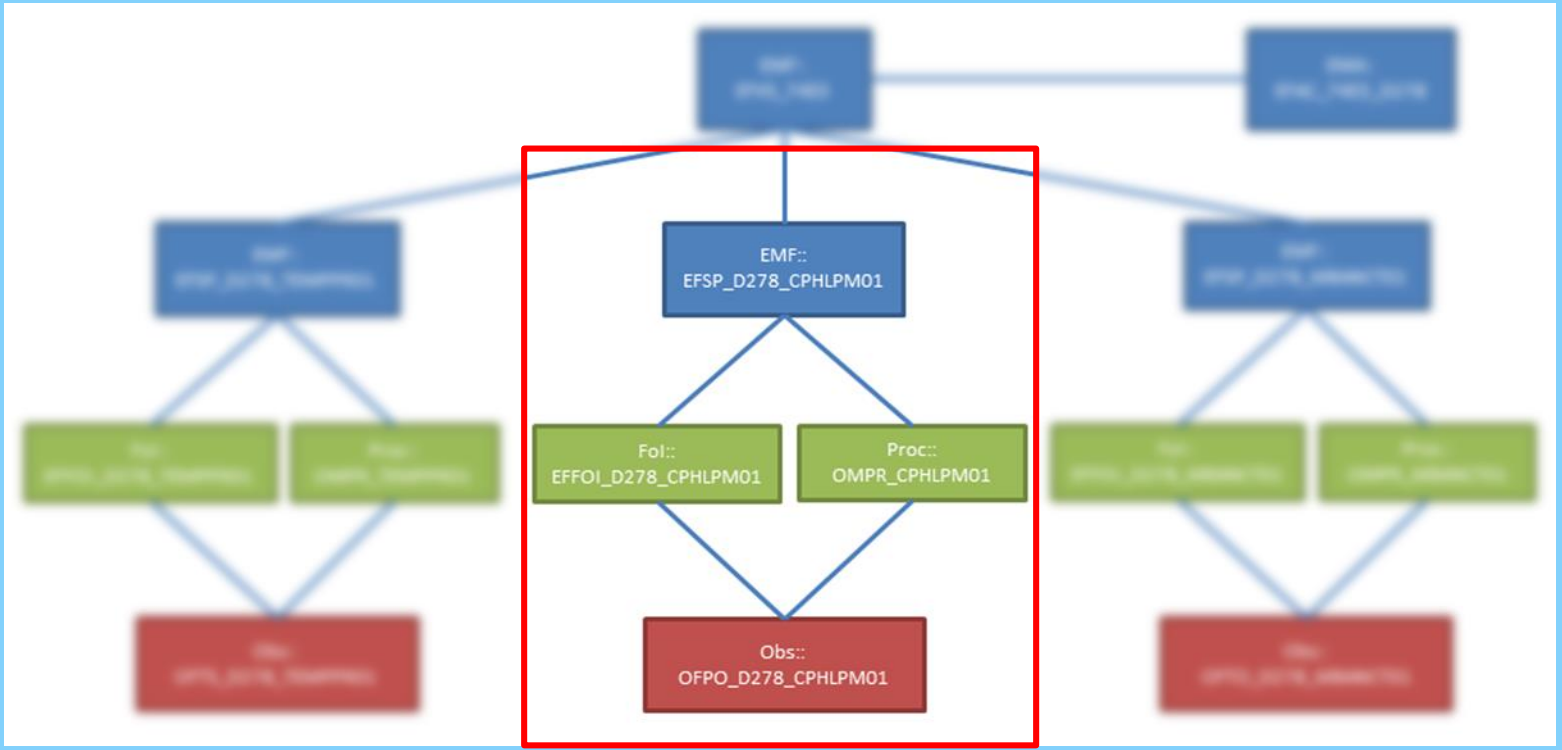


Feature Of Interest (FoI)
describes the **physical object** the measurement was taken on (i.e. the location)

