

What is the Industrial data ontology (IDO) actually

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ISO 23726-3 Industrial Data Ontology: the document

FINAL

ISO/FDIS 23726-3:2026(en)

DRAFT International Standard

Automation systems and integration — Ontology based interoperability — Part 3: Industrial data ontology

1 Scope

This document specifies the industrial data ontology (IDO), a web ontology language (OWL) ontology including:

- general overview of IDO and of the main principles;
- normative definitions of IDO classes and relations;
- informative examples of the use of IDO terminology in context;
- re-usable representation patterns.

This document does not specify:

- data modelling languages, such as resource description framework (RDF) and OWL used in ontology development;
- methods for reasoning with ontologies.

Introduction

In the digital era, the complexity of industrial assets, such as a new offshore renewable energy fields, an existing sub-sea development, or an aircraft model, necessitates collaboration and interoperability across various industries and domains. In this context, many types of assets can be considered systems of systems, where each collaboration (e.g. development, operation, maintenance, and reconstruction of these assets) involves multiple stakeholders. Each stakeholder has specified the use of structured vocabularies (e.g. from standards development organizations such as ISO, IEC, ASME, DIN), data model(s) and design standards. The exchange of information at each stage of the life cycle, and within a life cycle stage, related to for example cost, schedule, design, operation, maintenance, and re-build, is therefore complex. Errors in information exchange can lead to risks, such as time delays, cost overruns, safety events and product delays. Management of these risks include controls such as facilitating automated data exchange. This semantic interoperability involves humans and computers being able to unambiguously understand data and its context and is achieved through the reasoning ability of an ontology.

Industrial data ontology (IDO) is a web ontology language (OWL 2) ontology. IDO is designed to support machine automated reasoning according to OWL 2 direct semantics over information used in the design and through-life operation of complex, long-life assets.

IDO provides the following:

- a) a language that is accessible to engineers;
- b) industrially relevant modelling patterns,

while retaining the technical capability to perform OWL description logic (DL) reasoning with a well-founded ontological base.

This combination of user-centric characteristics is the primary motivation for the standardisation of IDO.

IDO is suitable for industrial use cases, to create vocabularies and asset models and to exploit OWL DL reasoning for quality assurance and inference of implicit knowledge. Being anchored in W3C semantic technology standards, resource description framework (RDF) graph assurance, such as shapes constraint language (SHACL) validation, can be additionally used for enforcing context-specific structure and completeness of data conforming to IDO and its domain-specific extensions.

IDO has proven its usefulness as upper ontology, as the precursor ISO 15926-14, and later as IDO, in a number of industrial R&D efforts as well as implemented operational systems, since 2008.

IDO provides a comprehensive set of fundamental elements to guide creation of ontology patterns and examples of patterns commonly used to capture important data and relations throughout the asset life cycle. The use, and reuse, of approved patterns reduces risks that modelling mistakes will be made and increases the speed of the model development and quality checking processes.

The ISO standard document covers IDO in full

5.3.4 The Temporal taxonomy

5.3.4.1 General

The class Temporal serves as one of three foundational categories within IDO, alongside Object and Dependent. It encompasses entities that are related to time or space-time. Within Temporal, entities are further categorized into three main subclasses: Activity, TemporalRegion, and SpatioTemporalRegion; see Figure 13. Activity entities represent temporal phenomena involving the participation of one or more physical objects, such as pumping, inspection, or report writing. TemporalRegion entities extend only in time and include instances and intervals, such as the moment a valve is closed or the length of time a bolt has been installed. SpatioTemporalRegion entities extend in both space and time, describing regions occupied by objects over specific periods, such as the spatiotemporal region of fluid contents in a vessel or the path of a pipeline inspection device during an inspection.

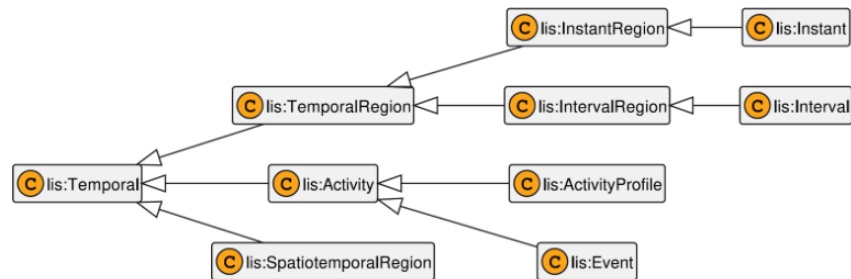


Figure 13 — IDO 'temporal' class hierarchy

5.3.4.2 lis:Temporal

Top-level class (direct subclass of owl:Thing)

- alternative label: Temporal Entity
- meaning: An entity that is part of time or takes place in time.
- example: A moment in time, a period of time, an activity or process, a beginning, a closing event.
- see also: obo:BFO_0000003

