EUOS
EU Observatory for
ICT Standardisation

Report of TWG Ontologies:

Landscape of Ontologies Standards

Lead Editor: Arkopaul Sarkar
Series Editors: Lindsay Frost, Ray Walshe, Silvana Muscella

Powered by

standICT.eu2026
ICT Standardisation Observatory and Support Facility in Europe

ONTO COMMONS
ONTOLOGY-DRIVEN DATA DOCUMENTATION FOR INDUSTRY COMMONS

DOI Number: 10.5281/zenodo.7907025

Disclaimer

The Ontologies TWG operates in full autonomy and transparency. The views and recommendations in this report are those of the Expert Group, the StandICT.eu Fellows acting in their personal capacities and do not necessarily represent the opinions of the European Commission or any other body; nor do they commit the Commission to implement them. Reuse is authorized provided the source and authors are acknowledged. For any use or reproduction of photos or other material this is not under EU copyright, permission must be sought directly from the copyright holders.

Legal notice

The document has been prepared for the Europen Commission and SDOs however it reflects the views only of the authors, and neither the European Commission nor the Standards Developing organisations can be held responsible for any use wihch may be made of the infomation contained therein. More infomation on the European Union is available on the internet (http://europa.eu).

About StandICT.eu

The StandICT.eu 2026 Coordination and Support Action project has received funding from the European Union's Horizon Europe - Research and Innovation programme - under grant agreement no. no. 101091933. The project is coordinated by Dublin City University (IE - Financial Coordinator) and Trust-IT Srl (IT - Technical Coordinator), supported by its partners from European Digital SME Alliance (BE), OpenForum Europe (BE), AUSTRALO (ES), Fraunhofer ISI (DE). The content of the present report does not represent the opinion of the European Union, and the European Union is not responsible for any use that might be made of such content.

Table of Contents

1 Foreword

"Improving public sector interoperability is fundamental for building a digital European Union, one that is open, inclusive, fair and trusted. It translates the core European idea of together finding better solutions for the digital age. It allows public administrations to better cooperate, to understand and trust each other, for the benefit of people, businesses, and our communities."

Johannes Hahn, Commissioner for Budget and Administration

Ontologies allow us to structure and represent knowledge about the world and domain-specific knowledge to enable the understanding of data and information. Ontologies can be used for information integration , information retrieval, enhanced content management and reasoning. Ontologies are thus a critical pillar for interoperability in the Digital Single Market.

The Commission aims to adopt the Interoperable Europe Act to strengthen cross-border interoperability and cooperation in the public sector across the EU. The Act shall support the creation of a network of sovereign and interconnected digital public administrations and accelerate the digital transformation of Europe's public sector.

The Interoperable Europe Act draft provides a framework for secure cross-border exchange of data and digital solutions. It will also enable public administrations to cooperate more effectively, exchange information and ensure the seamless delivery of public services across borders, sectors and organisational boundaries.

The European Commission continues to develop policies and frameworks to deliver on the Digital Single Market objectives and interoperable digital public services are essential for successfully digitalising the European Union's single market.

The EU Horizon2020 funded OntoCommons project brings together and coordinate activities of relevant EU stakeholders for the development of an Ontology Commons EcoSystem (OCES), consisting of ontologies and tools following specific standardization rules, that can be effectively used as foundation for data documentation in the industrial domain, in order to facilitate data sharing and valorisation and overcome interoperability bottlenecks.

Ensuring that the digital transformation of Europe's public sector is inclusive, fair, open, sustainable, value-driven and interoperable will deliver significant advantages for industry and society. Strengthened interoperability cooperation is essential for avoiding fragmentation and improving connectivity and data sharing to safeguarding Europe's digital sovereignty.

Laszlo Hetey
Project Adviser
Health and Digital Executive Agency (HaDEA)
European Commission
Unit HaDEA.B3 Industry

2 Introduction

The Technical Group for ICT under the European Observatory for Standardisation (EUOS) formed a special interest group comprising domain experts, ontologists, and researchers from academia and industry with the aim of surveying the landscape of Ontology standards. After months of effort, StandICT.eu 2026 community is delighted to present this report, which contains a set of carefully curated ontologies based on their relevance to ICT domains and vertical sectors, as well as their maturity and prominence for representing of linked data in the semantic web.

In the beginning years of the evolution of the semantic web and linked data, since they first entered Gartner's Emerging Technologies report in 2001, Ontology engineering made steady progress primarily through academic efforts to support the semantic web stack. Finally, the admission of 'Ontology and Graphs' in the "hype cycle" by Gartner's report in 2020 not only indicated its closeness to maturity but also highlighted that Ontology is finally being accepted as a practical solution for many ICT applications.

With the humble beginning of managing taxonomy and glossary, Ontology found increasing adoption in many ICT topics, such as natural language processing, big data and machine learning, cyber-physical systems, FAIR data, model-based engineering, digital twin and thread. The primary application of Ontology is to enable data interoperability through common semantics. However, rapid development and standardisation of ontology for various subject matters and vertical sectors are paramount to breaking the data silos across sectors. One of the primary motivations of this report is therefore to present the landscape of ontology coverage in various domains and sectors.

The success of ontology will also depend on the use of rigorous ontology engineering, consensus among stakeholders, and sustainability through continuous maintenance. This survey captures several standard ontologies, both foundational and domain-specific, published by international standardisation bodies such as ISO, IEC, and ETSI in the past few years.

As highlighted by European Interoperability Framework, the removal of interoperability issues impeding the collection, integration, and valorization of data from different sources across sectors and vertical markets will realise Europe's digital future, by enabling data sharing and reuse among government, public, and business, to increase ICT footprint in the highly competitive global data market, and to foster a data-agile economy by promoting innovation in business and academics. As part of Horizon Europe, several projects were funded by the European Commission aiming to standardize Ontology towards more uptake in various domains.

Multiple projects were funded by Horizon Europe to aim for the standardization and adoption of ontology across various domains, such as the H2020 CSA project OntoCommons for data interoperability in materials and manufacturing Interconnect for ontology-driven interoperability in IoT and smart energy. This survey features ontologies from national and international projects, with significant contributions from existing surveys from OntoCommons and the Alliance for the Internet of Things Innovation (AIOTI). These initiatives are advancing ontology development for knowledge integration and data sharing and are poised to have a significant impact on various domains.

One of the challenges that the working group tackled while preparing this report is to find the right scope for coverage and the strategy to classify ontologies. The collection features both recognized ontologies from standardization bodies and commercial developments from industries. We even considered some widely regarded ontologies developed by academia. The survey also considered a broad range of domains, including information science, cloud computing, communication, IoT, and multimedia, among others, across multiple vertical domains, such as manufacturing, robotics, smart city, energy, construction, bioscience, and agriculture. The use of Ontology to facilitate cross-domain and cross-sector data mobility justifies the need to cover such disparate domains, which is in line with the EU's rolling plan for ICT standardization.

This report aims to conduct a gap analysis and share knowledge with governments and city stakeholders. It serves as a tool for understanding standard ontologies and identifying priority areas for future development, which can inform policy proposals. Additionally, it acts as a guide for standardization in the ontology landscape while emphasizing the need for the sustainability of existing ontologies to benefit communities. Several ontology portals, including Bioportal, Agroportal,

and Industryportal, have established FAIR ontology repositories for specific sectors. This report received significant support from these repositories, which helped identify suitable ontologies and their respective locations within the portals.

This report may be considered a 'living document' as the collection of ontologies surveyed in this report requires periodic review to keep the survey updated with the rapidly evolving ontology landscape. The completion of the first version of this report was made possible, thanks to the tireless contributions of every member of TWG for Ontology. The members of the TWG and StandICT.eu also convey their gratitude to European Commission for supporting this work. At the same time, we invite stakeholders from industry, government, and academia to provide their valuable review and welcome their invaluable input in expanding the coverage of the survey in the future version for more effectiveness.

By the chair, **Arkopaul Sarkar**

3 Acknowledgements

StandICT.eu gratefully acknowledges the following individuals, who have contributed to the present report:

Arkopaul Sarkar (Senior researcher at Ecole Nationale de Tarbes, a.k.a. ENIT) in his coordination role of Chair of TWG-Onto and the members of the technical working groups, including **Aditya Mohan** (Senior Scientific Officer, AI, DLT), **Boonserm Kulvatunyou** (Systems Integration Division at the National Institute of Standards and Technology, a.k.a. NIST), **Dimitris Kiritsis** (Professor at University of Oslo), **Elisa Kendall** (Ontologist from EDM Council), **Hedi Karray** (Professor at Ecole Nationale de Tarbes, a.k.a. ENIT), **Nicolas Figay** (Collaborator at LIRIS), **Rita Giuffrida** (Researcher, Communication and Dissemination Officer at Trust-IT), **Patrick Guillemin** (Technical Officer at ETSI), **Pieter Pauwels** (Associate Professor at the Eindhoven University of Technology, a.k.a TUE), **Amélie Gyrard** (Research and Innovation Consultant at Trialog), **Raúl García-Castro** (Assistant Professor at the at Universidad Politécnica de Madrid, a.k.a UPM), **Barry Smith** (SUNY Distinguished Professor of Philosophy and Julian Park Chair at Department of Philosophy), **Clement Jonquet** (Senior Researcher at INRAE), **Ulrike Parson** (Founder and CEO of parson AG), **Walter Terkaj** (Senior Researcher at CNR-STIIMA), **Linda Elmhadhbi** (Associate Professor at INSA Lyon), and **Yves Keraron** (Founder of Innovation Strategy And Digital Engineering Using Semantics, a.k.a. ISADEUS).

Special thanks to **Ray Walshe** (EUOS Director), **Linsday Frost** (Series Editor), to **Amélie Gyrard** for providing many inputs through lov4iot repository, **Aditya Mohan** for the covering the ISO standards extensively, **Linda Elmhadhbi** (Associate Professor at INSA Lyon) for the curation of ontologies in IoT related domains, **Clement Jonquet** for providing access Agroportal and guiding the curation of Ontologies in agriculture domain, and **Rita Giuffrida** (Researcher, Communication and Dissemination Officer at Trust-IT) for collecting ontologies from OntoCommons survey and overall support.