Procedure (Proc)
describes **how** the measurement was performed

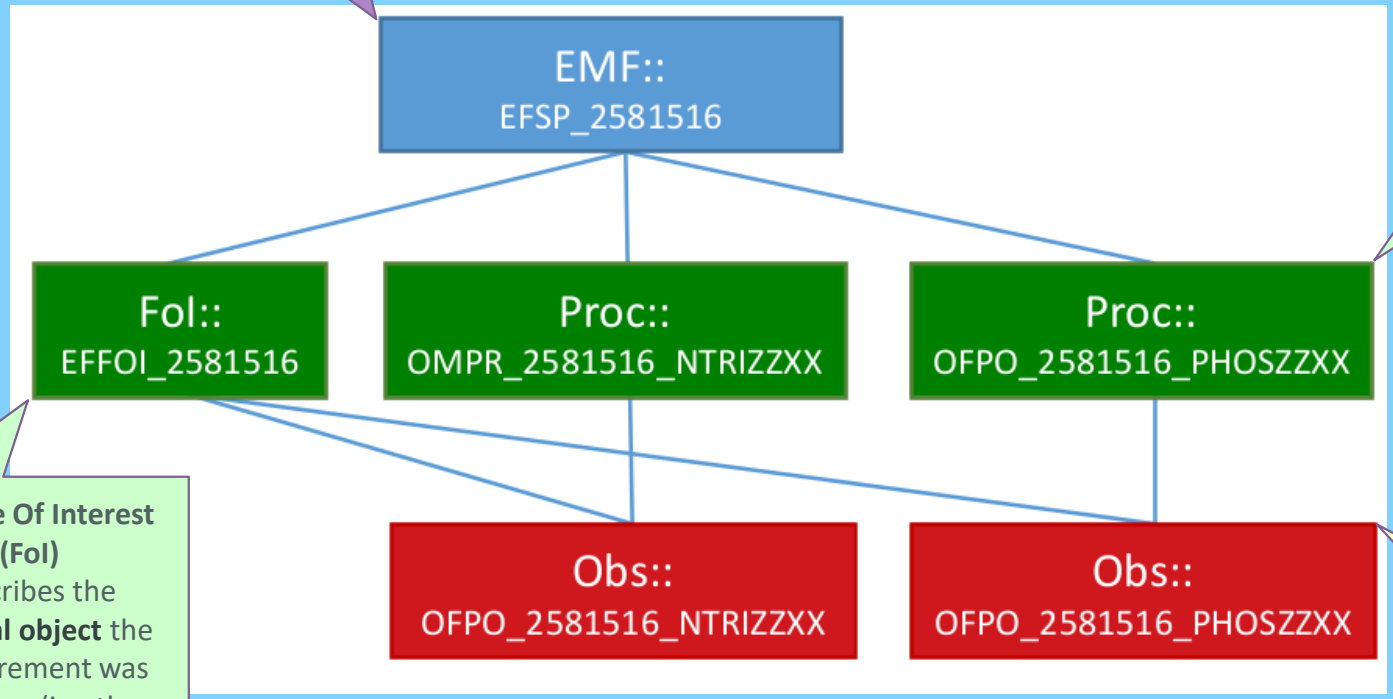
Observed Property (Obs)
defines **what** was measured

SeaDataCloud INSPIRE data models:



For monitoring data, we don't have all information about platform (e.g. Marine Vessel) or activities (vessel cruise). We decided to **adapt the structure proposed by SeaDataCloud** and use Environmental Monitoring Facility (EMF) to collect CDI information.

Adapt oud INSPIRE data models:



Environmental Monitoring Facility (EMF) has been created to describe each **CDI**