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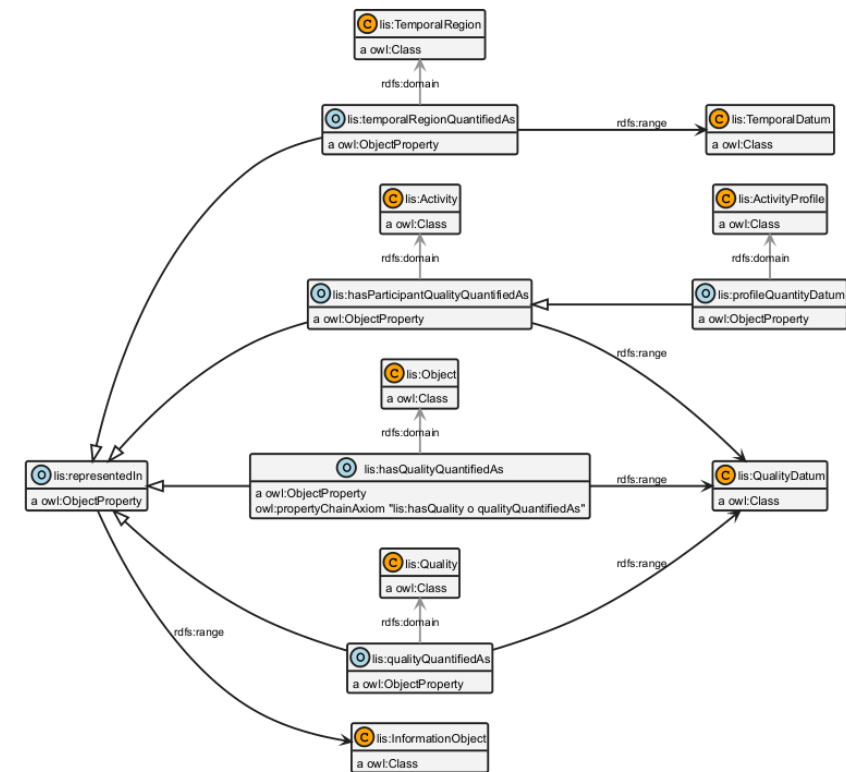