Thanks to the European Commission for their continued guidance and support: **Thomas Reibe, Emilio Davila-Gonzales, Calos Lopez Rodriguez, Laszlo Hetey.**

4 Landscape of Standards

Standardisation Documents

Information Science

ISO/CD TR 15926-14 Industrial automation systems and integration. Integration of life-cycle data for process plants including oil and gas production facilities. Part 14: Data model adapted for OWL2 Direct Semantics

URL 1: https://www.iso.org/standard/75949.html

URL 2: https://readi-jip.org/wp-content/uploads/2020/10/ISO_15926-14_2020-09-READI-Deliverable.pdf

ABSTRACT: Industrial automation systems and integration

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/01/2024

ISO 18629-11:2005 Industrial automation systems and integration. Process specification language. Part 11: PSL core

URL 1: https://www.iso.org/standard/33529.html

URL 2: https://doi.org/10.3182/20050703-6-CZ-1902.01525

ABSTRACT: ISO 18629 is an International Standard for the computer-interpretable exchange of information related to manufacturing processes. Taken together, all the parts contained in the ISO 18629 Standard provide a generic language for describing a manufacturing process throughout the entire production process within the same industrial company or across several industrial sectors or companies, independently from any particular representation model. The nature of this language makes it suitable for sharing process information related to manufacturing during all the stages of a production process. This part provides a description of the core elements of the language defined within the International Standard.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/10/2005

ISO/IEC 19763-3:2020 Information technology. Metamodel framework for interoperability (MFI). Part 3: Metamodel for ontology registration

URL: https://www.iso.org/standard/76581.html

ABSTRACT: This document specifies the metamodel that provides a facility to register administrative and evolution information related to ontologies. The metamodel is intended to promote interoperability among application systems, by providing administrative and evolution information related to ontologies, accompanied by standardized ontology repositories that register ontologies themselves in specific languages. This document does not specify the metamodels of ontologies expressed in specific languages and the mappings among them.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/10/2020

ISO/IEC 13250-5:2015 Information technology Topic Maps Part 5: Reference model

URL: https://www.iso.org/standard/40757.html

ABSTRACT: ISO/IEC 13250-5:2015 specifies a formal model for subject maps, minimal access functionality and information retrieval from subject maps and a constraint framework governing the interpretation of subject maps. Particular formalisms to constrain subject maps are not covered by this part of ISO/IEC 13250.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/04/2015

ISO/IEC 18384-3:2016 Information technology Reference Architecture for Service Oriented Architecture (SOA RA) Part 3: Service Oriented Architecture ontology

URL: https://www.iso.org/fr/standard/63106.html

ABSTRACT: ISO/IEC 18384-3:2016 defines a formal ontology for service-oriented architecture (SOA), an architectural style that supports service orientation. The terms defined in this ontology are key terms from the vocabulary in ISO/IEC 18384-1.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2016

ISO/IEC DIS 21838-3 Information technology. Top-level ontologies (TLO). Part 3: Descriptive ontology for linguistic and cognitive engineering (DOLCE)

URL: https://www.iso.org/standard/78927.html

ABSTRACT: The Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) is a top-level ontology (TLO) conforming to ISO/IEC 21838-1. It contains definitions of its terms and relational expressions and formal representations in OWL 2 and Common Logic (CL). DOLCE is a top-level ontology aimed at making explicit peoples assumptions about the nature and structure of the world, as reflected by natural language, cognition and human common sense. DOLCE is widely used by a diverse array of domain ontologies in areas like enterprise and process modelling, engineering, robotics, geographical information systems, socio-technical systems and digital humanities. The natural language specification of the DOLCE signature supports human maintenance and use of the ontology, including use in the development of conformant domain ontologies. The adoption of the Web Ontology Language (OWL) as a W3C standard was motivated by the need to have a decidable ontology representation language as the basis for the Semantic Web. The OWL 2 formalization of DOLCE supports the use of the ontology in computing, including enabling DOLCE to be used in tandem with other ontologies expressed in OWL and related languages, and in allowing ontology quality control through the use of OWL reasoners. The CL formalization of DOLCE provides the expressivity needed to provide an axiomatization whose models are the intended models of DOLCE. This axiomatization has a modular structure (see Figure 2 where the arrows represent the relation of extension of theories). This document conforms to ISO/IEC 21838-1.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 14/04/2022

ISO/IEC DIS 21838-4 Information technology. Top-level ontologies (TLO). Part 4: TUpper

URL: https://www.iso.org/standard/78928.html

ABSTRACT: PSL is being incorporated into the TUpper ontology as Part 4 of ISO 21838 (Top Level Ontologies). In particular, TUpper extends PSL with modules for physical objects, locations, and units of measure, thus addressing the shortcomings of using PSL alone. In these notes, we summarize various aspects of PSL and TUpper with respect to the IOF selection criteria for a foundational ontology.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 14/04/2022

ISO/IEC 21838-2:2021 Information technology Top-level ontologies (TLO) Part 2: Basic Formal Ontology (BFO)

URL: https://www.iso.org/standard/74572.html

ABSTRACT: This document describes Basic Formal Ontology (BFO), which is an ontology that is conformant to the requirements specified for top-level ontologies in ISO/IEC218381. It describes BFO as a resource designed to support the interchange of information among heterogeneous information systems. The following are within the scope of this document: definitions of BFO-2020 terms and relations; axiomatizations of BFO-2020 in OWL2 and CL; documentation of the conformity of BFO-2020 to the requirements specified for top-level ontologies in ISO/IEC218381; specification of the requirements for a domain ontology if it is to serve as a module in a suite of ontologies in which BFO serves as top-level ontology hub by providing a starting point for the introduction of the most general terms in those domain ontologies which are its nearest neighbours within the suite; specification of the role played by the terms in BFO in the formulation of definitions and axioms in ontologies at lower levels that conform to BFO. The following are outside the scope of this document: specification of ontology languages, including the languages RDF, OWL, and CL standardly used in ontology development; specification of methods for reasoning with ontologies; specification of translators between the notations of ontologies developed in different ontology languages.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/11/2021

Elementary Multiperspective Material Ontology (EMMO)

URL: https://github.com/emmo-repo/EMMO

ABSTRACT: EMMO is a multidisciplinary effort to develop a standard representational framework (the ontology) for applied sciences. It is based on physics, analytical philosophy and information and communication technologies. It has been instigated by materials science to provide a framework for knowledge capture that is consistent with scientific principles and methodologies. It is released under a Creative Commons CC BY 4.0 license.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 08/06/2022

The International Data Spaces (IDS) Information Model

URL: https://github.com/International-Data-Spaces-Association/InformationModel/

ABSTRACT: The Information Model is an RDFS/OWL-ontology covering the fundamental concepts of the International Data Spaces (IDS), i.e. the types of digital contents that are exchanged by participants by means of the IDS infrastructure components. The ontology and its documentation are published at https://w3id.org/idsa/core.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 30/09/2018

Common Core Ontology

URL 1: https://www.cubrc.org/index.php/data-science-and-information-fusion/ontology

URL 2: https://github.com/CommonCoreOntology/CommonCoreOntologies

ABSTRACT: The Common Core Ontologies (CCO) comprise twelve ontologies that are designed to represent and integrate taxonomies of generic classes and relations across all domains of interest. The CCO provide semantics for concepts and relations that are used in most domains of interest. The utility of the CCO comes from preventing BFO-compliant domain-specific ontologies from needlessly duplicating common concepts or from forcing such ontologies to include concepts outside of their domain (e.g. organization in the Ontology of Biomedical Investigations).

DOCUMENT TYPE: Product

PUBLICATION DATE: 06/03/2019

IT Service Management Ontology

URL: http://ontology.it/itsmo/v1/userguide/#Overview

ABSTRACT: It provides a formal vocabulary (also known as “schema”, “data dictionary”, or “ontology”) for describing resources related to IT Service Management best practices.

DOCUMENT TYPE: Product

PUBLICATION DATE: 05/01/2012

Domain ontology for technical communication

URL 1: https://iirds.org

URL 2: https://www.parson-europe.com/en/iirds

ABSTRACT: iiRDS is a standard for the delivery of intelligent information in the scope of user assistance for products. The information is provided with the product for the purpose of assisting the users in setting up, operating, and maintaining the product. Intelligent information is defined as technical documentation content enriched with metadata. iiRDS consists of a vocabulary for the metadata provided with the content (RDF Schema) and a package format for the exchange of packages.

DOCUMENT TYPE: Product

PUBLICATION DATE: 18/04/2018

Gist Upper enterprise ontology (GIST)

URL: https://github.com/semanticarts/gist

ABSTRACT: gist is Semantic Arts’ minimalist upper ontology for the enterprise. It is designed to have the maximum coverage of typical business ontology concepts with the fewest number of primitives and the least amount of ambiguity.

DOCUMENT TYPE: Product

PUBLICATION DATE: 01/04/2020

Security

Ontology of Identity Credentials

URL: https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=906227

ABSTRACT: An ontology of identity credentials is an explicit specification of a conceptualization of identity credentials, including the actors, actions, and objects that establish the relationships of their production, use, and destruction.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/10/2006

Computer Science, systems and electrical engineering

Energy Efficiency Prediction Semantic Assistant Ontology

URL 1: https://iesnaola.github.io/eepsa/EEPSA/index-en.html

URL 2: https://content.iospress.com/articles/applied-ontology/ao210245

ABSTRACT: The EEPSA (Energy Efficiency Prediction Semantic Assistant) ontology puts together all the ontology modules and ODPs that form the EEPSA Ontology

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/03/2021

REACT Ontology

URL: https://react2020.github.io/REACT-ONTOLOGY/react/index-en.html

ABSTRACT: The REACT ontology aims to represent all the necessary knowledge to support the achievement of island energy independence through renewable energy generation and storage, a demand response platform, and promoting user engagement in a local energy community

DOCUMENT TYPE: Project

PUBLICATION DATE: 07/08/2021

RESPOND Ontology

URL: https://respond-project.github.io/RESPOND-Ontology/respond/index-en.html

ABSTRACT: The RESPOND project aims to deploy an interoperable energy automation, monitoring and control solution to deliver Demand Response programs at a dwelling, building and district level

DOCUMENT TYPE: Project

PUBLICATION DATE: 14/04/2020

Telecommunication

Measurement Ontology for IP traffic (MOI)

URL: https://www.etsi.org/deliver/etsi_gs/moi/001_099/002/01.01.01_60/gs_moi002v010101p.pdf

ABSTRACT: The present document identifies the requirements that should characterise an ontology for the semantic conceptualisation of information related to IP traffic measurements. The requirements are obtained through the analysis of use cases spanning across a variety of related application categories and domains of interest, as well as the consideration of additional qualitative needs, such as the protection of personal data. Additional inputs arise from user experience, as well as the 'GS/MOI-010' Work Item study, entitled "Report on information models for IP traffic measurement". The general difficulty of setting limits to an ontology, taking concepts from outside is also dealt with within the present document that states MOI focus on IP traffic measurement concepts and let's side ontologies dealing with other subjects, an easy way to link. Thus a rather practical approach to define MOI ontology will be laid so that further QoS, traffic monitoring and Internet governance issues can be built on top of it by means of semantic tools.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2012

TOUCAN Ontology (ToCo)

URL 1: https://qianruzhou333.github.io/toco_ontology/

URL 2: https://lov.linkeddata.es/dataset/lov/vocabs/toco

ABSTRACT: An ontology for hybrid telecommunication networks. An Device-Interface-Link (DIL) ontology design pattern is proposed for the first time to our knowledge. Have been published on LOV (Linked Open Vocabulary) with the entry: https://lov.linkeddata.es/dataset/lov/vocabs/toco This development is part of an on-going project which is addressing the convergence of telecommunication networks across multiple technology domains. The DIL pattern is observed and summarised through the ontology developing progress. It could describe all kinds of networks. Build around the DIL pattern, the ToCo ontology describes the physical infrastructure, quality of channels, services and users in heterogeneous telecommunication networks which span multiple technology domains across the networks. Examples and use cases of ToCo in recent projects are discussed in publications.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 11/07/1905

IoT

SAREF: the Smart Applications REFerence ontology

URL: https://saref.etsi.org/core/

ABSTRACT: The Smart Applications REFerence ontology (SAREF) is intended to enable interoperability between solutions from different providers and among various activity sectors in the Internet of Things (IoT), thus contributing to the development of the global digital market.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/02/2020

W3C Thing Description (TD) Ontology

URL: https://www.w3.org/2019/wot/td

ABSTRACT: The Thing Description (TD) ontology is an RDF axiomatization of the TD information model, one of the building blocks of the Web of Things (WoT). Besides providing an alternative to the standard JSON representation format for TD documents, the TD ontology can also be used to process contextual information on Things and for alignments with other WoT-related ontologies.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 28/02/2022

Federated Interoperable Semantic IoT/cloud Testbeds and Applications Ontology

URL 1: https://hal.inria.fr/hal-01386917/file/wf-iot-2016.pdf

URL 2: https://github.com/fiesta-iot/ontology

ABSTRACT: FIESTA-IoT ontology aims to interconnect existing IoT solutions (SSN, M3-lite, WGS84, IoT-lite, Time, and DUL).

