
SeaDataNet Common Data Index (CDI) metadata model for Marine and Oceanographic Datasets

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Title: SeaDataNet Common Data Index (CDI) metadata model for Marine and Oceanographic Datasets

Scope: Proposal to acknowledge SeaDataNet Common Data Index (CDI) metadata profile of ISO 19115 as a standard metadata model for the documentation of Marine and Oceanographic Datasets. In particular, the proposal aims to promote CDI as a regional (i.e. European) standard.

SeaDataNet CDI has been drafted and published as a metadata community profile of ISO 19115 by SeaDataNet, the leading infrastructure in Europe for marine & ocean data management. Its wide implementation, both by data centres within SeaDataNet and by external organizations makes it also a de-facto standard in the Europe region.

The acknowledgement of SeaDataNet CDI as a standard data model by IODE/JCOMM will further favour interoperability and data management in the Marine and Oceanographic community.

Envisaged publication type: The proposal target audience includes all the European bodies, programs, and projects that manage and exchange marine and oceanographic data. Besides, the proposed document informs all the international community dealing with marine and oceanographic data about the SeaDataNet CDI metadata model.

Purpose and Justification: Provide details based wherever practicable.

1. Describe the specific aims and reason for this Proposal, with particular emphasis on the aspects of standardization covered, the problems it is expected to solve or the difficulties it is intended to overcome.

By acknowledging SeaDataNet CDI as a standard data model for Marine and Oceanographic datasets, multiple objectives are sought:

- Wider adoption of SeaDataNet CDI by additional marine data centres around European waters. The process will favour further harmonisation and standardisation of European ocean and marine metadata as well as interoperability by reducing the existing metadata heterogeneity. Organizations adopting this standard will be able to document their datasets according to a well-known and well specified marine metadata model, therefore the data management and exchange of marine and oceanographic information will be eased in many ways (see following point 2).
- Ease interoperability and outreach towards international communities and initiatives. The existence of a recognized standard at European level will favour its understanding also at a broader level.
Example given, international marine and oceanographic communities will be able to correctly understand the information carried by SeaDataNet CDI model.

2. Describe how this proposed standard supports data management, exchange or interoperability. When applicable include mention of what data management functions (e.g. data transport, quality control, archive) the proposal supports.

SeaDataNet CDI supports data management by providing a metadata profile of ISO 19115 to document individual datasets and collections managed and archived by Pan-European marine data centres.

Many metadata elements from ISO 19115 are part of the profile, including elements allowing discovery (e.g. using common criteria: what, when, where, who), evaluation (e.g. lineage), access and use (e.g. online resource information).

Extended (and restricted) elements are present as well, in order to tailor SeaDataNet CDI according to the specific needs of the marine and oceanographic community. Example given, specific elements having a free text domain in ISO 19115 are domain restricted in SeaDataNet CDI only to the values listed in specific code lists. This is the case of organisation names, allowing values only from the EDMO vocabulary. Other vocabularies used to restrict the allowed values of specific elements of SeaDataNet CDI include (but not limited to):

- EDMED - European Directory of Marine Environmental Data sets
- EDMERP - European Directory of Marine Environmental Research Projects
- SeaVoX Platform Categories
- SeaVoX salt and fresh water body gazetteer
- International Standards Organization countries
- SeaDataNet Parameter Discovery Vocabulary
- BODC data storage units

SeaDataNet CDI is a metadata community profile of ISO 19115, drafted and published according to ISO methodologies. SeaDataNet CDI is also compliant with the European directive INSPIRE, which imposes a common set of mandatory and optional metadata elements to be documented by all the organizations from EU countries that are sharing spatial datasets. Compliancy with ISO and INSPIRE eases interoperability towards different communities.

3. Describe the main interests benefitting from or affected by the proposed standard, such as industry, consumers, governments, distributors. Identify any relationships and/or dependencies.