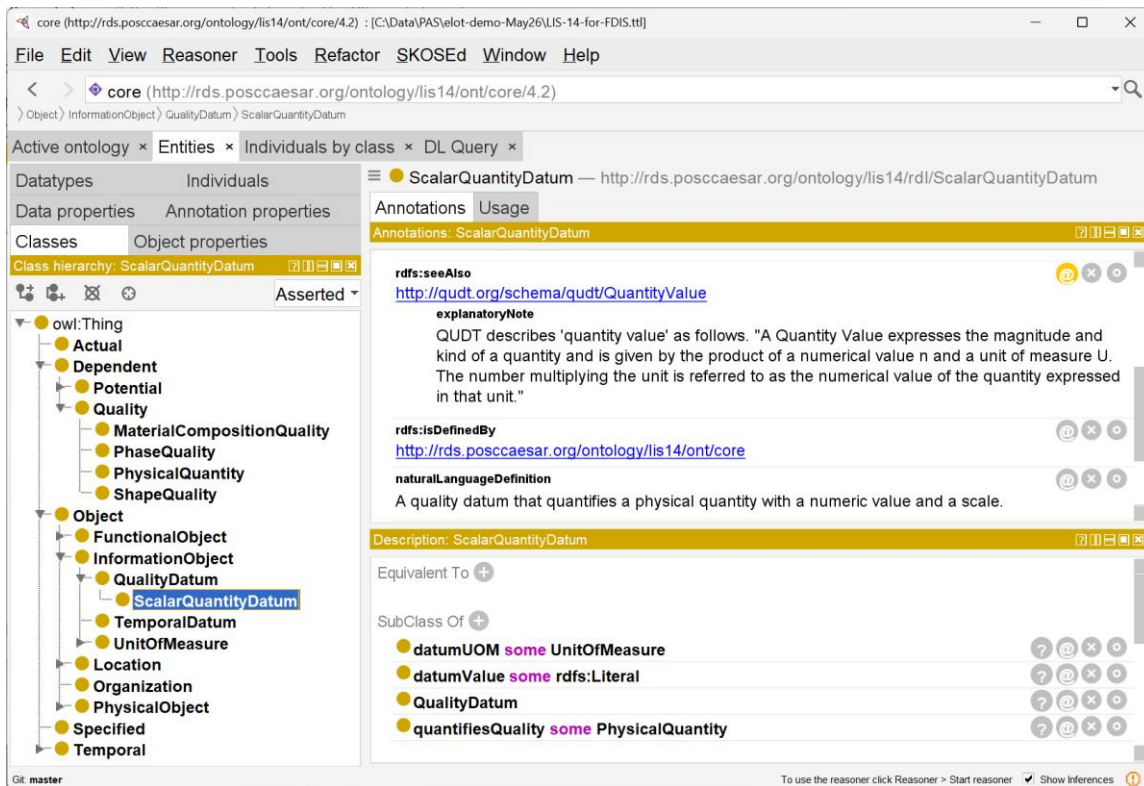
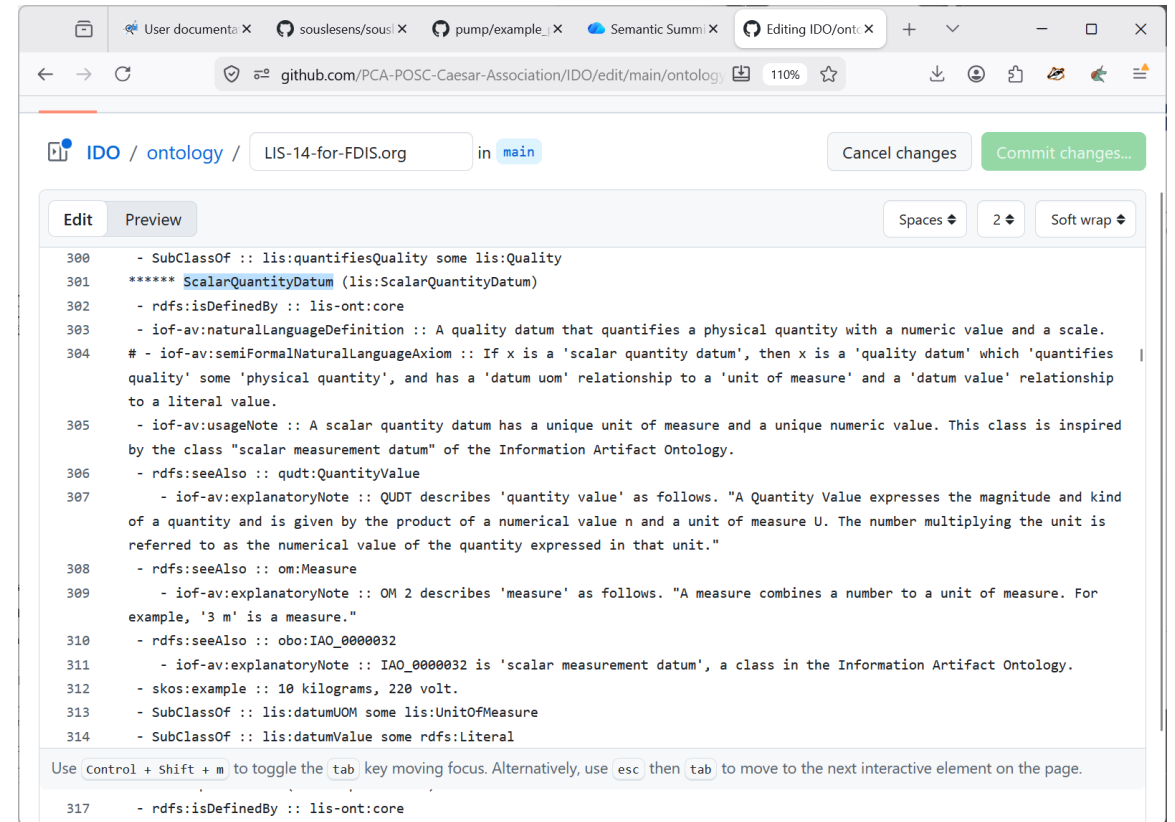