DOCUMENT TYPE: Project

PUBLICATION DATE: 09/07/2018

Internet of Things ontology

URL 1: https://hal.archives-ouvertes.fr/hal-01467853/document

URL 2: https://www.irit.fr/recherches/MELODI/ontologies/IoT-O.html

ABSTRACT: IOT-O describes connected devices and their relation with their environment.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 25/04/2019

IoT/Information

ISO/IEC 21823-3:2021 Internet of things (IoT). Interoperability for IoT systems. Part 3: Semantic interoperability

URL: https://www.iso.org/standard/83752.html

ABSTRACT: This document provides the basic concepts for IoT systems semantic interoperability, as described in the facet model of ISO/IEC 21823-1, including: requirements of the core ontologies for semantic interoperability; best practices and guidance on how to use ontologies and develop domain-specific applications, including the need to allow for extensibility and connection to external ontologies; cross-domain specification and formalization of ontologies to provide harmonized utilization of existing ontologies; relevant IoT ontologies along with comparative study of the characteristics and approaches in terms of modularity, extensibility, reusability, scalability, interoperability with upper ontologies, and so on, and; use cases and service scenarios that exhibit necessities and requirements of semantic interoperability.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/09/2021

IoT/security

Data-security ontology for IoT (DS4IoT)

URL 1: https://www.mdpi.com/1424-8220/20/3/801

URL 2: https://github.com/mainakae/ds4iot

ABSTRACT: DS4IoT defines data-security concepts such as regulations, certifications and provenance, access control methods and authentication mechanisms.

DOCUMENT TYPE: Project

PUBLICATION DATE: 21/04/2020

IoT/Sensor

W3C Semantic Sensor Network Ontology

URL 1: https://www.w3.org/TR/vocab-ssn/

URL 2: https://w3c.github.io/sdw/ssn/

ABSTRACT: The Semantic Sensor Network (SSN) ontology is an ontology for describing sensors and their observations, the involved procedures, the studied features of interest, the samples used to do so, and the observed properties, as well as actuators. SSN follows a horizontal and vertical modularization architecture by including a lightweight but self-contained core ontology called SOSA (Sensor, Observation, Sample, and Actuator) for its elementary classes and properties. With their different scope and different degrees of axiomatization, SSN and SOSA are able to support a wide range of applications and use cases, including satellite imagery, large-scale scientific monitoring, industrial and household infrastructures, social sensing, citizen science, observation-driven ontology engineering, and the Web of Things. Both ontologies are described below, and examples of their usage are given.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 19/10/2017

Domotic OSGi Gateway ONTology

URL: http://iot-ontologies.github.io/dogont/

ABSTRACT: The DogOnt ontology supports device/network independent descriptions of houses, including both controllable and architectural elements. It defines sensors such as gas, humidity, movement, pressure, occupancy, presence, smoke sensor, window sensor, door sensor, temperature, Co2, actuator (Door, shutter, Light, Window), etc.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 26/3/2019

Stream Annotation Ontology (SAO)

URL: http://iot.ee.surrey.ac.uk/citypulse/ontologies/sao/sao

ABSTRACT: SAO Ontology describes streams coming from sensors.

DOCUMENT TYPE: Project

PUBLICATION DATE: 12/05/2016

The Marine Metadata Interoperability Device Ontology

URL 1: (PDF) The MMI Device Ontology: Enabling Sensor Integration

URL 2: https://mmisw.org/ont/#/

ABSTRACT: The MMI Device Ontology defines metadata records for sensors, and associates devices with their platforms, deployments, measurement capabilities and restrictions.

DOCUMENT TYPE: Project

PUBLICATION DATE: 20/08/2011

IoT/M2M

OneM2M Base Ontology

URL: https://www.onem2m.org/images/pdf/TS-0012-Base_Ontology-V3_7_3.pdf

ABSTRACT: oneM2M's Base Ontology constitutes a basis framework for specifying the semantics of data that are handled in oneM2M. Sub-classes of some of its concepts are expected to be defined by other bodies in order to enable semantic interworking. In particular, interworking with non-oneM2M systems (e.g. Area Networks and their devices) should be facilitated.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 28/02/2019

IoT/System

SAREF4SYST: ontology pattern for Systems, Connections, and Connection Points

URL: https://saref.etsi.org/saref4syst/

ABSTRACT: SAREF4SYST defines Systems, Connections between systems, and Connection Points at which systems may be connected.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/06/2020

Smart Energy Aware Systems (SEAS)

URL: https://ci.mines-stetienne.fr/seas/

ABSTRACT: SEAS ontology describes energy systems and their interactions.

DOCUMENT TYPE: Project

PUBLICATION DATE: 29/8/2017

Smart Home Ontology

URL: https://github.com/omerbsezer/IoTSmartHomeOntologySimulator

ABSTRACT: SHO describes concepts related to smart systems used at home such as computers, home appliances, security, lighting and heating devices, etc.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 5/6/2015

IoT/Industry

SAREF4INMA: extension for the Industry and Manufacturing domains

URL: https://saref.etsi.org/saref4inma/

ABSTRACT: SAREF4INMA focuses on extending SAREF for the industry and manufacturing domain to solve the lack of interoperability between various types of production equipment that produce items in a factory and, once outside the factory, between different organizations in the value chain to uniquely track back the produced items to the corresponding production equipment, batches, material and precise time in which they were manufactured.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

IoT/Smart City

SAREF4CITY: extension for the Smart Cities domain

URL: https://saref.etsi.org/saref4city/

ABSTRACT: SAREF4CITY is an extension of SAREF for the Smart Cities domain. This extension has been created by investigating resources from potential stakeholders of the ontology, such as standardization bodies, associations, IoT platforms and European projects and initiatives. Taking into account ontologies, data models, standards and datasets provided by the identified stakeholders, a set of requirements were identified and grouped into the following categories: Topology, Administrative Area, City Object, Event, Measurement, Key Performance Indicator, and Public Service.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

IoT/Building

SAREF4BLDG: extension for the Building domain

URL: https://saref.etsi.org/saref4bldg/

ABSTRACT: SAREF4BLDG is an extension of the SAREF ontology that was created based on the Industry Foundation Classes (IFC) standard for building information. It should be noted that not the whole standard has been transformed since it exceeds the scope of this extension, which is limited to devices and appliances within the building domain.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

Brick Schema

URL 1: https://dl.acm.org/doi/10.1145/2993422.2993577

URL 2: https://brickschema.org/ontology/

ABSTRACT: Brick focuses on modelling the entities, relationships and contexts surrounding data sources in buildings. To this end, Brick defines (a) a comprehensive class organization of building equipment spanning multiple subsystems including HVAC, lighting and electrical infrastructure, (b) a set of Point definitions defining the semantics of data sources, (c) a set of object properties (called “relationships” in Brick parlance) that describe how entities are composed into complex systems.

The ultimate goal of the ontology is to enable “portable” analytics and control software that accesses a Brick model in order to configure its operation to a particular building environment.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 16/11/2016

KNX Information Model Ontology (KIM)

URL: https://schema.knx.org/2020/ontology/

ABSTRACT: KNX is an open standard for commercial and domestic building automation. The KNX Information Model Ontology has been designed by KNX Association to allow the expression of product and installation data in a well-defined ontology.

DOCUMENT TYPE: Product

PUBLICATION DATE: 01/01/2020

IoT/Lifts

SAREF4LIFT: extension for the Smart Lifts domain

URL: https://saref.etsi.org/saref4lift/

ABSTRACT: SAREF4LIFT is an ontology that extends SAREF for the Smart Lifts domain. This SAREF extension is based on a limited set of use cases and existing data models identified within available initiatives.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2021

IoT/Energy

SAREF4ENER: extension for the Energy domain

URL: https://saref.etsi.org/saref4ener/

ABSTRACT: SAREF4ENER is an extension of SAREF that was created in collaboration with Energy@ Home and EEBus to enable the interconnection of their (different) data models.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

Intelligent Energy Systems Ontologies (IES)

URL: http://www.gecad.isep.ipp.pt/ontologies/ies/

ABSTRACT: The ontology has been developed for semantic interoperability between agent-based systems within the smart grid and demand flexibility domain.

DOCUMENT TYPE: Product

PUBLICATION DATE: 01/01/2022

IoT/Smart Energy

Smart eneRGy dOmain oNtology (SARGON)

URL: https://git.rwth-aachen.de/acs/public/ontology/sargon

ABSTRACT: SARGON defines semantic descriptions of the smart assets in building automation and smart grid and the relationships between them.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2020

IoT/Automotive

SAREF4AUTO: extension for the Automotive domain

URL: https://saref.etsi.org/saref4auto/

ABSTRACT: SAREF4AUTO intends to connect SAREF with existing ontologies (such as W3C SSN, W3C SOSA, GeoSPARQL, etc.) and important standardization initiatives and ontologies in the Automotive domain.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2020

IoT/Water

SAREF4WATR: extension for the Water domain

URL: https://saref.etsi.org/saref4watr/

ABSTRACT: The SAREF extension for the water domain (SAREF4WATR) is based on a limited set of use cases and from available existing data models.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2020

IoT/Environment

SAREF4ENVI: extension for the Environment domain

URL: https://saref.etsi.org/saref4envi/

ABSTRACT: SAREF4ENVI has two main aims: on the one hand, to be the basis for enabling the use of SAREF in the environment domain and, on the other hand, to exemplify how to enable interoperability between environmental devices in cooperation.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

Standard Ontology for Ubiquitous and Pervasive Applications

URL: https://ebiquity.umbc.edu/_file_directory_/papers/105.pdf

ABSTRACT: The SOUPA ontology defines intelligent agents with associated beliefs, desires, and intentions, time, space, events, user profiles, actions, and policies for security and privacy.

DOCUMENT TYPE: Project

PUBLICATION DATE: 26/08/2004

A standard ontology for smart spaces

URL: https://www.researchgate.net/publication/220403208_A_standard_ontology_for_smart_spaces

ABSTRACT: The ontology defines smart environments, referentiality in terms of localization and temporality, and environmental change.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/08/2010

IoT/Health

SAREF4EHAW: extension for the eHealth/Ageing-well domain

URL: https://saref.etsi.org/saref4ehaw/

ABSTRACT: The SAREF4EHAW extension has been specified and formalised by investigating EHAW domain-related resources such as potential stakeholders, standardization initiatives, alliances/associations, European projects, EC directives, existing ontologies, and data repositories.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2020

IoT/Wearables

SAREF4WEAR: extension for the Wearables domain

URL: https://saref.etsi.org/saref4wear/

ABSTRACT: The SAREF extension for the wearables domain (SAREF4WEAR) is based on a limited set of use cases and from available existing data models.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2020

IoT/Transport

Urban IoT Ontologies

URL 1: http://www.semantic-web-journal.net/system/files/swj2607.pdf

URL 2: https://comune-milano.github.io/ontologie-iot-urbani/docs/electric/index-en.html

ABSTRACT: The Urban IoT modular suite of ontologies defines concepts related to sharing mobility (car sharing, bike sharing, etc.) and electric mobility (vehicle charging infrastructures).

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 23/03/2022

Core Ontologies for Safe Autonomous Driving (TTI Core)

URL: https://www.toyota-ti.ac.jp/Lab/Denshi/COIN/Ontology/TTICore-0.03/

ABSTRACT: The suite of ontologies is composed of three modules: Car, Control, and Map. The ontologies define knowledge of maps, driving paths, and driving environments for smart vehicles and Advanced Driver Assistance Systems.

