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INTERNATIONAL STANDARD

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Standardized product ontology register and transfer by data parcels –
Part 8: Web service interface for data parcels

Enregistrement d'ontologie de produits normalises et transfert par paquets de données –
Partie 8: Interface de service Web pour les paquets de données

IEC 62656-8:2020-06(en-fr)

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Enregistrement d'ontologie de produits normalises et transfert par paquets de données – Partie 8: Interface de service Web pour les paquets de données

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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STANDARDIZED PRODUCT ONTOLOGY REGISTER AND TRANSFER BY DATA PARCELS –

Part 8: Web service interface for data parcels

FOREWORD

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International Standard IEC 62656-8 has been prepared by subcommittee 3D: Classes, Properties and Identification of products – Common Data Dictionary (CDD), of IEC technical committee 3: Documentation, graphical symbols and representations of technical information.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
3D/342/FDIS	3D/346/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62656 series, published under the general title *Standardized product ontology register and transfer by data parcels*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

For a description of products and services throughout their lifecycle, an enhanced data interoperability with reduced human interventions is an ultimate goal of developing international standards for intelligent production systems. In attaining this goal, an industrial ontology is expected to play a significant role by allowing components of systems to talk to each other, namely machine-machine understanding, about their functions, capabilities, structures and their configurations.

The parcellized ontology model defined in IEC 62656-1, also known by its acronym "POM", is a generic ontology model with quadruple layers to capture different types of ontology models by sorting elements into categories of homogeneous collection of ontological entities, such as classes (concepts), properties, relations, enumerations, terms (constants), data types, etc. At the second layer from the top, named the Meta-Ontology (MO) layer, 11 types of category are defined. Each layer is a collection of categories, while each category is represented by a relational table-like matrix called "data parcel" whose meta data (attributes) are embodied as a selection of instances of the immediate upper layer. The top layer of the POM, named the Axiomatic Ontology (AO) layer, comprises two data parcels only, which conjointly define the "concept of concepts" by classes and properties, which is an information technology (IT) embodiment of the math-logical notion of the class (i.e., "concept") itself.

Other parts of the IEC 62656 series, which are collectively known as "Parcel standards", are intended as a specialization of the POM for a specific purpose.

IEC 62656-2 [1][1] is a guide for domain experts to apply the POM in order to capture a data dictionary from the definitions available in product standards in a form conformant to the IEC 61360-2 [2] and ISO 13584-42 [3] dictionary schema (i.e., common data dictionary model, or CDDM) and using the specification of a part of IEC 62656-1 as an official data interface for the IEC 61360-4 database known as the IEC CDD (Common Data Dictionary), enabling the uploading and downloading of the dictionary to and from the IEC CDD. A referential implementation of IEC 62656-1 is available as a tool, free of charge for standardization purposes.

IEC 62656-3 is intended as a mapping specification between a standard data model of the "Smart-Grid" domain, with acronym CIM (Common Information Model), and an extended, or rather generalized data model of the IEC CDD, namely, the POM. The CIM comprises the IEC 61968/IEC 61970/IEC 62325 series of International Standards. Thus, the IEC CDD can accommodate the CIM provided the IEC CDD sufficiently implements the POM as the data interface or database. Alternatively, this mapping inevitably entails a small but significant extension of the IEC CDD, without which the accommodation of the CIM into the IEC CDD is infeasible. Nevertheless, nothing needs to be added to or subtracted from the tool which is currently used as a data interface for the IEC CDD and which fully embodies IEC 62656-1.

IEC 62656-5 is intended as an interface for the description of activities as an ontology conformant to IEC 62656-1, thus opening a way to store definitions available from activity-centric International Standards, for instance IEC 62224-3, as an ontology. IEC 62656-5 can also be applied to the description of non-manufacturing use scenarios, such as for the description of activities of natural hazard management or electronic tourist guidance or navigation, with a harmonious integration of activities with related products and services.

This means a common ontology repository ("COR") based on the POM can store both IEC CDD and CIM types of data dictionaries or ontologies. Furthermore it can smoothly bridge the differences and fill the gaps covering ontologies of different provenances.

1 Numbers in square brackets refer to the Bibliography.

Future parts of the IEC 62656 series are expected to shed light on a new spectrum of applications for the COR based on the POM.

Above all, this document specifies a description of basic web services for semantic repositories based on the POM, whilst an advanced type of web interface, including complex enquiry about products as well as query forwarding to another repository, is left to a future part of the series, to be developed.

STANDARDIZED PRODUCT ONTOLOGY REGISTER AND TRANSFER BY DATA PARCELS –

Part 8: Web service interface for data parcels

1 Scope

This part of IEC 62656 specifies a web service interface to exchange data parcel(s) conformant to IEC 62656-1, between a parcel server and a parcel client or between parcel servers. This interface comprises three basic services: a registration service, resolution service and subscription service.

This document includes the following:

– holistic use scenario;
– detailed specification of the three basic services;
– JSON [1] and XML [5] notation schemas for data parcel(s).

