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**Register ontologije standardiziranih izdelkov in prenos po podatkovnih enotah - 8.
del: Vmesnik spletne storitve za podatkovne enote**

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

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TITLE:

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**STANDARDIZED PRODUCT ONTOLOGY REGISTER AND TRANSFER
BY DATA PARCELS –****Part 8: Web service interface for data parcels**

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The National Committees are requested to note that for this document the stability date is 20XX.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

52

INTRODUCTION

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

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

70 Subsequent parts of the IEC 62656 standards, which as a whole is collectively known as
71 "Parcel standards", are for specialization of the POM for a specific purpose:

72 IEC 62656-2 is a guide for domain experts to apply the POM for capturing a data dictionary
73 from definitions available from product standards in a form conformant to IEC 61360-2/ISO
74 13584-42 dictionary schema (i.e., common data dictionary model, or CDDM for short) and
75 using the specification of the part as an official data interface for IEC 61360-4 DB known as
76 IEC CDD (Common Data Dictionary), by enabling uploading and downloading of the dictionary
77 to and from the IEC CDD. A referential implementation of this part is available as a tool, free
78 of charge for standardization purposes.

79 IEC 62656-3 is intended as a mapping specification between a standard data model of the
80 "Smart-Grid" domain acronymed as CIM (Common Information Model) and an extended or
81 rather generalized data model of the IEC CDD, namely the POM. The CIM comprises IEC
82 61968/61970/62325 series of standards. Thus, the IEC CDD can accommodate the CIM,
83 provided the IEC CDD sufficiently implements POM as data interface or database.
84 Alternatively, this mapping inevitably entails a small but significant extension of the IEC CDD,
85 without which the accommodation of the CIM into the IEC CDD is infeasible. Nevertheless,
86 there is nothing to add to or subtract from the tool which is currently used as a data interface
87 for the IEC CDD and which fully embodies IEC 62656-1.

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

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

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

100 Amongst all, IEC 62656-8 is intended for the description of basic web-services for semantic
101 repositories based on the POM, whilst an advanced type of web-interface including complex

102 enquiry about product as well as query forwarding to another repository is left to a future Part
103 of the series to be developed.

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STANDARDIZED PRODUCT ONTOLOGY REGISTER AND TRANSFER BY DATA PARCELS –

Part 8: Web service interface for data parcels

1 Scope

This document specifies a web service interface based on JSON [1] and XML [2] for transporting over the Internet or an extranet network a set of ontological data conformant to IEC 62656-1. This web service allows an exchange of data parcel(s) between a parcel server and a parcel client or between parcel servers. The data parcel(s) used therein comprises one of the parcel ontology layers, i.e., Axiomatic Ontology layer (AO), Meta-ontology layer (MO), Domain Ontology layer (DO) or Domain Library layer (DL), the detail of which is defined in IEC 62656-1. This interface comprises three basic services, registration service, resolution service and subscription service. With respect to query, the query language for a data parcel will be a subject of another part of IEC 62656.

Consequently, the web service interface specified in this document includes the following;

- detailed specification of the three basic services;
- transport methods of data parcel(s) used in ontology data communication.

The following items are outside the scope of this document.

- user identification and authorization
- query language;
- 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.

- ISO 639-1:2002, *Codes for the representation of names of languages -- Part 1: Alpha-2 code*
- ISO 3166-1:2013, *Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes*
- ISO 13584-24:2003, *Industrial automation systems and integration -- Parts library -- Part 24: Logical resource: Logical model of supplier library*
- ISO 13584-32:2010, *Industrial automation systems and integration -- Parts library -- Part 32: Implementation resources: OntoML: Product ontology markup language*
- ISO 13584-42:2010, *Industrial automation systems and integration -- Parts library -- Part 42: Description methodology: Methodology for structuring parts families*
- ISO/TS 29002-20:2010, *Industrial automation systems and integration -- Exchange of characteristic data -- Part 20: Concept dictionary resolution services*
- IEC 61360-1:2017(to be), *Standard data element types with associated classification scheme for electric components -- Part 1: Definitions - Principles and methods*

146 IEC 61360-2:2012, *Standard data element types with associated classification scheme for*
147 *electric components -- Part 2: EXPRESS dictionary schema*

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

150 IEC 62656-2:2013, *Standardized product ontology register and transfer by spreadsheets -*
151 *Part 2: Application guide for use with the IEC common data dictionary (CDD)*

152 ISO/IEC 21778 (to be), *The JSON data interchange format*

153 **3 Terms, definitions and abbreviations**

154 **3.1 Terms and definitions**

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

156 **3.1.1**

157 **application ontology repository**

158 **AOR**

159 ontology repository where proprietary ontologies and their instances can be stored

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

161 Note 2 to entry: Standard ontologies can be also stored in AOR.

162 **3.1.2**

163 **common ontology repository**

164 **COR**

165 shared ontology repository where standardized ontologies of different base models can be
166 stored

167 **3.1.3**

168 **conjunctive parcels**

169 parcel sheets that are used together to define a library, reference dictionary, or meta-
170 dictionary