DOCUMENT TYPE: Product

PUBLICATION DATE: 01/05/2015

IoT/Agriculture

SAREF4AGRI: extension for the Smart Agriculture and Food Chain domains

URL: https://saref.etsi.org/saref4agri/

ABSTRACT: SAREF4AGRI intends to connect SAREF with existing ontologies and important standardization initiatives and ontologies in the Smart Agriculture and Food Chain domain, including ICAR for livestock data, AEF for agricultural equipment, Plant Ontology Consortium for plants, or AgGateway for IT support for arable farming.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2020

Cloud Computing

ISO/IEC 18384-3:2016 Information technology. Reference Architecture for Service Oriented Architecture (SOA RA). Part 3: Service Oriented Architecture ontology

URL: https://www.iso.org/standard/63106.html

ABSTRACT: ISO/IEC 18384-3:2016 defines a formal ontology for service-oriented architecture (SOA), an architectural style that supports service orientation. The terms defined in this ontology are key terms from the vocabulary in ISO/IEC 18384-1.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2016

Multi-media

ISO/IEC 21000-19:2010 Information technology. Multimedia framework (MPEG-21). Part 19: Media Value Chain Ontology

URL: https://www.iso.org/standard/52887.html

ABSTRACT: ISO/IEC 21000-19:2010 describes MPEG-21 Media Value Chain Ontology (MVCO). The MVCO may be used to capture knowledge about media value chains and to represent it in a computer-readable way, concepts in the domain and the relationships between those concepts. ISO/IEC 21000-19:2010 describes the following technology. Model: the model is described in Clause 6, by way of a narrative description of the Value Chain, its main elements and relations. Representation: the MVCO has been formalised as a normative OWL Ontology, the description of which is given in this Clause. The description consists of listing the classes, the object properties, the datatype properties, and the class individuals. Classes are described by giving the name, an English definition, the class hierarchy, and the restrictions imposed on the class. The representation is given in Clause 7. Annex B contains the normative OWL (XML/RDF) comprising the entire semantics of the elements in the model. Ontology use: an Informative section is provided with non-normative descriptions of use, extensions and an API (Annex A).

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/06/2010

ISO/IEC 21000-21:2017 Information technology . Multimedia framework (MPEG-21) . Part 21: Media contract ontology

URL: https://www.iso.org/standard/69299.html

ABSTRACT: ISO/IEC 21000-21:2017 specifies an ontology for representing contracts in the Multimedia Framework formed for the transaction of MPEG-21 Digital Items or services related to the MPEG-21 Framework. Media Contract Ontology (MCO) aims to digitally express agreements made in environments using ISO/IEC 21000. These agreements are contracts for transactions of content packed as Digital Items, as well as for services provided around this content by means of a sematic representation. The range of contracts under scope are as follows: - contracts about transactions on rights for the exploitation of content as MPEG-21 Digital Items; - contracts about the provision of MPEG-21-based services, like delivery, identification, encryption, search and others. However, MCO can also be used as electronic format for contracts on the trade of media rights beyond the MPEG framework.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2017

ISO/IEC 21000-19:2010 Information technology Multimedia framework (MPEG-21) Part 19: Media Value Chain Ontology

URL: https://www.iso.org/standard/52887.html

ABSTRACT: ISO/IEC 21000-19:2010 describes MPEG-21 Media Value Chain Ontology (MVCO). The MVCO may be used to capture knowledge about media value chains and to represent it in a computer-readable way, concepts in the domain and the relationships between those concepts. ISO/IEC 21000-19:2010 describes the following technology. Model: the model is described in Clause 6, by way of a narrative description of the Value Chain, its main elements and relations. Representation: the MVCO has been formalised as a normative OWL Ontology, the description of which is given in this Clause. The description consists of listing the classes, the object properties, the datatype properties, and the class individuals. Classes are described by giving the name, an English definition, the class hierarchy, and the restrictions imposed on the class. The representation is given in Clause 7. Annex B contains the normative OWL (XML/RDF) comprising the entire semantics of the elements in the model. Ontology use: an Informative section is provided with non-normative descriptions of use, extensions and an API (Annex A).

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/06/2010

ISO/IEC 21000-21:2017 Information technology Multimedia framework (MPEG-21) Part 21: Media contract ontology

URL: https://www.iso.org/standard/69299.html#:~:text=ISO%2FIEC%2021000%2D21%3A2017%20specifies%20an%20ontology%20for,environments%20using%20ISO%2FIEC%2021000.

ABSTRACT: ISO/IEC 21000-21:2017 specifies an ontology for representing contracts in the Multimedia Framework formed for the transaction of MPEG-21 Digital Items or services related to the MPEG-21 Framework. Media Contract Ontology (MCO) aims to digitally express agreements made in environments using ISO/IEC 21000. These agreements are contracts for transactions of content packed as Digital Items, as well as for services provided around this content by means of a sematic representation. The range of contracts under scope are as follows:- contracts about transactions on rights for the exploitation of content as MPEG-21 Digital Items; - contracts about the provision of MPEG-21-based services, like delivery, identification, encryption, search and others. However, MCO can also be used as electronic format for contracts on the trade of media rights beyond the MPEG framework.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/05/2017

Geomatics

ISO/TS 19150-1:2012 Geographic information. Ontology. Part 1: Framework

URL: https://www.iso.org/standard/57465.html

ABSTRACT: ISO/TS 19150-1:2012 defines the framework for semantic interoperability of geographic information. This framework defines a high-level model of the components required to handle semantics in the ISO geographic information standards with the use of ontologies.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/11/2012

Blockchain

ISO/TS 23258:2021 Blockchain and distributed ledger technologies. Taxonomy and Ontology

URL: https://www.iso.org/standard/75094.html

ABSTRACT: This document specifies a taxonomy and an ontology for blockchain and distributed ledger technologies (DLT). The taxonomy includes a taxonomy of concepts, a taxonomy of DLT systems and a taxonomy of application domains, purposes and economy activity sections for use cases. The ontology includes classes and attributes as well as relations between concepts. The audience includes but is not limited to academics, architects, customers, users, tool developers, regulators, auditors and standards development organizations.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/07/2021

ISO/TS 23258:2021 Blockchain and distributed ledger technologies Taxonomy and Ontology

URL: https://www.iso.org/standard/75094.html

ABSTRACT: This document specifies a taxonomy and an ontology for blockchain and distributed ledger technologies (DLT). The taxonomy includes a taxonomy of concepts, a taxonomy of DLT systems and a taxonomy of application domains, purposes and economy activity sections for use cases. The ontology includes classes and attributes as well as relations between concepts. The audience includes but is not limited to academics, architects, customers, users, tool developers, regulators, auditors and standards development organizations.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/11/2021

Digital Twin

Real Estate Core Ontology

URL: https://github.com/azure/opendigitaltwins-building

ABSTRACT: This DTDL ontology is implemented based on the domain ontology RealEstateCore. RealEstateCore is a common language used to model and control buildings, simplifying the development of new services. The ontology is rich and complete while providing simplicity and real-world applicability with proven industry solutions and partnerships. It has seen practical deployments across sizeable real estate portfolios over the past several years and has gone through several revisions based on real-world feedback and learning. RealEstateCore specifically does not aim to be a new standard but rather provides a common denominator and bridge with other building industry standards such as Brick Schema, Project Haystack, W3C Building Topology Ontology (W3C BOT), and more. Read more about our ontology alignment with standards. The original RealEstateCore ontology is represented using the W3C Web Ontology Language (OWL) and it can be visualized here. It has been converted into the DTDL syntax used in this repository using our universal OWL2DTDL tool.

DOCUMENT TYPE: Product

PUBLICATION DATE: 06/11/2020

Smart Cities Ontology

URL: https://github.com/Azure/opendigitaltwins-smartcities/

ABSTRACT: We collaborated with Open Agile Smart Cities (OASC) and Sirus to provide DTDL-based ontology, starting with ETSI CIM NGSI-LD, and accelerate the development of digital twins-based solutions for smart cities. In addition to ETSI NGSI-LD, we've also evaluated Saref4City, CityGML, ISO and others. The ETSI CIM NGSI-LD specification defines an open framework for context information exchange named NGSI-LD which comes with an information model that defines the meaning of the most needed terms, and a domain-specific extension to model any information. The core meta-model provides a basis for representing property graphs using RDF/RDFS/OWL, and is formed of Entities, their Relationships, and their Properties with values, encoded in JSON-LD.

DOCUMENT TYPE: Product

PUBLICATION DATE: 26/02/2021

Energy

Open Energy Ontology

URL: https://openenergy-platform.org/ontology/oeo/

ABSTRACT: OEO defines the energy domain including energy generation, social and economic aspects of the energy domain, etc. It uses BFO as a top level ontology.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/01/2020

Energy Grid Ontology

URL 1: https://techcommunity.microsoft.com/t5/internet-of-things-blog/energy-grid-ontology-for-digital-twins-is-now-available/ba-p/2325134

URL 2: https://github.com/Azure/opendigitaltwins-energygrid/

ABSTRACT: The Energy Grid ontology describes power stations, substations, energy resources, and customers.

DOCUMENT TYPE: Product

PUBLICATION DATE: 06/052021

Open Automated Demand Response Ontology (OpenADR)

URL: https://albaizq.github.io/OpenADRontology/OnToology/ontology/openADRontology.owl/documentation/index-en.html

ABSTRACT: This ontology models the OpenADR protocol standard that allows electricity providers to communicate demand response signals directly to existing customers using a common language and existing communications means.

DOCUMENT TYPE: Project

PUBLICATION DATE: 17/11/2020

Energy Efficiency Prediction Semantic Assistant ontology (EEPSA)

URL: https://iesnaola.github.io/eepsa/EEPSA/index-en.htmll

ABSTRACT: EEPSA ontology captures all the necessary expert knowledge related to buildings, sensing and actuating devices, and their corresponding observations and actuations.

DOCUMENT TYPE: Project

PUBLICATION DATE: 8/3/2021

Domain Analysis-Based Global Energy Ontology

URL: http://www.edwardcurry.org/publications/WS-DABGEO.pdf

ABSTRACT: DABGEO provides a common representation of the energy domains represented heterogeneously by the already available energy ontologies.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 27/01/2020

ONTOlogy for WIND energy

URL 1: https://arxiv.org/pdf/1803.02808.pdf

URL 2: https://github.com/dkucuk/Energy-Ontologies-OntoWind

ABSTRACT: OntoWind defines the semantic information of the wind energy domain including sensors, measurements, forecasts, etc.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 07/03/2018

Robotics

IEEE Approved Draft Standard for Autonomous Robotics (AuR) Ontology

URL: https://standards.ieee.org/ieee/1872.2/7094/

ABSTRACT: This standard extends IEEE 1872-2015 Standard for Ontologies for Robotics and Automation to represent additional domain-specific concepts, definitions, and axioms commonly used in Autonomous Robotics (AuR). This standard is general and can be used in many ways - for example, to specify the domain knowledge needed to unambiguously describe the design patterns of AuR systems, to represent AuR system architectures in a unified way, or as a guideline to build autonomous systems consisting of robots operating in various environments.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 23/09/2021

IEEE Standard Ontologies for Robotics and Automation

URL 1: https://standards.ieee.org/ieee/1872/5354/

URL 2: https://github.com/srfiorini/IEEE1872-owl

ABSTRACT: CORA ontology defines concepts such as robot, robotic system, robot part, etc.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 09/11/2011

Perception and Manipulation Knowledge (PMK)

URL: https://github.com/srfiorini/IEEE1872-owl

ABSTRACT: Perception and Manipulation knowledge framework (PMK) presents a standardized ontology framework for autonomous robot perception and manipulation, which follows the IEEE standards 1872 of representing knowledge for the robotic domain. Moreover, an inference mechanism for reasoning over knowledge is included, which enhances the planning of manipulation tasks.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 14/07/2019

Battery

Battery INterFace Ontology (BattINFO)

URL: https://github.com/BIG-MAP/BattINFO

ABSTRACT: A battery interface domain ontology based on EMMO

DOCUMENT TYPE: Project

PUBLICATION DATE: 28/02/2022

Industry

ISO 10303-1:2021 Industrial automation systems and integration. Product data representation and exchange. Part 1: Overview and fundamental principles