Figure 34 — IDO 'represented in' relations hierarchy

IDO is a W3C OWL 2 compliant ontology



Source revision in GitHub repository



IDO in the Protégé ontology workbench

Development and standardization of IDO has been a true team effort

IDO Core Team



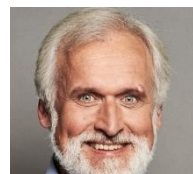
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Aibel



Nils Sandmark
POSC Caesar

Part of

- ISO/TC 184/SC 4/WG 26

Supported by

- Arrowhead fPVN project
- DISC initiative

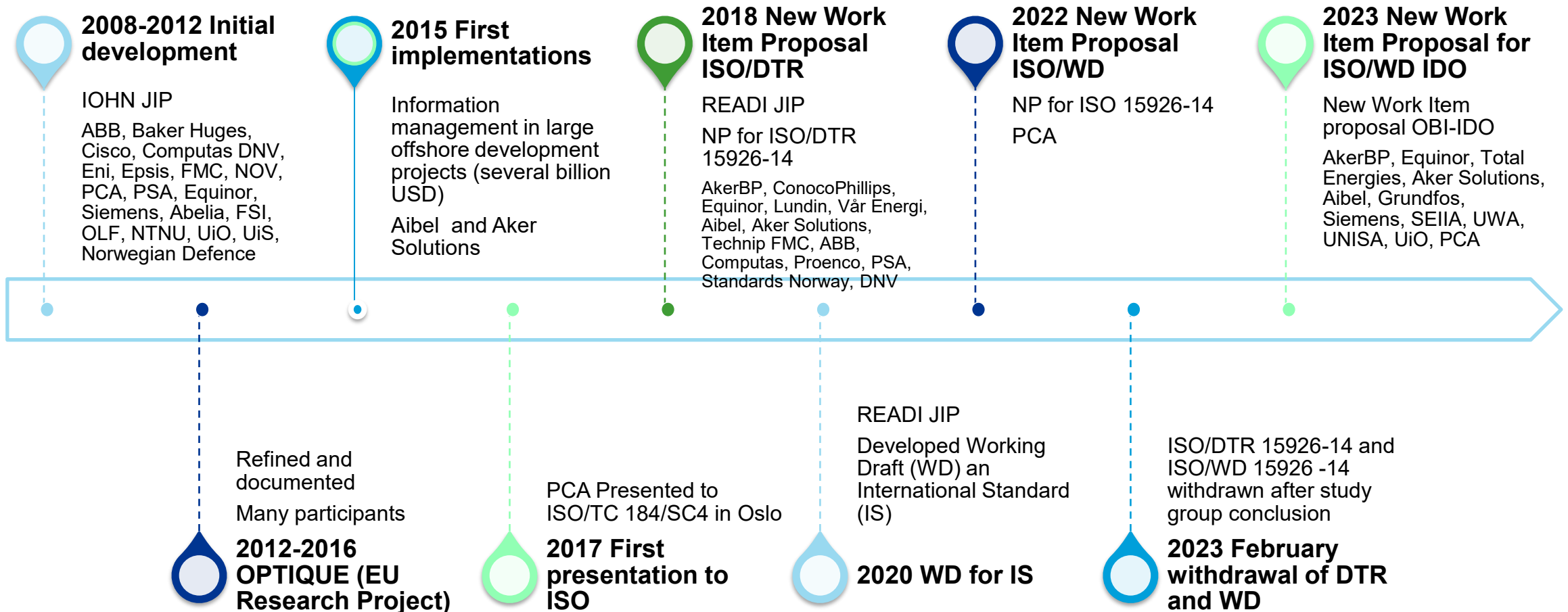
Standardization supported by a consortium of key players



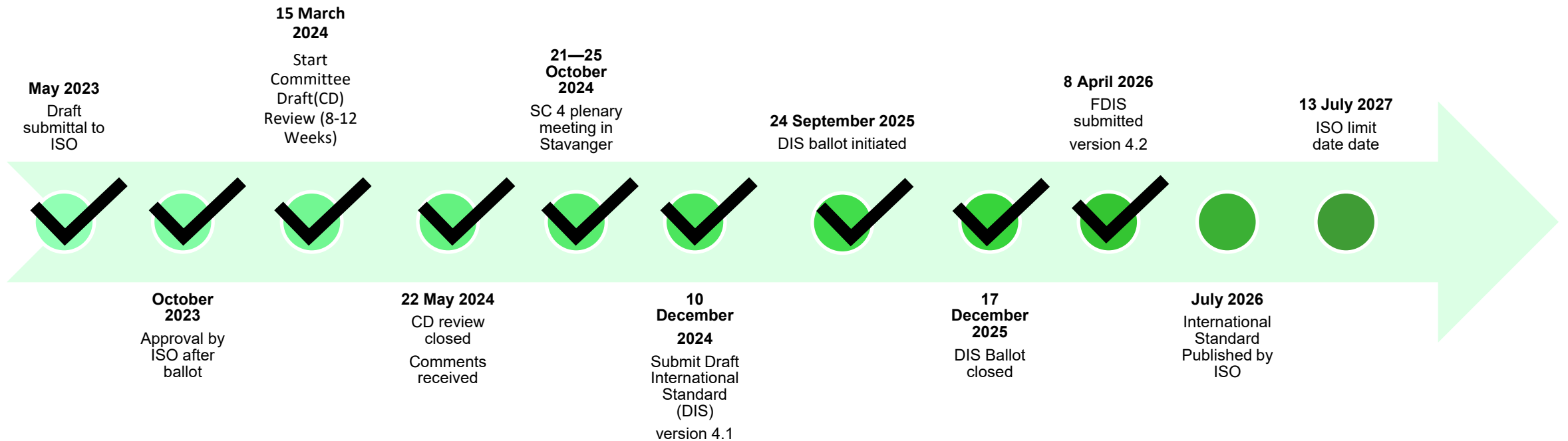
Motivations include

- Stable references
- Common language
- Verification, validation, and quality assurance
- Automated reasoning
- Simplicity and reusability

