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Information container for linked document delivery — Exchange specification —

Part 2: Link types

Conteneur d'informations pour la livraison de documents liés — Spécification d'échange —

Partie 2: Types de liens

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 13, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM),* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 442, *Building Information Modelling (BIM),* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 21597 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 21597 series has been developed in response to a need within the construction industry to be able to handle multiple interrelated documents as a single information delivery.

In ISO 21597-1, a specification is given for a generic container format that stores documents using various formats and structures, along with a means of linking otherwise disconnected data within those documents (including individual parts). These documents can have any syntax and semantics.

This document extends that specification by the addition of common link types (that define relationships) as specializations of the generic types provided in ISO 21597-1. This provides the ability to add information about the contents of a container, rather than extending the contents.

The link types provide the ability to express comparison, ordering and dependency relationships between the documents and entities within documents that form part of the payload of a container. This contributes greatly to the value of the container by providing commentary, guidance and explanation of the relationships between link elements which could otherwise be unclear or ambiguous, without making any assumptions about, nor being dependent on the specific type of the link elements.

The specification of link types in this document deliberately uses only annotation to add further details or meta data to the defined link types. This allows the container to be machine readable and human interpretable while noting that machine reasoning is not within the scope of this document. The concern is to avoid the risk of reading too much into the intention behind the expressed relationships. If machine reasoning is needed, further specifications would be required that are not in the current scope of this document.

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Information container for linked document delivery — Exchange specification —

Part 2: Link types

1 Scope

This document provides the opportunity to add information about the contents of a container by further specializing the generic types of links specified in ISO 21597-1. The defined link types have been chosen to enhance the use of the container by allowing the addition of semantic relationships that are human interpretable to provide greater clarity about those links.

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 21597-1:2020, *Information container for linked document delivery — Exchange specification — Part 1: Container*

W3C-OWL2-SPEC. Motik B., Patel-Schneider P.F., Parsia B., eds. OWL 2 Web Ontology Language: Structural Specification and Functional-Style Syntax (Second Edition). W3C Recommendation, 11 December 2012 [viewed July 22nd 2019]. Latest version available at http://www.w3.org/TR/owl2-syntax/

W3C-RDF11-CONCEPTS. Cyganiak R., Wood D., Lanthaler M. RDF 1.1 Concepts and Abstract Syntax. W3C Recommendation, 25 February 2014 [viewed July 22nd 2019]. Latest version available at http://www.w3.org/TR/rdf11-concepts/

W3C-RDF11-SCHEMA. Brickley D., Guha R.V. RDF Schema 1.1. W3C Recommendation, 25 February 2014 [viewed July 22nd 2019]. Latest version available at http://www.w3.org/TR/rdf-schema/

W3C-RDF11-XML. Gandon F., Schreiber G. RDF 1.1 XML Syntax. W3C Recommendation, 25 February 2014 [viewed July 22nd 2019]. Latest version available at http://www.w3.org/TR/rdf-syntax-grammar/

3 Terms and definitions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21597-1 apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 21597-1 apply.

4 Specifications

4.1 Use of RDF, RDFS and OWL constructs

All ontologies held in containers that conform to the ISO 21597 series shall be based on the languages RDF [W3C-RDF11-CONCEPTS], RDFS [W3C-RDF11-SCHEMA] and OWL [W3C-OWL2-SPEC] (referred to collectively in the ISO 21597 series as RDF(S)/OWL) and shall be serialized in RDF/XML [W3C-RDF11-XML] or any other equivalent RDF serialization recommended by W3C.

The terms inverse, functional, transitive and symmetric as used in this document are defined in paragraph 9.2 of the OWL 2 specification [W3C-OWL2-SPEC].

ISO 21597-1:2020, Table 1 lists the RDF/OWL constructs that are used in the ISO 21597 series and the interpretation to be used when validating the contents of a container.

4.2 Symbols and notation

Throughout this document, the structure of the ontologies is illustrated using a UML notation as described in ISO 21597-1:2020, 4.2.

In addition to the namespaces listed in ISO 21597-1:2020, Table 2, Table 1 lists the namespaces and corresponding prefixes used in this document.

Table 1 — Namespaces and prefixes used in ontologies defined in this document

Ontology	Prefix	Namespace
Extended Linkset ontology	els	https://standards.iso.org/iso/21597/-2/ed-1/en/ExtendedLinkset

4.3 Container structure

The structure of the container shall be the same as that of ISO 21597-1. Figure 1 shows the minimum content of the ‘Ontology resources’ folder of an ICDD Part 2 container.