Adoption by IODE/JCOMM of SeaDataNet CDI as a metadata standard will give extra momentum to European marine and ocean data centres adopting SeaDataNet. This will also benefit users from all over the world from various sectors. Moreover, it will benefit efforts for global interoperability (such as ODIP project activities) because that process can focus on a limited set of marine metadata profiles, whereby SeaDataNet CDI represents European input.

4. Describe the feasibility of implementing the proposed standard. Include any factors that could hinder the successful establishment or global application of the Proposed standard. Are there any associated issues? Identify resource implications resulting from the recommendations.

The feasibility and practicality of implementing the SeaDataNet CDI can be, and has already been successfully accomplished at 57 data centres within the SeaDataNet partnership. Moreover, another 47 data centres in Europe at present have realized the

CDI implementation for their managed data sets giving in total access to already more than 1.6 million data sets for physical oceanography, chemistry, geology, geophysics, bathymetry and biology. The results of these activities can be followed at the operational CDI data access service, that is part of the SeaDataNet portal (<http://www.seadatanet.org>). The implementation is supported by dedicated Training Workshops which deal with presenting the standards and the associated tools and which provide hands-on training activities to get fully acquainted with them. The training material is also documented in Vademecums for study and consultation. The time needed for full implementation at a data centre is approximately estimated in 12 months considering the mapping of legacy datasets to SeaDataNet CDI and deployment of the associated SeaDataNet CDI tools.

5. Considering the needs of other fields or organizations, indicate the timeliness, target date(s), or if proposing a series of standards, suggest priorities. List any statutory requirement or other driving factors.

There are no statutory requirements for adoption of the SeaDataNet CDI standard as one of the metadata discovery standards. The National Oceanographic Data Centres in Europe are bound to implement the standard within their contractual obligations of several EU projects. The NODCs also motivate other data centres in their countries to adopt it. The IOC recommendation will add to this process.

6. Describe the possible benefits gained by the implementation of the proposed standard. Alternatively, describe the loss or disadvantage(s) if no standard is established within a reasonable time.

The advantage of using the SeaDataNet CDI standard in Europe is described in (2) and (3). There are no anticipated disadvantages to adopting it.

7. Indicate whether the proposed standard is or may become the subject of regulations or may require the harmonization of existing regulations. Describe any impacts of this activity.

The SeaDataNet CDI standard is a de-facto standard in Europe and increasingly prescribed in calls for proposal and contracts by the European Commission for framework programmes and the EMODNET implementation as part of the EU Marine Directive.

Current Operational Implementations: At present already 57 National Ocean Data Centers (NODC's) and marine data centres within the SeaDataNet partnership have successfully implemented the SeaDataNet CDI standard and are leveraging it at their local centre for giving overview and access to their managed data sets as part of the Data Discovery and Access Services of the SeaDataNet infrastructure (see <http://www.seadatanet.org>). Another 47 data centres in Europe at present have implemented the SeaDataNet CDI standard as part of related EU funded projects (FP6-Upgrade Black Sea SCENE, FP6-CASPINFO, FP7/Geo-Seas, EMODNET Projects, FP7-EuroFleets, FP7-JERICO, FP7-CitClops, FP7-Micro B3, ..). The results of these activities can be followed at the SeaDataNet portal, where at present search can be distributed against 104 data centres, giving access to already more than

1.6 million data sets for physical oceanography, chemistry, geology, geophysics, bathymetry and biology. Implementation is currently based on the reference SeaDataNet XML encoding: a CSW ISO service is available for queries from automatic tools (e.g this is the interface leveraged by GEOSS), as well as an OAI-PMH service (e.g. leveraged to automatize harvesting by the ODP portal).

In addition, SeaDataNet has been adopted as the leading component for data management in the development of the European Marine Observation and Data Network (EMODNet) which was initiated in the framework of the MSFD. This contributes to SeaDataNet perspective towards long term sustainability.