URL: https://www.iso.org/standard/72237.html

ABSTRACT: ISO 10303 provides a representation of product information along with the necessary mechanisms and definitions to enable product data to be exchanged. The exchange is among different computer systems and environments associated with the complete product lifecycle, including product design, manufacture, use, maintenance, and final disposition of the product. This document defines the basic principles of product information representation and exchange used in ISO 10303. It specifies the characteristics of the various series of parts of ISO 10303 and the relationships among them.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/03/2021

ISO/DIS 20534: 50.00 (2018) Industrial automation systems and integration. Formal semantic models for the configuration of global production networks

URL: https://www.iso.org/standard/68274.html

ABSTRACT: Defines a formal logic-based concept specialisation approach to support the development of manufacturing reference models that can underpin the necessary business-specific knowledge models that are needed to support the configuration of global production networks.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/09/2018

ISO/IEC 15944-4:2015 Information technology Business operational view Part 4: Business transaction scenarios Accounting and economic ontology

URL: https://www.iso.org/standard/67199.html

ABSTRACT: ISO/IEC 15944-4:2015 provides a set of UML class diagrams and conceptual explanations that circumscribe the Open-edi Business Transaction Ontology (OeBTO). It explains the mechanics of a business transaction state machine, the procedural component of an OeBTO, and the (internal) constraint component of OeBTO, its repository for business rules. ISO/IEC 15944-4:2015 addresses collaborations among independent trading partners as defined in ISO/IEC 159441. ISO/IEC 15944-4:2015 applies to both binary collaborations (buyer and seller) and mediated collaborations (buyer, seller, third-party). The ontological features described herein propose standards only for the Business Operational View (BOV), that is, the business aspects of business transactions as they are defined in ISO/IEC 159441.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/04/2015

Universal Standard Products and Services Classification

URL: http://www.cs.vu.nl/~mcaklein/unspsc/

ABSTRACT: coding system to classify both products and services for use throughout the global marketplace

DOCUMENT TYPE: Product

PUBLICATION DATE: 01/01/2002

Industrial Ontology Foundry (Core)

URL: https://github.com/iofoundry/Core

ABSTRACT: The IOF's mission is to create a suite of ontologies intended to support digital manufacturing by facilitating cross-system integration both within the factory and across an enterprise, in commerce between suppliers, manufacturers, customers and other trading partners, and throughout the various stages of the product life cycle. The IOF Core Ontology resides at the top of this suite from an architectural perspective and contains terms found in a number of operational areas of manufacturing. These common terms appear or are anticipated to appear, in two or more of the ontologies of the suite. Additionally, as the architectural approach chosen by the IOF is to base all of its ontologies on a single foundational or top-level ontology for which the IOF chose the Basic Formal Ontology or BFO the Core Ontology contains a number of intermediate-level terms that derive from BFO and from which common industry terms are in turn derived. Such intermediate-level terms

are most often domain independent meaning they are found in other industries and domains, such as in the banking, insurance, and healthcare industries, or the sciences, as in the physics, chemistry and biology domains. The IOF Core Ontology is developed and formalized as an ontology using both first-order logic and version 2 of the Web Ontology Language (OWL). The use of logic ensures that each term is defined in a way that is unambiguous to humans and can be processed by computers. All terms appearing in the ontology are reviewed and curated by a working group and consensus is reached by validating usage in the context of manufacturing domain use cases.

DOCUMENT TYPE: Product

PUBLICATION DATE: 06/05/2022

Industry 4.0 Knowledge Graph Ontology

URL: https://w3id.org/i40/sto

ABSTRACT: It represents standards, standardization organizations and standardization frameworks for the Industry 4.0 area.

DOCUMENT TYPE: Project

PUBLICATION DATE: 04/12/2019

Mechanical and Industrial Engineering

ISO 13399-1:2006 Cutting tool data representation and exchange. Part 1: Overview, fundamental principles and general information model

URL 1: https://www.iso.org/standard/36757.html

URL 2: https://www.iso.org/standard/59310.html

ABSTRACT: the main categories of cutting tool data and the relationships between them. It provides a general information model of data representation and information exchange for these categories, as well as an overview of the principles of product data exchange used in ISO 13399 as a whole, a description of the other parts of ISO 13399 and a method for transferring cutting tool data

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/02/2006

Open Assembly Model

URL 1: https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=822185

URL 2: https://www.nist.gov/publications/open-assembly-model-exchange-assembly-and-tolerance-information-overview-and-example

ABSTRACT: The objective of the paper is to show how the OAM can be used to realize seamless integration of product information, with an emphasis on assembly, throughout all phases of a product design

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/01/2019

VAR Ontology

URL 1: https://www.researchgate.net/publication/344362531_Towards_Adaptive_Interactive_Assistive_and_Collaborative_Assembly_Workplaces_through_Semantic_Technologies

URL 2: http://industryportal.enit.fr/ontologies/VAR

ABSTRACT: a semantic approach which can adapt the workplace in real-time to the production context and operators' characteristics

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/09/2020

ontology for product footprint concepts

URL: https://github.com/BONSAMURAIS/BONSAI-ontology-RDF-framework

ABSTRACT: Product footprint ontology that describes the environmental impacts of a product system through Life Cycle Assessment (LCA)

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2020

Coordinated Holistic Alignment of Manufacturing Processes (CHAMP)

URL: https://github.com/NCOR-US/CHAMP

ABSTRACT: The goal of CHAMP is to represent the domain of the Product Life Cycle in a suite of mid-level ontologies that may be extended in applications to integrate data both within industrial organizations and across them

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/07/2018

Additive Manufacturing Ontology

URL: https://www.sciencedirect.com/science/article/abs/pii/S0166361518301647

ABSTRACT: Ontological representation of products and their life cycle

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/02/2019

CDM_Code

URL: https://www.scitepress.org/Link.aspx?doi=10.5220/0006056301360143

ABSTRACT: Ontology to balance general (re)applicability and use case specificity, namely automotive exhaust production and metallic press maintenance

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/11/2016

Falcon Project Ontology (FALCONONTO)

URL 1: http://www.falcon-h2020.eu/

URL 2: http://industryportal.enit.fr/ontologies/FALCON

ABSTRACT: Virtual Open Platform to seamlessly connect product-service usage information to design and development processes

DOCUMENT TYPE: Project

PUBLICATION DATE: 12/31/2017

GRACE ontology

URL: https://www.sciencedirect.com/science/article/pii/S1474667016343968

ABSTRACT: methodology to gather and analyze relevant influences on product quality and a multi-agent architecture for flexible and quality-focused production control

DOCUMENT TYPE: Project

PUBLICATION DATE: 29/02/2012

EMMO-Mechanical Testing

URL: https://github.com/emmo-repo/domain-mechanical-testing

ABSTRACT: A domain ontology for mechanical testing based on EMMO

DOCUMENT TYPE: Project

PUBLICATION DATE: 12/02/2021

Industrial MAintenance Management Ontology

URL: http://industryportal.enit.fr/ontologies/IMAMO

ABSTRACT: IMAMO Powerloom and UML class diagram version were developed By Hedi Karray et al in the scope of the European project SMAC at FEMTO-ST Institute, University of Franche-Comt.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2010

Z-BRE4K ontology

URL 1: https://www.z-bre4k.eu/

URL 2: http://industryportal.enit.fr/ontologies/Z-BRE4K

ABSTRACT: Industrial maintenance and knowledge regarding components and processes

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2020

IOF-Maintenance

URL: http://industryportal.enit.fr/ontologies/IOF-MAINTENANCE

ABSTRACT: reference ontology for industrial maintenance using a top-down ontology engineering approach

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 17/11/2020

Manufacturing System Ontology

URL 1: https://hal.inria.fr/hal-01431136/document

URL 2: https://github.com/enegri/OFM

ABSTRACT: The Manufacturing Systems Ontology (MSO) is a structured representation of the domain of manufacturing systems and logistics systems, based on object-oriented methodology. The modelling method defines the system by addressing four main different aspects separately: the physical aspect, the technological aspect, the control aspect and the visualization aspect.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/01/2014

MAnufacturing's Semantics ONtology (MASON)

URL 1: https://ieeexplore.ieee.org/document/1633441

URL 2: https://sourceforge.net/projects/mason-onto/files/

ABSTRACT: This paper presents a proposal for a manufacturing upper ontology, aimed to draft a common semantic net in the manufacturing domain.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 15/06/2006

Semantically Integrated Manufacturing Planning Model (SIMPM)

URL 1: https://doi.org/10.1016/j.rcim.2018.04.002

URL 2: https://github.com/ohio-ontology/SIMPM

ABSTRACT: Distributed computer integrated manufacturing is increasingly adopting cloud computing, software-as-a-service (SaaS) and multi-agent systems as steps towards design anywhere, build anywhere strategy. In this scenario, ontologies not only serve as common message exchange structure among distributed agents but also provide reasoning capability to extract implicit knowledge from explicit information already stored in the knowledge base. Foundation ontologies (upper-level), comprised of most general concepts of a domain, provide a common semantic structure to the domain-level ontologies, which capture details of multi-disciplinary manufacturing knowledge. In this paper, novel upper-level ontology, called SIMPM (Semantically Integrated Manufacturing Planning Model), is proposed in order to model three fundamental constraints of manufacturing process planning: variety, time, and aggregation. The philosophical underpinning of the proposed ontology presented as OWL-DL axioms is derived from a three-dimensional planning model, developed during our past research on computer-aided process planning. As part of the evaluation of SIMPM ontology, we first expound on the interoperability issues with other upper-level manufacturing ontologies. Next, we present a case study on process planning for prismatic part design. In this way, we demonstrate how the generic set of proposed axioms may be used to address various manufacturing process planning concerns, such as alternative manufacturing resources, the temporal order among operations and granularity in the details of a process plan.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 17/05/2021

Manufacturing Service Description Language (MSDL)

URL 1: https://infoneer.wp.txstate.edu/ontology-download/msdl-ontology/#:~:text=Manufacturing%20Service%20Description%20Language%20(MSDL,is%20currently%20maintained%20and%20extended

URL 2: http://industryportal.enit.fr/ontologies/MSDL

ABSTRACT: Manufacturing Service Description Language (MSDL) is an OWL-based ontology developed for formal representation of manufacturing services. Development of MSDL started at the PLM Alliance research group at the University of Michigan and its first version was released in fall 2005. It is currently maintained and extended in the INFONEER Research Group at Texas State University under supervision of Farhad Ameri. MSDL is based on Description Logic (DL) formalism that provides sufficient expressivity and extensibility for manufacturing knowledge modeling. A unique feature of MSDL is that it is built around a service-oriented paradigm, therefore, it can be used constructing temporary supply chains that are composed to fulfill a certain set of required services. MSDL is a highly axiomatic ontology and is considered to be one of the most comprehensive ontologies in manufacturing domain. MSDL was initially designed to enable automated supplier discovery in distributed environments with focus on mechanical machining services.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/09/2006

ManuService

URL 1: https://link.springer.com/article/10.1007/s10845-016-1250-x

URL 2: http://industryportal.enit.fr/ontologies/MANUSERVICE

ABSTRACT: ManuService is an ontology for enabling semantic interoperability and communication within the domain of manufacturing. Aiming at solving the interoperability issue within the domain of manufacturing, ManuService consists of all necessary concepts for describing highly customized products and manufacturing resources. These concepts include product specifications, quality constraints, manufacturing processes, organisation information, cost expectations, logistics requirements etc. ManuService ontology provides a module-based, reconfigurable, privacy-enhanced and standardised approach to modelling customised manufacturing service requests.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 12/01/2016

Product Ontology (PRONTO)

URL 1: https://sites.google.com/site/ontoversioningrepository/pronto---product-ontology?authuser=0

URL 2: http://industryportal.enit.fr/ontologies/PRONTO

ABSTRACT: An ontology for comprehensive and consistent representation of product information