Procedure (Proc) describes **how** each parameters was acquired

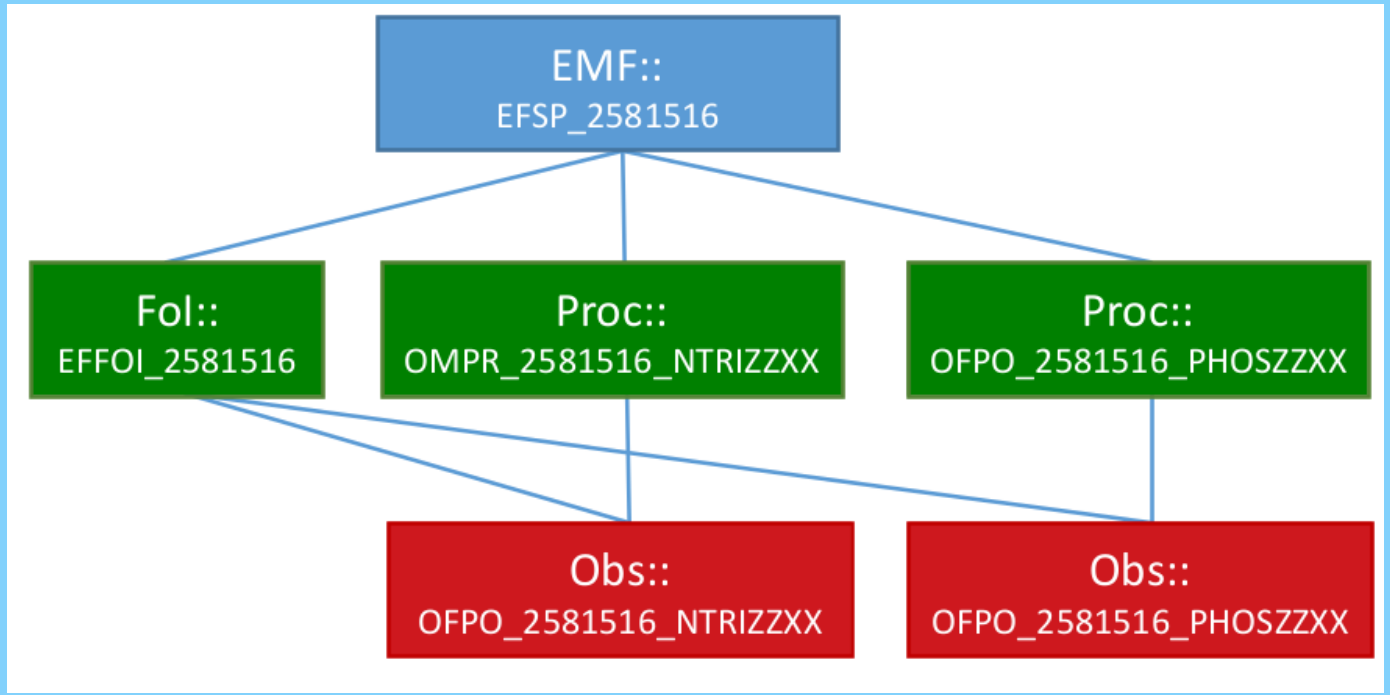
Feature Of Interest (FoI) describes the **physical object** the measurement was taken on (i.e. the location)

Observed Property (Obs) defines **what** was measured

Relationship between different INSPIRE classes:

- in **blue** stem from the INSPIRE Theme EMF,
- in **red** stem from the specialized observations utilized for the INSPIRE Theme OF,
- in **green** objects are the area of overlap, utilized by both INSPIRE Themes.

Adapted SeaDataCloud INSPIRE data models:



As synthesized in figure and in more detail in the GML examples, the **Environmental Monitoring Facility** is described as a single Sampling Point, where the **Feature of Interest** in the water column (at 4 depths: 0, 5, 10 and 18 m) at that specific location. The **process** relates with two different parameter analysed, Nitrites and Phosphate, producing as results two **Observations**.