Different software tools are implementing SeaDataNet CDI, such as the MIKADO metadata editor and the GI-cat discovery broker.

Relevant Documents:

The following document (attached to the current proposal) is the normative specification for the SeaDataNet CDI metadata model:

- E.Boldrini, S.Nativi. SeaDataNet CDI metadata profile of ISO 19115, Version 10.0.0, September 2013, published at <http://www.seadatanet.org/Standards-Software/Metadata-formats/CDI>

The SeaDataNet CDI homepage represents as well an informative reference for SeaDataNet CDI, containing the normative reference document, as well as related standards (e.g. the XML encoding of SeaDataNet CDI metadata model) and useful documentation:

- SeaDataNet CDI metadata profile Homepage, at <http://www.seadatanet.org/Standards-Software/Metadata-formats/CDI>

Cooperation and liaison:

1. **Existing Community:** All the organizations listed in the '**Current Operational Implementations**' section are using SeaDataNet CDI in an operational environment and represent the SeaDataNet CDI community. In particular MARIS, CNR-IIA and IFREMER have been involved in the drafting and publication of the SeaDataNet CDI standard (together with the rest of the SeaDataNet Technical Task Team) and are responsible for the current proposal submission.
2. **Expanded Community:** Firstly, other relevant marine and oceanographic data centres in Europe that are not yet engaged in the NODC national networks and/or any of the EU projects and would like to adopt SeaDataNet CDI as the metadata model for their datasets.

Moreover, other marine and oceanographic data centres worldwide eager to discover, evaluate and access SeaDataNet CDI datasets at full. In this regard, SeaDataNet is establishing exchanges from its infrastructure and portal to GEOSS, Ocean Data Portal (ODP) of IOC-IODE, EurOBIS and the European Nucleotide Archive (ENA) of EMBL-EBI. These activities have been extended with the active participation of SeaDataNet in the Ocean Data

Interoperability Platform (ODIP) project where cooperation takes place with leading oceanographic data infrastructures from the USA (US NODC, IOOS, R2R), Australia (IMOS) as well as IOC-IODE to explore common standards and interoperability solutions.

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List of Acronyms:

- CDI – Common Data Index
- CNR-IIA – National Research Council of Italy – Institute of Atmospheric Pollution Research
- EDMED - SeaDataNet European Directory of Marine Environmental Data sets
- EDMERP - SeaDataNet European Directory of Marine Environmental Research Projects
- EDMO – SeaDataNet European Directory of Marine Organisations
- EMODNET – European Marine Observation and Data Network
- EU – European Union
- EuroFleets – EU FP7 project Towards an Alliance of European Research Fleets
- GEOSS – Group on Earth Observation System of Systems
- Geo-Seas - EU FP7 project for a Pan-European Infrastructure for Marine Geological and Geophysical Data Management
- IFREMER – Institut Français de recherche pour l'exploitation de la mer
- IOC – Intergovernmental Oceanographic Commission
- IODE – International Oceanographic Data and Information Exchange
- ISO – International Organization for Standardization
- MARIS – Mariene Informatie Service
- MIKADO – SeaDataNet metadata editor software tool
- MMI – Marine Metadata Initiative
- MSFD - Marine Strategy Framework Directive
- NEMO – SeaDataNet ASCII data formats conversion software tool
- NODC – National Oceanographic Data Center
- ODIP - Ocean Data Interoperability Platform
- ODP - Ocean Data Portal
- SeaDataNet – EU FP6 project for a Pan-European Infrastructure for Marine and Oceanographic Data Management
- SeaVoX – mailing list governing the SeaDataNet Common Vocabularies

- Upgrade Black Sea SCENE - EU FP7 project for an Upgrade Black Sea Scientific Network
- URL – Uniform Resource Locator
- URN – Uniform Resource Name
- Vocabs – SeaDataNet Common Vocabularies services
- XML – Extensible Mark-up Language
- XSD – XML Schema Definition

Other Attachments: No other attachments.