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/12/2011

Supply Chain Process Ontology (SCOPRO)

URL: https://openreview.net/forum?id=ricE3prhfH8

ABSTRACT: Ontology that formally describes a SC at various abstraction levels, by specifying its associated business processes based on the SCOR de facto standard as well as sharing a precise meaning of the information exchanged during communication among the many stakeholders involved in the SC

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/01/2014

Assembly Design Ontology

URL: https://www.sciencedirect.com/science/article/abs/pii/S0010448506001680

ABSTRACT: This paper shows that the ability of the AsD ontology to be reasoned can capture both assembly and joining intents by a demonstration with a realistic mechanical assembly

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/12/2006

Common Design Features Ontology

URL: https://ieeexplore.ieee.org/document/4427131?arnumber=4427131

ABSTRACT: To enable semantics data exchange, we propose an ontology-based approach, consisting in developing a “Common Design Features Ontology”, called CDFO

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 5/11/2007

ADAptive holonic COntrol aRchitecture for distributed manufacturing systems

URL: https://www.researchgate.net/publication/221549094_The_Role_of_Foundational_Ontologies_in_Manufacturing_Domain_Applications

ABSTRACT: This paper shows how foundational ontologies can be used in the manufacturing control area

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/10/2004

Industrial Maintenance

Reference ontology for industrial maintenance (ROMAIN)

URL 1: https://www.researchgate.net/publication/332390146_ROMAIN_Towards_a_BFO_compliant_reference_ontology_for_industrial_maintenance

URL 2: https://github.com/HediKarray/ROMAIN

ABSTRACT: ROMAIN is domain-specific, open access, reference ontology for maintenance management domain. We use a hybrid approach, based on a top-down alignment to an open-source top-level ontology, the Basic Formal Ontology (BFO), and a bottom-up focus on classes that are grounded in maintenance practice. We constrain the scope of the ontology to the classes that are unique to the maintenance management practice, such as maintenance strategy, degradation, and work order management, rather than modelling the entire domain of maintenance. This approach reduces the scope of the development task and enables reasoning to be tested at a manageable scale. ROMAIN provides a unifying framework that can be used in conjunction with other BFO compliant sub-domain ontologies, such as planning and scheduling ontologies. The proposed ontology is validated using real-life data in the context of a use case related to evaluating the effectiveness of maintenance strategy.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 01/04/2019

Manufacturing

ExtruOnt

URL 1: https://www.semantic-web-journal.net/system/files/swj2317.pdf

URL 2: http://industryportal.enit.fr/ontologies/EXTRUONT

ABSTRACT: ExtruOnt ontology describes a type of manufacturing machine, more precisely, a type that performs an extrusion process (extruder). Although the scope of the ontology is restricted to a concrete domain, it could be used as a model for the development of other ontologies for describing manufacturing machines in Industry 4.0 scenarios.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 14/05/2014

Supply Chain

Supply Chain Operation Reference (SCOR)

URL: https://github.com/vocol/scor

ABSTRACT: The Supply Chain Operation Reference (SCOR) is a cross-industry approach to lay the groundwork for more efficient and effective information exchange in supply networks.

DOCUMENT TYPE: Project

PUBLICATION DATE: 12/01/2018

Material Science and Engineering

Allotrope Ontology (AFO)

URL: https://www.allotrope.org/ontologies

ABSTRACT: The Allotrope Foundation Ontologies (AFO) is a curated collection of defined terms prepared by Allotrope Foundation. The AFO is collectively licensed under the Creative Commons Attribution License (CC-BY). However, the collection includes terms that are from or based on third party sources, as identified in the attribution file within the AFO software release package, as updated from time-to-time. Such individual terms may be subject to subject to other licenses specified by the source (e.g., terms from the CHMO or chemical methods ontology are also under the CC-BY, while terms based on Wikipedia entries are subject to CC BY-SA).

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/09/2022

Product Service System (PSS)

URL 1: https://www.industrialontologies.org/product-service-system-wg/

URL 2: http://industryportal.enit.fr/ontologies/PSS

ABSTRACT: Ontology to enhance engineering of PSS in manufacturing, by modelling all the aspects that affect, or could affect a PSS

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 10/05/2022

eNanomapper

URL: https://enanomapper.net/ontology

ABSTRACT: The eNanoMapper ontology was developed by the eNanoMapper team and is now maintained by the NanoCommons project. The ontology includes and defines common vocabulary terms in use in nanosafety research with a classification hierarchy and other relationships. In parts it is an extension and refinement of the Nanoparticle Ontology

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 05/03/2015

BWMD Domain Ontology (BWMD-Domain)

URL: https://matportal.org/ontologies/BWMD-DOMAIN

ABSTRACT: The BWMD ontology was created by Fraunhofer IWM. Within the DMD4F project this ontology was curated by Fraunhofer EMI, i.e. it was divided into modules.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/25/2021

NanoMine

URL 1: https://www.eng.uc.edu/~beaucag/Classes/Properties/Slides/AI%20ML%20IoT%20Papers/NanoMine1.5046839.pdf

URL 2: https://github.com/tetherless-world/nanomine-ontology

ABSTRACT: NanoMine, built with the Whyis knowledge graph framework, integrates diverse data from over 1,700 polymer nanocomposite experiments

DOCUMENT TYPE: Project

PUBLICATION DATE: 07/11/2018

OntoSTEP: OWL-DL Ontology for STEP

URL 1: https://www.nist.gov/publications/ontostep-owl-dl-ontology-step

URL 2: https://www.nist.gov/services-resources/software/ontostep-plugin

ABSTRACT: In this paper the authors present an OWL-DL (Web Ontology Language - Description Logic) version of STEP (OntoSTEP) that will allow logic reasoning and inference mechanisms and thus enhancing semantic interoperability

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2009

VIMMP Ontologies

URL 1: https://gitlab.com/vimmp-semantics/vimmp-ontologies

URL 2: https://zenodo.org/record/4411422#.YpoMKqhBw2w

ABSTRACT: Ontologies developed in the context of the VIMMP project

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2021

TribAIn

URL: https://github.com/snow0815/tribAIn

ABSTRACT: ontology that aims to formalize knowledge gained from tribological experiments for reuse, comparison and documentation

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 27/6/2020

Materials Design Ontology

URL: https://w3id.org/mdo

ABSTRACT: MDO is an ontology for materials design field, representing the domain knowledge specifically related to solid-state physics and computational materials science

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 23/08/2022

Construction

Building Topology Ontology (BOT)

URL: https://w3c-lbd-cg.github.io/bot/

ABSTRACT: The Building Topology Ontology (BOT) is a minimal ontology for describing the core topological concepts of a building.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 28/06/2021

Digital Construction Ontologies (DiCon)

URL: https://digitalconstruction.github.io/v/0.5/index.html

ABSTRACT: Digital Construction Ontologies (DiCon) are an enabler for the semantic interoperability between systems in the construction and renovation domain

DOCUMENT TYPE: Project

PUBLICATION DATE: 20/04/2021

Building ontology

URL: https://bimerr.iot.linkeddata.es/def/building/

ABSTRACT: The Building ontology has been developed to perform as the core module of the BIMERR Ontology Network, containing information related to building topology, and components. The model is constructed as an extention of the BOT ontology that provides the vocabulary to describe the topology of a building as well as the relationships between their main components such as zones, spaces, and building elements. The taxonomy of building components is based on the proposed by the IFC 4.1 standard.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/07/2020

Material properties ontology

URL: http://bimerr.iot.linkeddata.es/def/material-properties#

ABSTRACT: The Material Properties Ontology aims to provide the vocabulary to describe the building components, materials, and their corresponding properties, relevant within the construction industry.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2020

Urban Planning/Energy

SEMANCO Ontology

URL: http://semanco-tools.eu/ontology-releases/eu/semanco/ontology/SEMANCO/SEMANCO.owl

ABSTRACT: The SEMANCO Energy Model is a formal ontology specified using Web Ontology Language 2 (OWL 2) comprising concepts captured from diverse sources including standards, use cases and activity descriptions and data sources related to the domains of urban planning and energy management. In particular it contains the terms and attributes that describe regions, cities, neighbourhoods and buildings; energy consumption and CO2 emission indicators, as well as climate and socio- economic factors that influence energy consumption. The ontology enables semantic tools to access the data stemming from different domains and applications.

DOCUMENT TYPE: Project

PUBLICATION DATE: 30/07/2014

Smart Grid

IEC 61970-301:2020 Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base

URL 1: http://www.iec.ch/search/?q=61970

URL 2: https://webstore.iec.ch/publication/62698

ABSTRACT: The Common Information Model (CIM) is an electric power transmission and distribution standard developed by the electric power industry. It aims to allow application software to exchange information about an electrical network. It has been officially adopted by the International Electrotechnical Commission (IEC).

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 26/06/2020

Smart City

ISO/IEC 21972:2020 Information technology Upper-level ontology for smart city indicators

URL: https://www.iso.org/standard/72325.html

ABSTRACT: This document establishes general principles and gives guidelines for an indicator upper-level ontology (IULO) for smart cities that enables the representation of indicator definitions and the data used to derive them. It includes concepts (e.g., indicator, population, cardinality); and properties that relate concepts (e.g., cardinality_of, parameter_of_var).

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/01/2020

iCity Transportation Planning Suite of Ontologies (iCity TPSO)

URL: https://enterpriseintegrationlab.github.io/icity/iCityOntologyReport_1.2.pdf

ABSTRACT: The Transportation Planning Suite of Ontologies (TPSO) provides a common set of terms for unambiguously storing and accessing data. The key purpose of the iCity TPSO is to address the challenges of data integration and reuse in the context of transportation planning.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 30/09/2018

Transport

Vehicle Signal Specification ontology

URL 1: https://github.com/klotzbenjamin/vss-ontology

URL 2: https://www.w3.org/TR/vsso/

ABSTRACT: VSSo derives from the automotive standard VSS, and follows the SSN pattern for representing observations and actuations. VSSo defines car components, sensors, signals, etc.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 03/03/2022

datAcron Ontology

URL: http://ai-group.ds.unipi.gr/datacron_ontology/#ontology

ABSTRACT: datAcron Ontology defines semantic trajectories at different levels of spatiotemporal analysis (aviation and maritime conceptualizations).