IDO has been in use since 2015

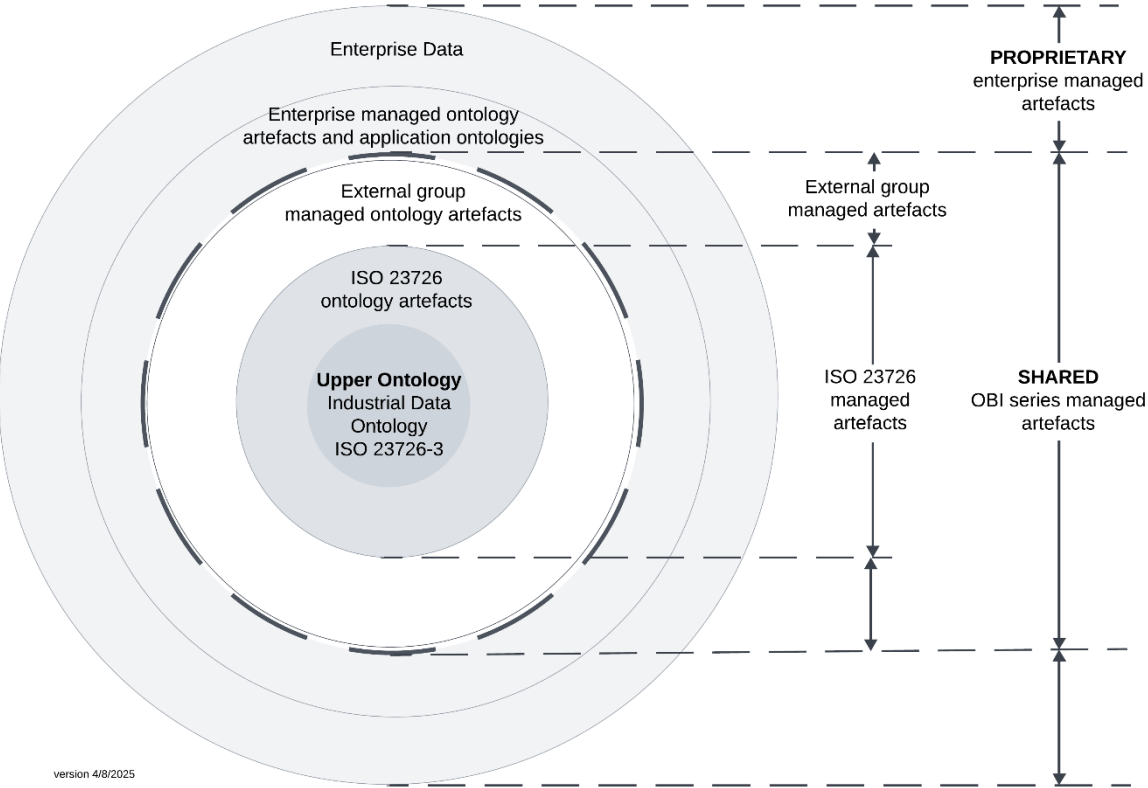


IDO is scheduled to be published in 2026



Three ballots and reviews passed, with a total of 278 comments processed

A standards-based ontology ecosystem for interoperability and meaningful data



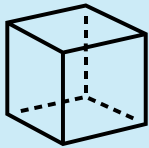
Parts to ISO 23726 Ontology based interoperability		
Part	Name	Publication (Planned)
1	Overview and fundamental principles	30 January 2028
2	Vocabulary	20 June 2027
3	Industrial data ontology	23 July 2026
100	Schedule data ontology	31 May 2027

version 4/8/2025



Top-level categories

 lis:Object



independent
entities that
persist
through time

 lis:Dependent



inherent
qualities or
potentials of
an object

 lis:Temporal



entities relating
to or occurring
in time

Top-level categories

 **lis:Object**

 **lis:PhysicalObject**



tangible
entities with
mass and
spatial
occupancy

 **lis:Location**



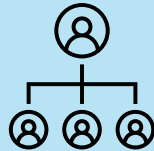
spatial
regions

 **lis:InformationObject**



data and
information

 **lis:Organization**



groups with
common
objectives

 **lis:Dependent**



inherent
qualities or
potentials of
an object

 **lis:Temporal**



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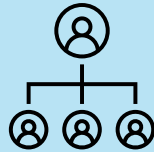
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data and
information

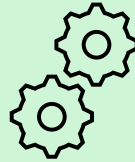
 **lis:Organization**



groups with
common
objectives

 **lis:Dependent**

 **lis:Potential**



attributes
realizable
through
activities

 **lis:Quality**



inherent
attributes

 **lis:Temporal**



entities relating
to or occurring
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Top-level categories

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 **lis:Location**



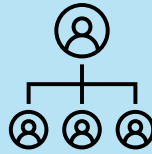
spatial
regions

 **lis:InformationObject**



data and
information

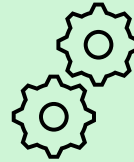
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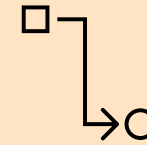
 **lis:Quality**