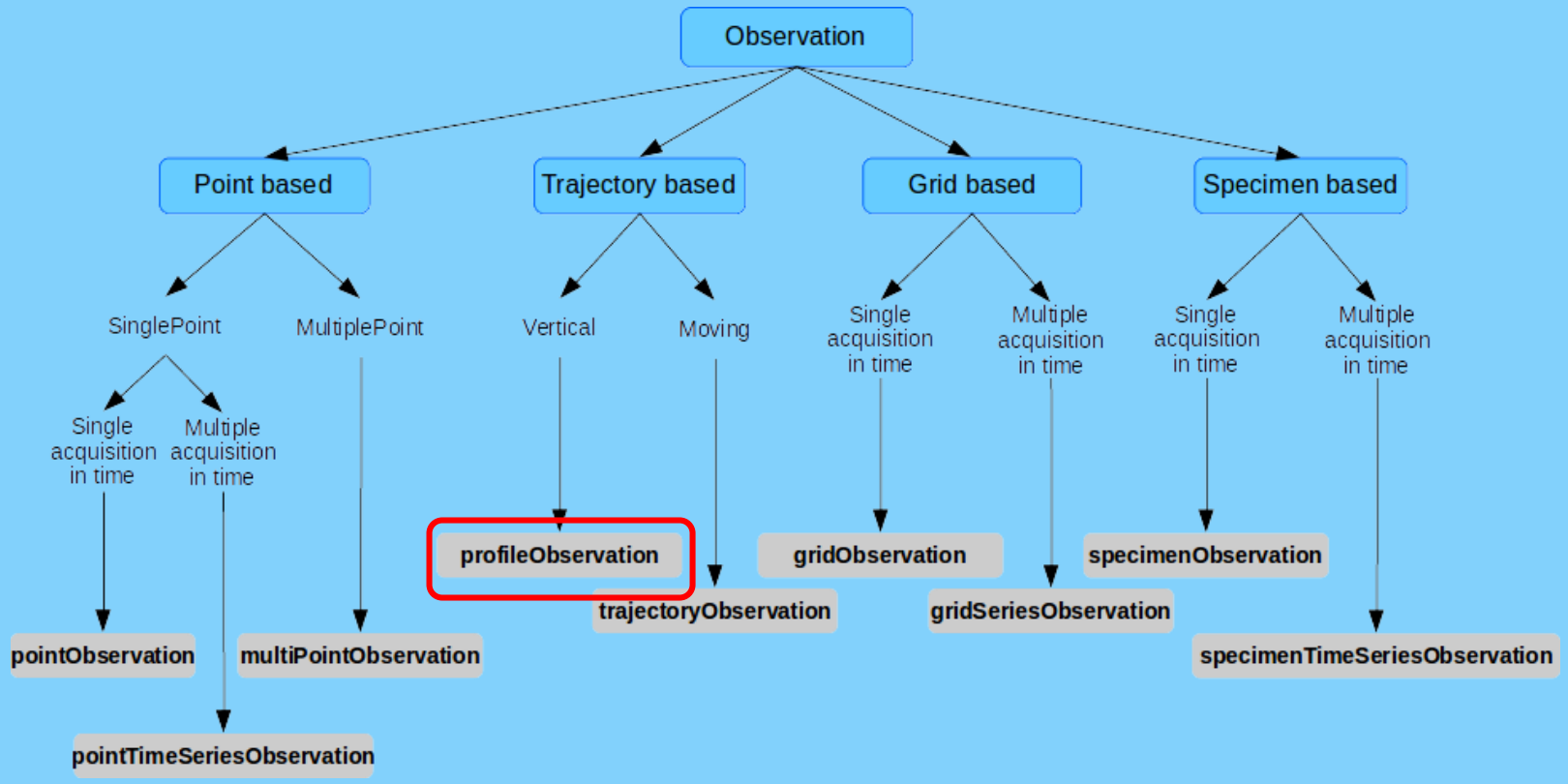
Mapping from source to target

Attribute Association role Constraint	Values/ Enumerations	Multiplicity	Example	Source	Path
Application Schema 'Environmental Monitoring Facilities' (version 4.0)			**Application Schema <provide the name of the application schema>**		
gml:id	NCName	1	EFSP_2581516	CDI	EFSP_ + [CDI-record id]
inspire Id	Identifier	1			
localId	CharacterString	1	EFSP_2581516	CDI	EFSP_ + [CDI-record id]
namespace	CharacterString	1			
additional Description	CharacterString	0...1		CDI	gmd:MD_Metadata/gmd:identificationInfo/sdn:SDN_DataIdentification/gmd:abstract/gco:CharacterString

The mapping between SeaDataCloud metadata and INSPIRE elements was done using CDI and ODV (http://nodc.ogs.trieste.it/INSPIRE_compliant/INSPIREmatching_MEDCIS.xlsx).