DOCUMENT TYPE: Project

PUBLICATION DATE: 30/04/2017

Cognition

Emotion Ontology

URL 1: https://github.com/jannahastings/emotion-ontology/

URL 2: https://ceur-ws.org/Vol-833/paper10.pdf

ABSTRACT: The Emotion Ontology is an ontology for affective phenomena such as emotions and moods. It was originally developed collaboratively between the Swiss Centre of Affective Sciences and the University at Buffalo.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 19/07/2022

Biology

Chemical Entities of Biological Interest Ontology (ChEBI)

URL 1: https://www.ebi.ac.uk/chebi/

URL 2: https://bioportal.bioontology.org/ontologies/CHEBI

ABSTRACT: Chemical Entities of Biological Interest (ChEBI) is a freely available dictionary of molecular entities focused on small chemical compounds. The term molecular entity refers to any constitutionally or isotopically distinct atom, molecule, ion, ion pair, radical, radical ion, complex, conformer, etc., identifiable as a separately distinguishable entity. The molecular entities in question are either products of nature or synthetic products used to intervene in the processes of living organisms. ChEBI incorporates an ontological classification, whereby the relationships between molecular entities or classes of entities and their parents and/or children are specified.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 07/30/2008

Human Phenotype Ontology

URL 1: https://hpo.jax.org/app/

URL 2: https://bioportal.bioontology.org/ontologies/HP

ABSTRACT: The Human Phenotype Ontology (HPO) provides a standardized vocabulary of phenotypic abnormalities encountered in human disease. Each term in the HPO describes a phenotypic abnormality, such as Atrial septal defect. The HPO is currently being developed using the medical literature, Orphanet, DECIPHER, and OMIM. HPO currently contains over 13,000 terms and over 156,000 annotations to hereditary diseases. The HPO project and others have developed software for phenotype-driven differential diagnostics, genomic diagnostics, and translational research. The HPO is a flagship product of the Monarch Initiative, an NIH-supported international consortium dedicated to semantic integration of biomedical and model organism data with the ultimate goal of improving biomedical research. The HPO, as a part of the Monarch Initiative, is a central component of one of the 13 driver projects in the Global Alliance for Genomics and Health (GA4GH) strategic roadmap.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 09/23/2008

Cell Ontology

URL 1: https://cell-ontology.github.io/

URL 2: https://bioportal.bioontology.org/ontologies/CL

ABSTRACT: An ontology of cell types.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 05/29/2008

Gene Ontology (GO)

URL 1: http://geneontology.org/

URL 2: https://bioportal.bioontology.org/ontologies/GO

ABSTRACT: The Gene Ontology resource provides a computational representation of our current

scientific knowledge about the functions of genes (or, more properly, the protein and non-coding RNA molecules produced by genes) from many different organisms, from humans to bacteria. It is widely used to support scientific research, and has been cited in tens of thousands of publications.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 06/26/2008

Semanticscience Integrated Ontology

URL: https://www.ebi.ac.uk/ols/ontologies/sio

ABSTRACT: integrated ontology of types and relations for rich description of objects, processes and their attributes

DOCUMENT TYPE: Project

PUBLICATION DATE: 20/03/2010

Phenotype And Trait Ontology (PATO)

URL 1: https://obofoundry.org/ontology/pato.html

URL 2: https://bioportal.bioontology.org/ontologies/PATO

ABSTRACT: Phenotypic qualities (properties). This ontology can be used in conjunction with other ontologies such as GO or anatomical ontologies to refer to phenotypes. Examples of qualities are red, ectopic, high temperature, fused, small, edematous and arrested.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 07/30/2008

BioAssay Ontology (BAO)

URL 1: http://bioassayontology.org/

URL 2: https://bioportal.bioontology.org/ontologies/BAO

ABSTRACT: The BioAssay Ontology (BAO) describes chemical biology screening assays and their results including high-throughput screening (HTS) data to categorize assays and data analysis. BAO is an extensible, knowledge-based, highly expressive (currently SHOIQ(D)) description of biological assays making use of descriptive logic-based features of the Web Ontology Language (OWL). BAO currently has over 1000 classes and also makes use of several other ontologies. It describes several concepts related to biological screening, including Perturbagen, Format, Meta Target, Design, Detection Technology, and Endpoint. Perturbagens are perturbing agents that are screened in an assay; they are mostly small molecules. Assay Meta Target describes what is known about the biological system and/or its components interrogated in the assay (and influenced by the Perturbagen). Meta target can be directly described as a molecular entity (e.g. a purified protein or a protein complex), or indirectly by a biological process or event (e.g. phosphorylation). The format describes the biological or chemical features common to each test condition in the assay and includes biochemical, cell-based, organism-based, and variations thereof. The assay Design describes the assay methodology and implementation of how the perturbation of the biological system is translated into a detectable signal. Detection Technology relates to the physical method and technical details to detect and record a signal. Endpoints are the final HTS results as they are usually published (such as IC50, percent inhibition, etc.). BAO has been designed to accommodate multiplexed assays. All main BAO components include multiple levels of sub-categories and specification classes, which are linked via object property relationships forming an expressive knowledge-based representation.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 09/17/2010

Biomedical

ISO 14199:2015 Health Informatics Information Models Biomedical Research Integrated Domain Group (BRIDG) Model

URL: https://www.iso.org/standard/66767.html

ABSTRACT: ISO 14199:2015 defines a set of models collectively referred to as the Biomedical Research Integrated Domain Group (BRIDG) model for use in supporting the development of computer software, databases, metadata repositories, and data interchange standards. It supports technology solutions that enable semantic (meaning-based) interoperability within the biomedical/clinical research arena and between research and the healthcare arena. The clinical research semantics are represented as a set of visual diagrams which describe information relationships, definitions, explanations, and examples used in protocol-driven biomedical research. These diagrams are expressed using the iconography and grammar of the Unified Modelling Language (UML), the HL7 Reference Information Model (RIM), and a Web Ontology Language (OWL). ISO 14199:2015 establishes the links between protocol-driven research and its associated regulatory artefacts including the data, organization, resources, rules, and processes involved in the formal assessment of the utility, impact, or other pharmacological, physiological, or psychological effects of a drug, procedure, process, subject characteristic, or device on a human, animal, or other subject or substance along with all associated regulatory artefacts required for or derived from this effort, including data specifically associated with post-marketing adverse event reporting.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/10/2014

ISO 14199:2015 Health informatics. Information models. Biomedical Research Integrated Domain Group (BRIDG) Model

URL: https://www.iso.org/standard/66767.html

ABSTRACT: ISO 14199:2015 defines a set of models collectively referred to as the Biomedical Research Integrated Domain Group (BRIDG) model for use in supporting the development of computer software, databases, metadata repositories, and data interchange standards. It supports technology solutions that enable semantic (meaning-based) interoperability within the biomedical/clinical research arena and between research and the healthcare arena. The clinical research semantics are represented as a set of visual diagrams which describe information relationships, definitions, explanations, and examples used in protocol-driven biomedical research. These diagrams are expressed using the iconography and grammar of the Unified Modelling Language (UML), the HL7 Reference Information Model (RIM), and a Web Ontology Language (OWL).

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/09/2015

Orphanet Rare Disease Ontology (ORDO)

URL 1: https://www.orpha.net/consor/cgi-bin/index.php

URL 2: https://bioportal.bioontology.org/ontologies/ORDO

ABSTRACT: The Orphanet Rare Disease ontology (ORDO) is jointly developed by Orphanet and the EBI to provide a structured vocabulary for rare diseases capturing relationships between diseases, genes and other relevant features which will form a useful resource for the computational analysis of rare diseases. It is derived from the Orphanet database (www.orpha.net), a multilingual database dedicated to rare diseases populated from literature and validated by international experts. It integrates a nosology (classification of rare diseases), relationships (gene-disease relations, epiemological data) and connections with other terminologies (MeSH, SNOMED CT, UMLS, MedDRA), databases (OMIM,

UniProtKB, HGNC, ensembl, Reactome, IUPHAR, Geantlas) or classifications (ICD10). The ontology will be maintained by Orphanet and further populated with new data. Orphanet classifications can be browsed in the OLS view. The Orphanet Rare Disease Ontology is updated monthly and follows the OBO guidelines on deprecation of terms. It constitutes the official ontology of rare diseases produced and maintained by Orphanet (INSERM, US14).

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/31/2014

Medical Dictionary for Regulatory Activities Terminology (MedDRA)

URL 1: https://www.meddra.org/

URL 2: https://bioportal.bioontology.org/ontologies/MEDDRA

ABSTRACT: MedDRA is an international medical terminology with an emphasis on use for data entry, retrieval, analysis, and display. It applies to all phases of drug development, excluding animal toxicology, and the health effects and malfunction of devices. An appendix includes concept descriptions which describe how a medical concept is interpreted, used, and classified within the MedDRA terminology. It is not intended as a medical definition. The concept descriptions are intended to aid the consistent and accurate use of MedDRA in coding, retrieval, and analysis.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 05/08/2013

National Cancer Institute Thesaurus (NCIT)

URL 1: https://ncithesaurus.nci.nih.gov/ncitbrowser/

URL 2: https://bioportal.bioontology.org/ontologies/NCIT

ABSTRACT: NCI Thesaurus (NCIt) provides reference terminology for many NCI and other systems. It covers vocabulary for clinical care, translational and basic research, and public information and administrative activities.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 08/22/2007

RxNORM

URL 1: https://www.nlm.nih.gov/research/umls/rxnorm/index.html

URL 2: https://bioportal.bioontology.org/ontologies/RXNORM

ABSTRACT: RxNorm provides normalized names for clinical drugs and links its names to many of the drug vocabularies commonly used in pharmacy management and drug interaction software, including those of First Databank, Micromedex, Multum, and Gold Standard Drug Database. By providing links between these vocabularies, RxNorm can mediate messages between systems not using the same software and vocabulary. RxNorm now includes the United States Pharmacopeia (USP) Compendial Nomenclature from the United States Pharmacopeial Convention. USP is a cumulative data set of all Active Pharmaceutical Ingredients (API).

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 09/08/2009

Medical Subject Headings (MeSH)

URL 1: https://www.nlm.nih.gov/mesh/meshhome.html

URL 2: https://bioportal.bioontology.org/ontologies/MESH

ABSTRACT: The Medical Subject Headings (MeSH) thesaurus is a controlled and hierarchically-organized vocabulary produced by the National Library of Medicine. It is used for indexing, cataloguing, and searching of biomedical and health-related information. MeSH includes the subject headings appearing in MEDLINE/PubMed, the NLM Catalog, and other NLM databases.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 02/13/2009

The Software Ontology (SWO)

URL: https://www.ebi.ac.uk/ols/ontologies/swo

ABSTRACT: The Software Ontology (SWO) is a resource for describing software tools, their types, tasks, versions, provenance and associated data

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 21/10/2019

Foundational Model of Anatomy (FMA)

URL 1: http://si.washington.edu/projects/fma

URL 2: https://bioportal.bioontology.org/ontologies/FMA

ABSTRACT: The Foundational Model of Anatomy Ontology (FMA) is an evolving computer-based knowledge source for biomedical informatics; it is concerned with the representation of classes or types and relationships necessary for the symbolic representation of the phenotypic structure of the human body in a form that is understandable to humans and is also navigable, parseable and interpretable by machine-based systems. Specifically, the FMA is a domain ontology that represents a coherent body of explicit declarative knowledge about human anatomy. Its ontological framework can be applied and extended to all other species.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/03/2007

SNOMED Clinical Terms (SNOMED)

URL 1: https://www.snomed.org/

URL 2: https://bioportal.bioontology.org/ontologies/SNOMEDCT

ABSTRACT: SNOMED Clinical Terms is a systematically organized computer-processable collection of medical terms providing codes, terms, synonyms and definitions used in clinical documentation and reporting. SNOMED CT is considered to be the most comprehensive, multilingual clinical healthcare terminology in the world.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 01/31/2009

Ontology for Biomedical Investigations (OBI)

URL 1: http://obi-ontology.org/

URL 2: https://bioportal.bioontology.org/ontologies/OBI

ABSTRACT: OBI is an ontology of investigations, the protocols and instrumentation used, the material used, the data generated and the types of analysis performed on it.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 07/25/2008

Disease Ontology (DO)

URL: https://disease-ontology.org/

ABSTRACT: The Disease Ontology has been developed as a standardized ontology for human disease with the purpose of providing the biomedical community with consistent, reusable and sustainable descriptions of human disease terms, phenotype characteristics and related medical vocabulary disease concepts through collaborative efforts of biomedical researchers, coordinated by the University of Maryland School of Medicine, Institute for Genome Sciences.