inherent
attributes

 **lis:Temporal**

 **lis:Activity**



temporal
phenomena
involving
physical
objects

 **lis:TemporalRegion**

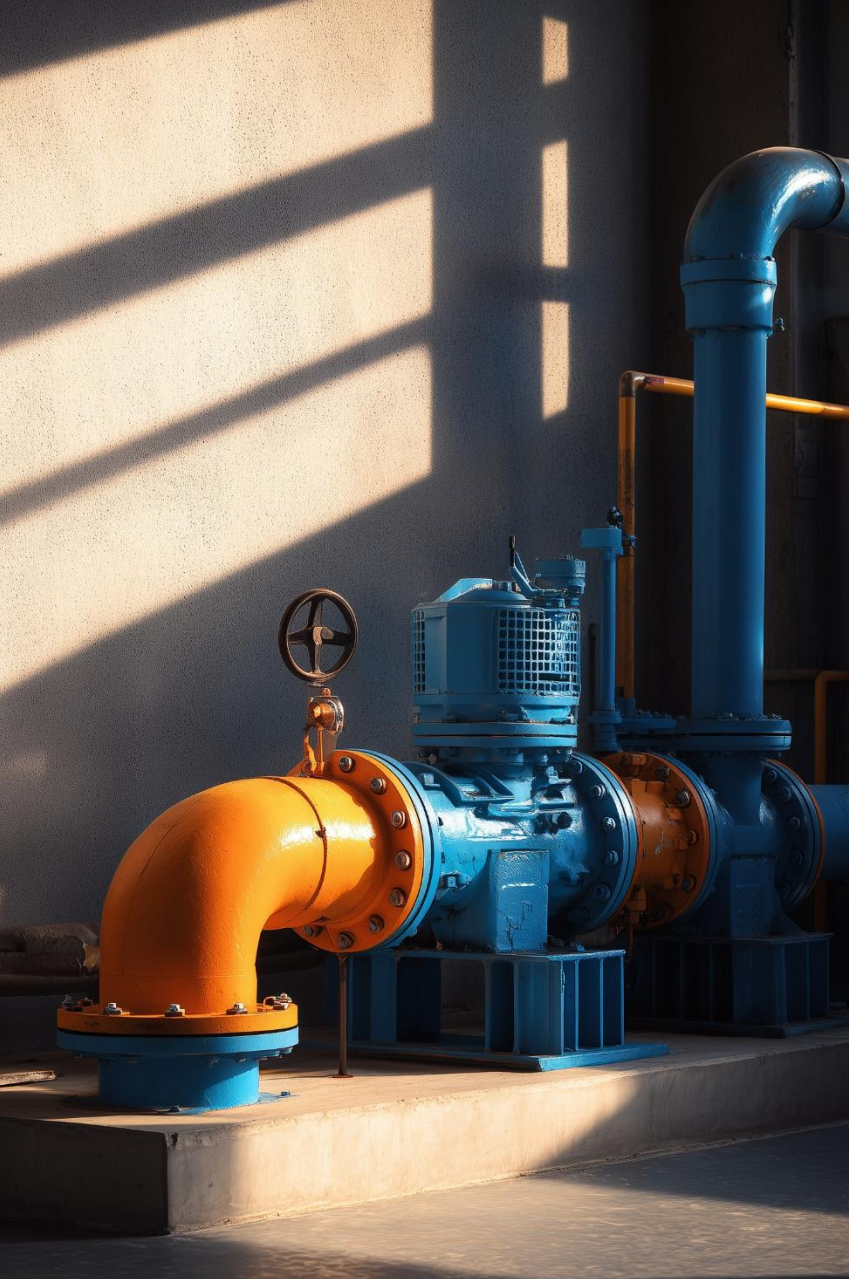


instances and
intervals