The INSPIRE data models have been designed in a complementary manner and are interconnected between them.

OM_Observation: profileObservation



Among the different types of observations that can be described with O&M standards, we decide, **based on the nutrients data** used for testing, to adopt the **ProfileObservation** as XML profile.

INSPIRE GML

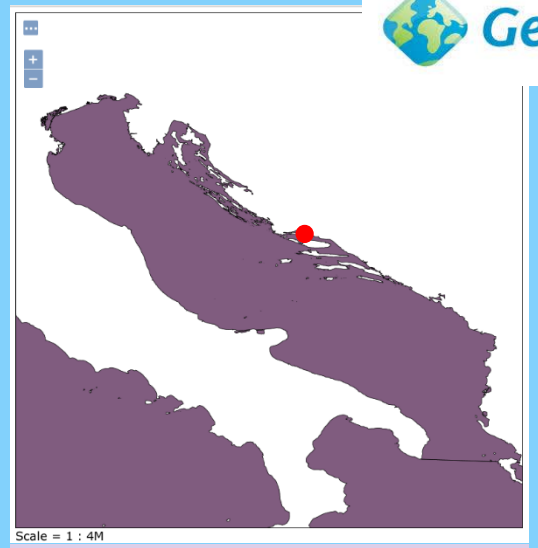
```
<!--Result-->
<gml:resultOf>
  <gmlcov:GeneralGridCoverage gml:id="GGC_2581516_PHOSZZXX">
    <gmlcov:DomainSet>
      <gmlcov:GeneralGrid srsName="http://vocab.nerc.ac.uk/collection/P01/current/ADEPZZ01/" axisLabels="DepBelowSurf">
        <gmlcov:DisplacementAxisNest axisLabels="DepBelowSurf" uomLabels="m">
          <gmlcov:P>
            <gmlcov:C>0</gmlcov:C>
            <gmlcov:C>5</gmlcov:C>
            <gmlcov:C>10</gmlcov:C>
            <gmlcov:C>18</gmlcov:C>
          </gmlcov:P>
        </gmlcov:DisplacementAxisNest>
      </gmlcov:GeneralGrid>
    </gmlcov:DomainSet>
    <gmlcov:RangeSet>
      <gmlcov:DataBlock>
        <gmlcov:CV>
          <gmlcov:V>0.13667</gmlcov:V>
          <gmlcov:V>0.117688</gmlcov:V>
          <gmlcov:V>0.106299</gmlcov:V>
          <gmlcov:V>0.167041</gmlcov:V>
        </gmlcov:CV>
      </gmlcov:DataBlock>
    </gmlcov:RangeSet>
    <gmlcov:RangeType>
      <swe:DataRecord>
        <swe:field name="PHOSZZXX" xlink:href="http://vocab.nerc.ac.uk/collection/P01/current/PHOSZZXX/">
          <swe:Quantity>
            <swe:label>P04</swe:label>
            <swe:uom code="micromol/l" xlink:href="http://vocab.nerc.ac.uk/collection/P06/current/UPOX"/>
          </swe:Quantity>
        </swe:field>
      </swe:DataRecord>
    </gmlcov:RangeType>
  </gmlcov:GeneralGridCoverage>
</gml:resultOf>
</gml:Observation>
</gml:featureMember>
</gml:FeatureCollection>
```

A complete version of XML files are downloadable at the following link: http://nodc.ogs.trieste.it/INSPIRE_compliant

GML publication

GML to SHP for publication

WMS publication



nodc.ogs.trieste.it/geoserver/Nodc/wms?service=WMS&version=1.1.0&request=GetMap&layers=Nodc:INSPIRE-test&styles=&bbox=15.6768,43.1265,16.7054,44.1716&width=755&height=768&srs=EPSG:4326&format=application/openlayers

Conclusion

The exercise demonstrates the completeness of **EMODnet Chemistry** metadata with respect to **INSPIRE** requirements and the feasibility to map EMODnet to INSPIRE models. It shows that EMODnet platform could be used to expose monitoring data following Art.19(3), i.e. compliant with INSPIRE, when a centralized tool will be developed to convert formats.

Thanks for your attention!