DOCUMENT TYPE: Project

PUBLICATION DATE: 01/01/2008

Bioinformatics

Ontology of bioscientific data analysis and data management (EDAM)

URL 1: http://edamontology.org/

URL 2: https://bioportal.bioontology.org/ontologies/EDAM

ABSTRACT: EDAM is a comprehensive ontology of well-established, familiar concepts that are prevalent within bioscientific data analysis and data management (including computational biology, bioinformatics, and bioimage informatics). EDAM includes topics, operations, types of data and data identifiers, and data formats, relevant to data analysis and data management in life sciences. EDAM provides a set of concepts with preferred terms and synonyms, related terms, definitions, and other information - organised into a simple and intuitive hierarchy for convenient use

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 06/11/2010

Agriculture

Agronomy Ontology (AGRO)

URL 1: https://bigdata.cgiar.org/resources/agronomy-ontology/

URL 2: http://agroportal.lirmm.fr/ontologies/AGRO

ABSTRACT: AgrO is an ontology for representing agronomic practices, techniques, variables and related entities

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 06/03/2016

FoodOn (FOODON)

URL 1: https://foodon.org

URL 2: http://agroportal.lirmm.fr/ontologies/FOODON

ABSTRACT: FoodOn (http://foodon.org) is a consortium-driven project to build a comprehensive and easily accessible global farm-to-fork ontology about food, that accurately and consistently describes foods commonly known in cultures from around the world.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 03/28/2017

Context-Aware System Ontology (CASO)

URL 1: https://w3id.org/def/caso

URL 2: http://agroportal.lirmm.fr/ontologies/CASO

ABSTRACT: CASO (Context Aware System Observation) is an ontology for context aware systems and observation services. Its goal is to describe all the processing of the context.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 03/19/2020

Agricultural Experiments Ontology (AEO)

URL 1: http://lovinra.inra.fr/

URL 2: http://agroportal.lirmm.fr/ontologies/AEO

ABSTRACT: AEO is an ontology aimed to represent objects related to agricultural practices.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 02/24/2017

Multi-scale Multi-step ontology (MS2O)

URL 1: http://lovinra.inra.fr/2015/12/16/multi-scale-multi-step-ontology/

URL 2: http://agroportal.lirmm.fr/ontologies/MS2O

ABSTRACT: The Multi-scale Multi-step ontology (MSO) is an ontology to describe transformation processes., Multi-scale Multi-step ontology (MSO) est une ontologie permettant de dcrire des processus de transformation.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 09/01/2015

Feature Annotation Location Description Ontology (FALDO)

URL 1: https://github.com/JervenBolleman/FALDO

URL 2: http://agroportal.lirmm.fr/ontologies/FALDO

ABSTRACT: FALDO is the Feature Annotation Location Description Ontology. It is a simple ontology to describe sequence feature positions and regions as found in GFF3, DBBJ, EMBL, GenBank files, UniProt, and many other bioinformatics resources. This ontology aims to describe the position of a sequence region or a feature. It does not aim to describe features or regions themselves but instead depends on resources such as the Sequence Ontology or the UniProt core ontology.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 06/28/2013

Experimental Factor Ontology (EFO)

URL 1: http://www.ebi.ac.uk/efo/

URL 2: http://agroportal.lirmm.fr/ontologies/EFO

ABSTRACT: The Experimental Factor Ontology (EFO) provides a systematic description of many experimental variables available in EBI databases and for projects such as the GWAS catalogue. It combines parts of several biological ontologies, such as UBERON anatomy, ChEBI chemical compounds, and Cell Ontology. EFO is developed by the EMBL-EBI Samples, Phenotypes and Ontologies Team (SPOT). We also add terms for external users when requested.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 05/15/2015

Variation Ontology (VARIO)

URL 1: http://variationontology.org/

URL 2: http://agroportal.lirmm.fr/ontologies/VARIO

ABSTRACT: Variation Ontology, VariO, is an ontology for standardized, systematic description of effects, consequences and mechanisms of variations. VariO allows unambiguous description of variation effects as well as computerized analyses over databases utilizing the ontology for annotation. VariO is a position specific ontology that can be used to describe effects of variations on DNA, RNA and/or protein level, whatever is appropriate.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 05/01/2015

Plant Trait Ontology (TO)

URL 1: http://planteome.org

URL 2: http://agroportal.lirmm.fr/ontologies/TO

ABSTRACT: An ontology that describes phenotypic traits in plants. Each trait is a distinguishable feature, characteristic, quality or phenotypic feature of a developing or mature plant.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 06/28/2016

Environment Ontology (ENVO)

URL 1: http://environmentontology.org/

URL 2: http://agroportal.lirmm.fr/ontologies/ENVO

ABSTRACT: ENVO is an ontology which represents knowledge about environments, environmental processes, ecosystems, habitats, and related entities

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 02/13/2015

Plant Ontology (PO)

URL 1: http://www.planteome.org

URL 2: http://agroportal.lirmm.fr/ontologies/PO

ABSTRACT: The Plant Ontology is a structured vocabulary and database resource that links plant anatomy, morphology and growth and development to plant genomics data.

DOCUMENT TYPE: Technical Specification

PUBLICATION DATE: 08/20/2013

DEMETER Agriculture Information Model (DEMETER-AIM)

URL 1: https://gitlab.com/demeterproject/wp2/agriculturalinformationmodel/domainspecificontologies

URL 2: http://agroportal.lirmm.fr/ontologies/DEMETER-AIM

ABSTRACT: The DEMETER Agri Profile is a master profile importing focused specific profiles/modules of DEMETER AIM.

DOCUMENT TYPE: Project

PUBLICATION DATE: 07/01/2020

Semanticscience Integrated Ontology (SIO)

URL 1: http://sio.semanticscience.org/

URL 2: http://agroportal.lirmm.fr/ontologies/SIO

ABSTRACT: The semantic science integrated ontology (SIO) provides a simple, integrated ontology (types, relations) for objects, processes and their attributes.

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 06/10/2015

Sustainability

ISO 37120. Sustainable Development and Resilience of Communities. Indicators for City Services and Quality of Life (under TC268)

URL 1: https://rd-alliance.org/system/files/documents/GCI-Innovation-Ontology.pdf

URL 2: http://ontology.eil.utoronto.ca/ISO37120.html

ABSTRACT: ISO 37120 Sustainable Development and Resilience of Communities Indicators for City Services and Quality of Life (under TC268) http://ontology.eil.utoronto.ca/ISO37120.html. This OWL file defines a class for each indicator defined in the ISO 37120 standard. Names for each indicator are provided. Text definitions are provided only for Economy, Education and Energy indicators, due to copyright restrictions imposed by ISO. This file is meant to provide a single URI for each indicator. An ontology for representing an indicator's supporting data plus meta information such as provenance, validity and trust can be found in: http://ontology.eil.utoronto.ca/GCI/Foundation/GCI-Foundation.owl Documentation of the ontology can be found in: http://eil.utoronto.ca/smartcities/papers/GCI-Foundation-Ontology.pdf

DOCUMENT TYPE: Scientific Publication

PUBLICATION DATE: 26/09/2005

Cultural Heritage

ISO 21127:2014: Information and documentation. A reference ontology for the interchange of cultural heritage information

URL: https://www.iso.org/standard/57832.html

ABSTRACT: ISO 21127:2014 establishes guidelines for the exchange of information between cultural heritage institutions. In simple terms, this can be defined as the information managed by museums, libraries, and archives. The intended scope of ISO 21127:2014 is defined as the exchange and integration of heterogeneous scientific documentation relating to museum collections. This definition requires further elaboration.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/10/2014

Linguistic

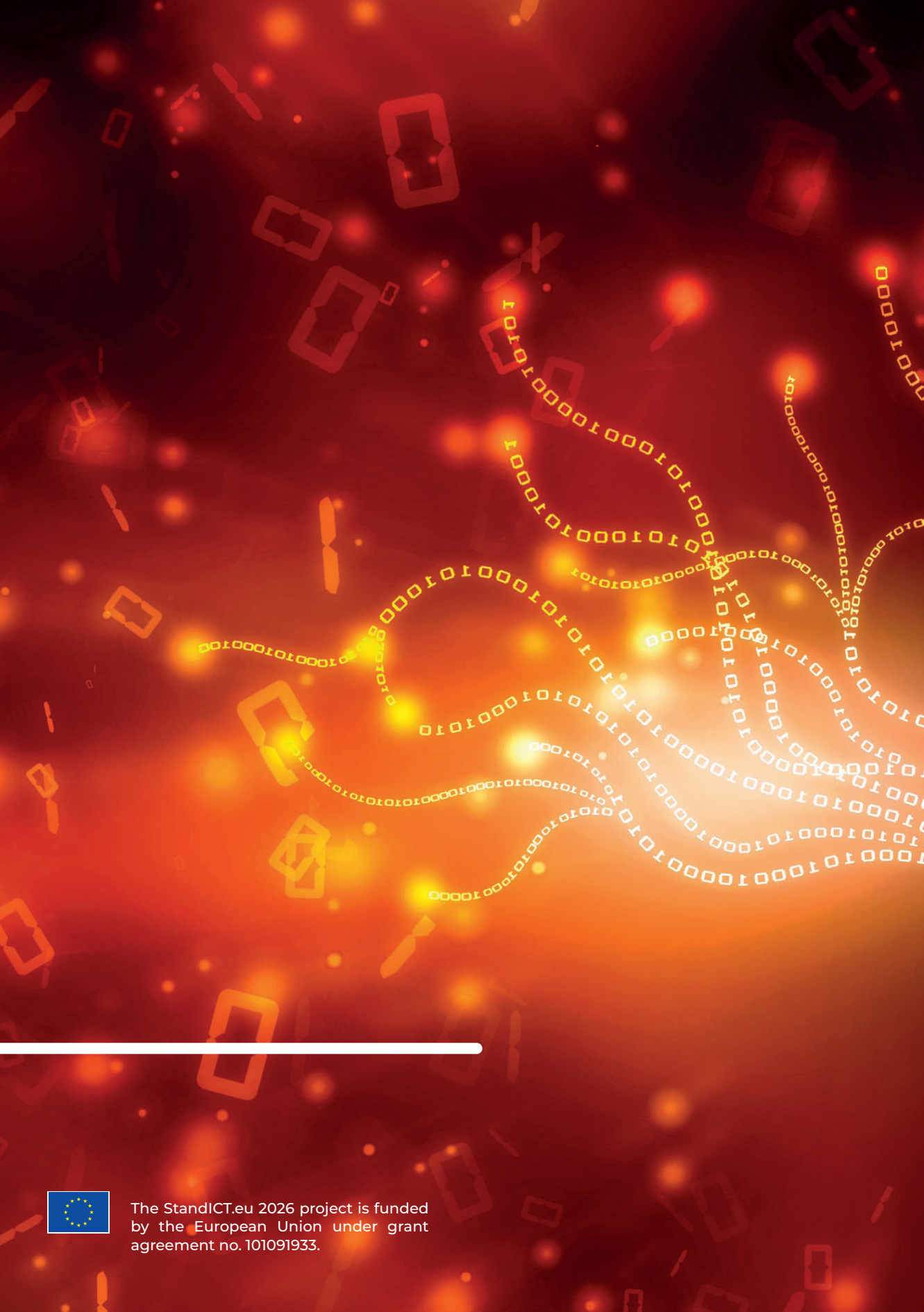
ISO 24623-2:2021: Linguistic resource management. Corpus query lingua franca (CQLF) . Part 2: Ontology

URL: https://www.iso.org/fr/standard/72103.html

ABSTRACT: This document specifies the structure of an ontology for a fine-grained description of the expressive power of corpus query languages (CQLs) in terms of search needs. The ontology consists of three interrelated taxonomies of concepts: the CQLF metamodel (a formalization of ISO24623-1); the expressive power taxonomy, which describes different facets of the expressive power of CQLs; and taxonomy of CQLs. This document specifies a) the taxonomy of the CQLF metamodel; b) the topmost layer of the expressive power taxonomy (whose concepts are called functionalities); c) the structure of the layers of the expressive power taxonomy and the relationships between them, in the form of subsumption assertions; d) the formalization of the linkage between the CQL taxonomy and the expressive power taxonomy, in the form of positive and negative conformance statements. This document does not define the entire contents of the ontology.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 01/12/2021



The StandICT.eu 2026 project is funded by the European Union under grant agreement no. 101091933.