 **lis:SpatiotemporalRegion**



regions occupied
by objects during
specific time
periods



PUMP

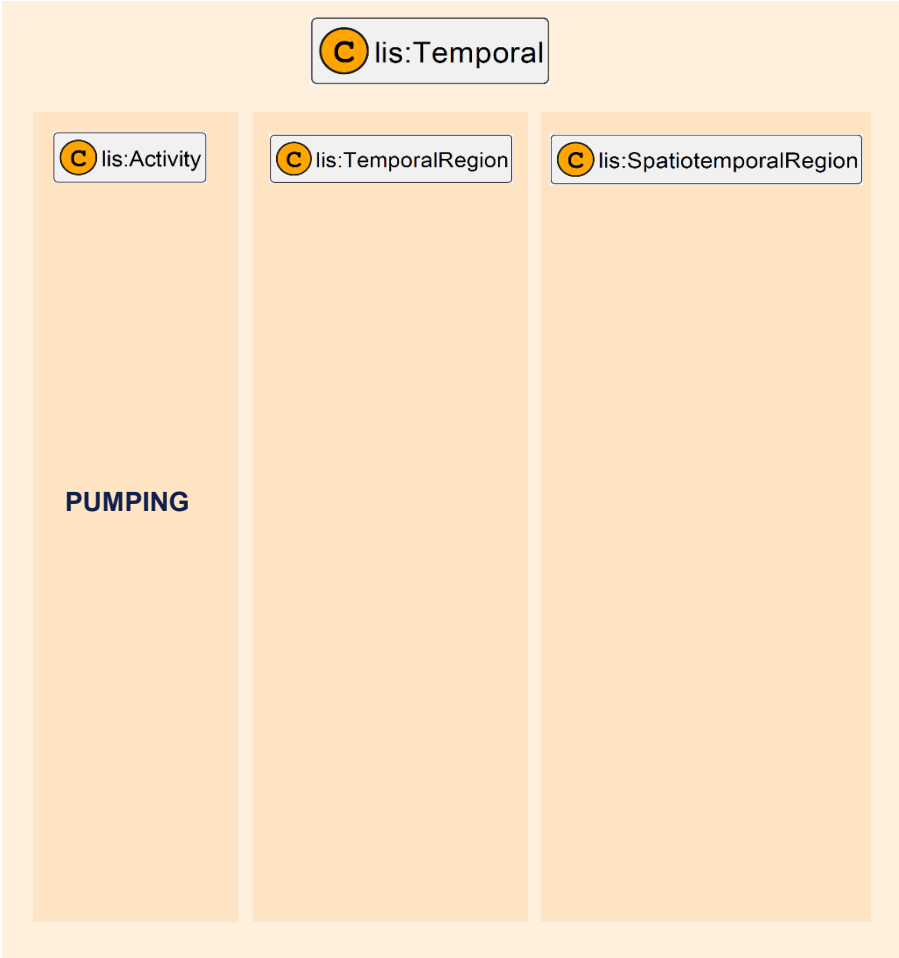
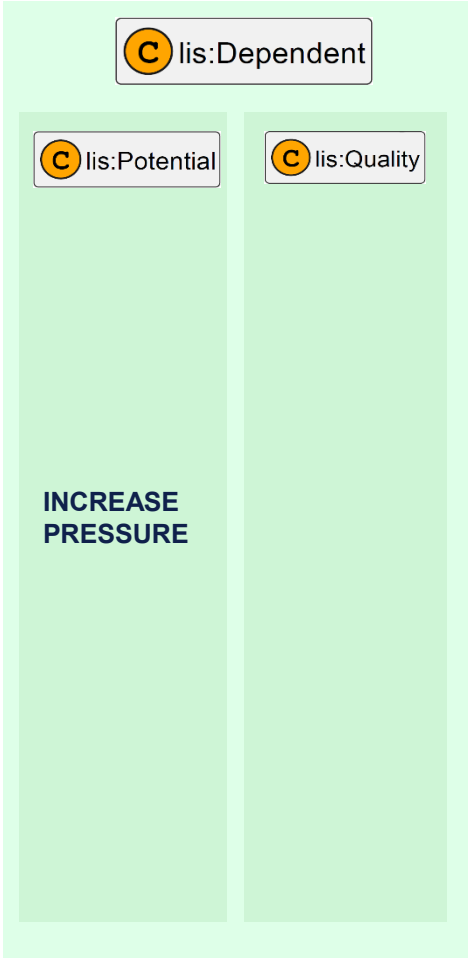
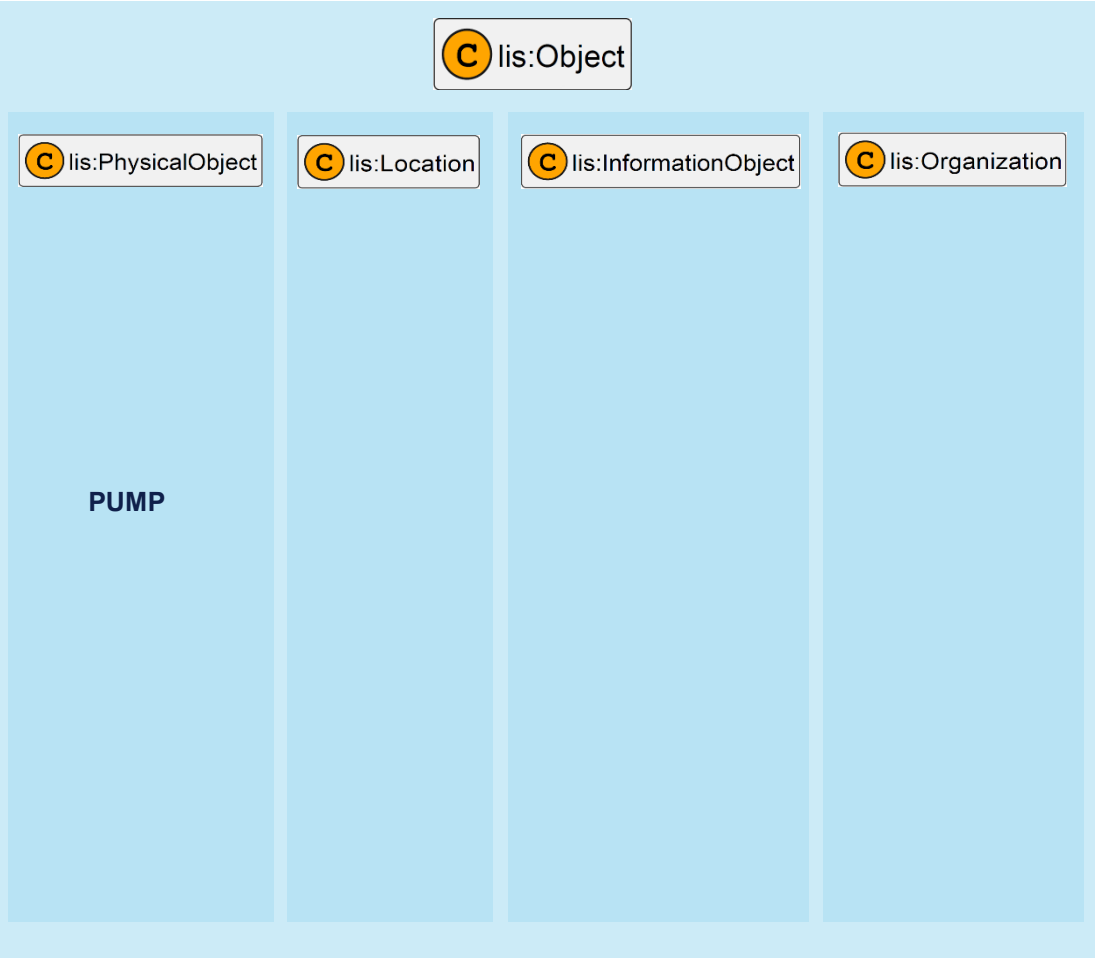


