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Observations and Measurements Design Patterns within INSPIRE

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Several INSPIRE spatial data themes have been specified so that their scope, in addition to classical geographic information, includes measured, modelled or simulated data. The FprEN ISO 19156 standard on Observations and Measurements (O&M) was designed for the explicit purpose of creating application schemas for such data, and thus shall be used in INSPIRE as a basis for developing data models for these themes.
The following INSPIRE themes have identified O&M as integrally relevant to their thematic domain and are including elements of O&M in their data specifications:
• Geology
• Oceanographic geographical features
• Atmospheric conditions and Meteorological geographical features
• Environmental monitoring facilities
• Soil
In addition to these themes, several other INSPIRE themes have been identified to which observational information, while not at the core of the data specification, is relevant. Some examples of this are the INSPIRE theme "Species distribution", where primary occurrence data could be provided together with the aggregate distribution, as well as "Industrial and production facilities", where the provision of emissions data on such facilities would be useful for various environmental reporting obligations.
While the O&M standard provides a generic framework for the provision of measurement data, it is also kept very abstract, and there are many ways of implementing the core structures in specific application schemas. In order to assure the consistent application of the O&M classes and properties across different INSPIRE themes, a cross-thematic working group on the use of O&M in INSPIRE has been convened. This group has analysed the requirements towards O&M within INSPIRE, identified the types of O&M design patterns required in INSPIRE and developed both additional classes identified as necessary within INSPIRE as well as guidelines detailing how this standard is to be used within INSPIRE. Some examples for these additional classes are:
• the ObservationCollection class (which was included in O&M v1.0, but has been removed in the final version of FprEN ISO 19156), that serves as a container for semantically grouping multiple observations;
• the ObservableProperty class, that provides structures for the definition of complex observed properties including statistical qualifiers and constraints;
• the ObservingCapabilities class for providing information about the types of measurements that a facility or instrument can make in a way that reflects the semantics of the actual Observations;
• the further specialization of the OM_Process (with identifier, responsible party, etc.) class that is primarily empty within the O&M concept.
These additional classes and guidelines can be used by the various INSPIRE themes that integrate or reference the O&M standard, as well as for other specifications that are created outside of the INSPIRE process and extend existing INSPIRE specifications with the use of O&M. The INSPIRE O&M guidelines also contain generic analysis which may be of interest when evaluating how and whether to apply O&M to a particular domain. The results of this work will be presented.