The following items are outside the scope of this document:

– user identification and authorization;
– query language for a data parcel;
– transportation protocol;
– data and communication security techniques.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62656-1:2014, *Standardized product ontology register and transfer by spreadsheets – Part 1: Logical structure for data parcels*

ISO/IEC 21778, *Information technology – The JSON data interchange syntax*

ISO 639-1, *Codes for the representation of names of languages – Part 1: Alpha-2 code*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*

ISO 8601-1, *Date and time – Representations for information interchange – Part 1: Basic rules*

ISO 8601-2, *Date and time – Representations for information interchange – Part 2: Extensions*

ISO 13584-32, *Industrial automation systems and integration – Parts library – Part 32: Implementation resources: OntoML: Product ontology markup language*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
application ontology repository
AOR
ontology repository where proprietary ontologies and their instances can be stored

Note 1 to entry: A proprietary ontology can be a modification and/or an extension of a standardized ontology.

Note 2 to entry: Standardized ontologies can be also stored in an AOR.

3.1.2
common ontology repository
COR
shared ontology repository where standardized ontologies of different base models can be stored

3.1.3
conjunctive parcels
parcel sheets that are used together to define a library, reference dictionary, or meta-dictionary

[SOURCE: IEC 62656-1:2014, 3.6]

3.1.4
data parcel
parcel
information structure in a form of a level-pair, comprising a set of properties and a set of tuples of values for the set of properties, with an aim to describe a domain data dictionary, a domain data library or an ontological modelling concept

Note 1 to entry: A data parcel is typically implemented and exchanged as a set of spreadsheets, but the medium of implementation or exchange is not limited to spreadsheets; it may be in any other form.

[SOURCE: IEC 62656-1:2014, 3.8]

3.1.5
dictionary
data dictionary
set of terms with respective identifiers formulated in a canonical syntax and with commonly accepted definitions designed to yield a lexical or taxonomical framework for knowledge representation in a computer interpretable form, which can be shared by different information systems and communities

[SOURCE: IEC 62656-1:2014, 3.10]

3.1.6
JSON data
data represented in compliance with the ISO/IEC 21778 specification

3.1.7
JSON name
series of characters assigned to a value or object for referring to it in JSON data

3.1.8
ontological entity
artefact that is used to represent a category of being of things or relationship among them

[SOURCE: IEC 62656-1:2014, 3.36]

3.1.9
ontology repository
data repository where ontologies or ontological entities are stored

3.1.10
parcel client
client system or application that can read or write parcelling sheets in general, and may have an optional capability to send them to or receive them from a server system

[SOURCE: IEC 62656-1:2014, 3.37]

3.1.11
parcel ontology layer
abstraction layer which is embodied as a set of data parcels on the same level

Note 1 to entry: IEC 62656-1:2014 classifies parcel ontology layers as axiomatic ontology (AO), meta ontology (MO), domain ontology (DO) and domain library (DL).

3.1.12
parcel server
server system or application that can provide parcel spreadsheets in general over Internet

[SOURCE: IEC 62656-1:2014, 3.41]

3.1.13
parcel registration
operation to enter new record of information by data parcels to a parcel server

Note 1 to entry: Registration operations are classified into addition, modification and deletion operations.

3.1.14
parcel resolution
operation to receive information by data parcels by using the specific parameter(s) as search condition(s)

3.1.15
parcel subscription
agreement to receive the status or the change of the information by data parcels

3.2 Abbreviated terms

AOR Application Ontology Repository
CDD Common Data Dictionary
COR Common Ontology Repository
HTTP Hypertext Transfer Protocol
HTTPS Hypertext Transfer Protocol Secure
ICID International Concept Identifier
JSON JavaScript Object Notation
RAI Registration Authority Identifier
SOAP Simple Object Access Protocol
VI Version Identifier
XML eXtensible Markup Language
WADL Web Application Description Language
WSDL Web Services Description Language

4 Use scenarios

4.1 Holistic use scenario

A standardized ontology such as that set out in IEC 61360-4 consists of a standardized set of classes and properties which should be used for common understanding of the meaning of data among users. In most cases, such a standardized ontology contains a minimum agreed set of classes and properties expressed in the English language; therefore it usually needs to be customized for actual use. For example, language translation may be important for the use of an ontology for non-native English users in a regional company. For another example, extensions of classes and properties, such as commercial data or administrative information, are essential for product information management in each company. The four modelling layers approach defined in IEC 62656-1 allows for the representation of such an extension and modification in data parcels.

Such a customized ontology is usually maintained and published in a server (e.g., application ontology repository) such as a national server and an enterprise server, separately from the server (e.g., common ontology repository) where the standardized ontology is stored. If there is a mechanism not only for downloading or uploading data parcels but also for subscription to an ontology by using the web technique, the use of a standardized ontology and its extension will be enhanced and made easy. Web services specified in this document will contribute to enabling the exchange of data parcel(s) of an ontology between a server and a client or between servers.

In many cases, data exchange both between servers and between a server and a client are done over the HTTP(S) protocol, because there are many hardware, software and security techniques for it. Therefore, the use of the HTTP(S) protocol is recommended for a parcel web service, but other protocols are also available for a data exchange by means of a parcel web service for a specific requirement such as communication speed.

The web services for the exchange of or the subscription to data parcels defined in this document presume, but are not limited to, the following use scenarios depicted in Figure 1.