INCREASE PRESSURE

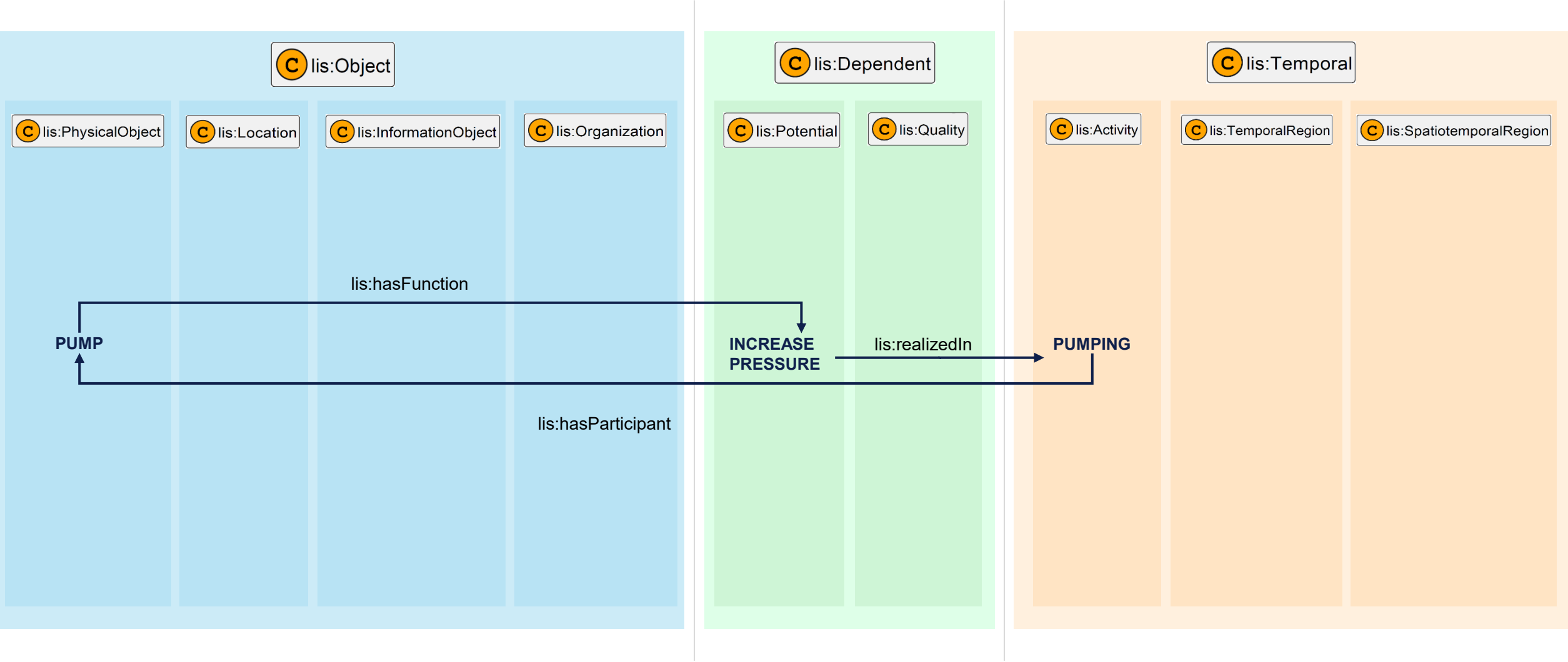


PUMPING

Fundamental modelling pattern of IDO



Fundamental modelling pattern of IDO



Layered modular ontology architecture