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

172 **3.1.4**

173 **data parcel**

174 **parcel**

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

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

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

181 **3.1.5**

182 **dictionary**

183 **data dictionary**

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

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

- 189 **3.1.6**
 190 **JSON data**
 191 data represented in compliance with the ISO/IEC 21778 specification
- 192 **3.1.7**
 193 **JSON name**
 194 series of characters assigned to a value or object for referring to it in JSON data
- 195 **3.1.8**
 196 **ontological entity**
 197 artefact that is used to represent a category of being of things or relationship among them
 198 [SOURCE: IEC 62656-1:2014, 3.36]
- 199 **3.1.9**
 200 **ontology repository**
 201 data repository where ontologies or ontological entities are stored
- 202 **3.1.10**
 203 **parcel client**
 204 client system or application that can read or write parcelling sheets in general, and may have
 205 an optional capability to send them to or receive them from a server system
 206 [SOURCE: IEC 62656-1:2014, 3.37]
- 207 **3.1.11**
 208 **parcel ontology layer**
 209 abstraction layer which is embodied as a set of data parcels on the same level
- 210 Note to entry: IEC 62656-1:2014 classifies parcel ontology layers as axiomatic ontology (AO), meta ontology (MO),
 211 domain ontology (DO) and domain library (DL).
- 212 **3.1.12**
 213 **parcel server**
 214 server system or application that can provide parcel spreadsheets in general over the Internet
 215 [MODIFIED: IEC 62656-1:2014, 3.41]
- 216 **3.1.13**
 217 **parcel registration**
 218 operation to enter new record of information by data parcels to a parcel server
- 219 Note 1 to entry: Registration operations are classified into an addition, modification and deletion operations.
- 220 **3.1.14**
 221 **parcel resolution**
 222 operation to receive information by data parcels by using the specific parameter(s) as search
 223 condition(s)
- 224 **3.1.15**
 225 **parcel subscription**
 226 agreement to receive the status or the change of the information by data parcels
- 227 **3.2 Abbreviations**
- 228 **AOR** Application Ontology Repository
- 229 **CDD** Common Data Dictionary
- 230 **COR** Common Ontology Repository

231	ICID	International Concept Identifier
232	JSON	JavaScript Object Notation
233	RAI	Registration Authority Identifier
234	SOAP	Simple Object Access Protocol
235	VI	Version Identifier
236	XML	eXtensible Markup Language
237	WADL	Web Application Description Language
238	WSDL	Web Services Description Language

239 **4 Use scenarios**

240 **4.1 Holistic use scenario**

241 A standard ontology such as the IEC 61360-4 consists of a standardized set of classes and
242 properties which should be used for commonly understanding a meaning of data among users.
243 In general, such a standard ontology contains a minimum agreed set of classes and
244 properties with official languages, therefore it is usually needed to be modified or extended for
245 an actual use. For example, a language translation is important for the use of an ontology for
246 non-native users in a regional company. For another example, an extension of classes and
247 properties such as a price for a customer and a kind of administrative information is essential
248 for describing product data in each company. The four modelling layers approach defined in
249 IEC 62656-1 allows to represent such an extension and modification in data parcels.

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

258 The web services for data parcels defined in this document assumes, but not limited to, the
259 following use scenarios depicted in Figure 1.

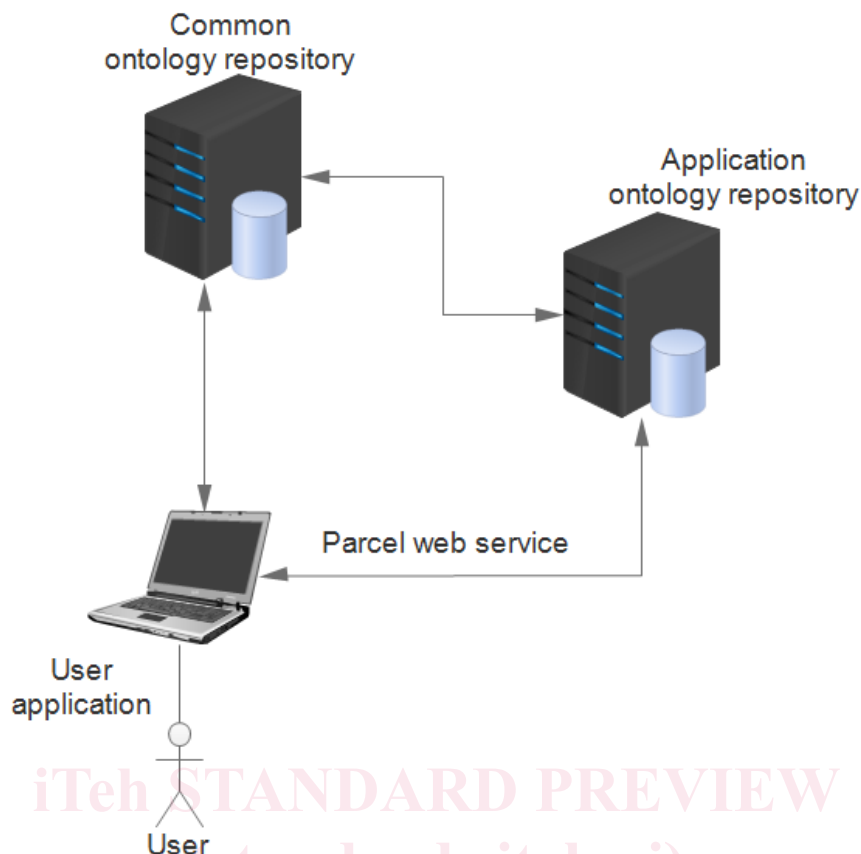


Figure 1 – Holistic use scenario of parcel web services

4.2 Use scenario between server and client

A detailed use scenario between an ontology repository and a parcel client is depicted in Figure 2 with the following activities and associated information flows:

- A1: A client application such as an ontology editor registers the content of a set of data parcels into an ontology repository without going through an operation on the web page of the ontology repository.
- A2: A client application such as a controller, CAD application or purchasing system, requests to resolve the identifier of a dictionary item and gets part or the whole set of information about a dictionary item designated by the identifier without going through an operation on the web page of an ontology repository.

Note1 Content delivered by a set of data parcels is a data dictionary or an update of a data dictionary.