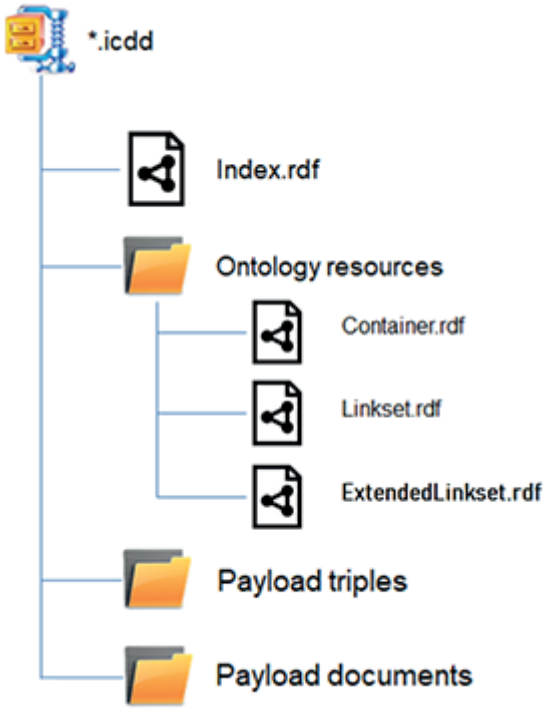

Figure 1 — Minimum content of the "Ontology resources" folder

4.4 Link types

4.4.1 Overview

This document specifies nine link types that shall be used where there is a need to express relationships between documents and/or elements within documents that form the payload of the container. These are defined in the Extended Linkset ontology in Annex C and shall be referenced in any datasets that conform to this document. The link types shall be used to propose semantic relationships between documents and individual elements within the documents to suggest identity, taxonomy, meronomy and other groupings, as well as precedence, conflicts and alternatives.

The proposed relationships represent the opinion of the authoring/providing party, and generally do not have the same status as the linked elements referenced. In all cases, the intention is that recipients use the link types to clarify their understanding and help them manage and use the information.

The provisional nature of the links shall be taken into account in all cases. For example, a conflict relationship may be reported that on examination is not deemed critical by the receiver.

Furthermore, the relationships defined using these link types shall not duplicate or contradict each other, nor shall any relationships found within the documents. The link types shall not be used to imply any more specific relationships that depend on the semantics of the linked elements. For example, a dependency relationship between two work-package descriptions shall not be assumed to imply sequencing.

4.4.2 Categories of link types

The link types fall into two broad categories: those that are specialized from *ls:DirectedBinaryLink* (Figure 2); and those specialized from *ls:Directed1toNLink* (Figure 3). As functional sub-class concepts, these are all objectified concepts that can carry annotated properties and metadata in the form of annotations. This ensures that they are machine readable and can be reported to the end user, but all interpretation is left entirely to the human receiver.

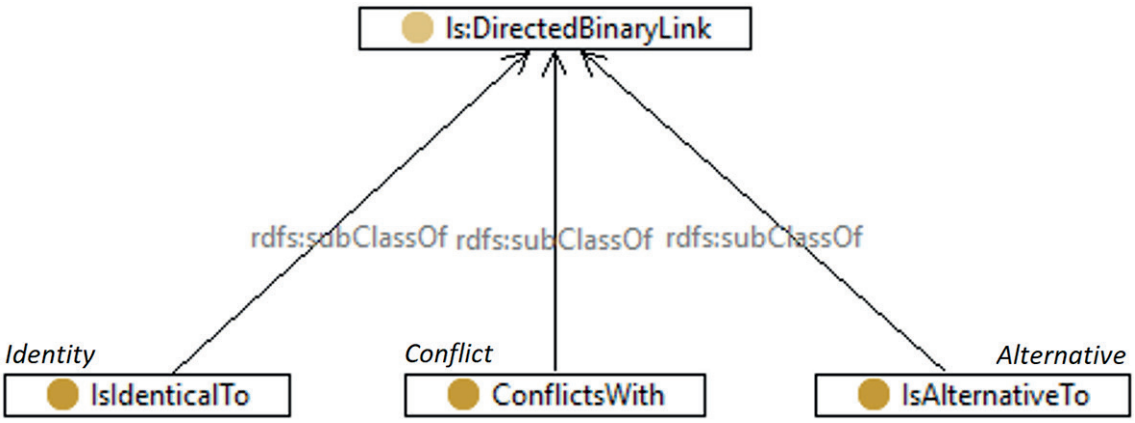

Figure 2 — Link types that use binary relationships

Each of the one-to-many link types depicted in Figure 3 has an explicitly defined inverse relationship shown in Figure 4. This gives the user a clear choice to express the semantics using either the primary or inverse relationship.

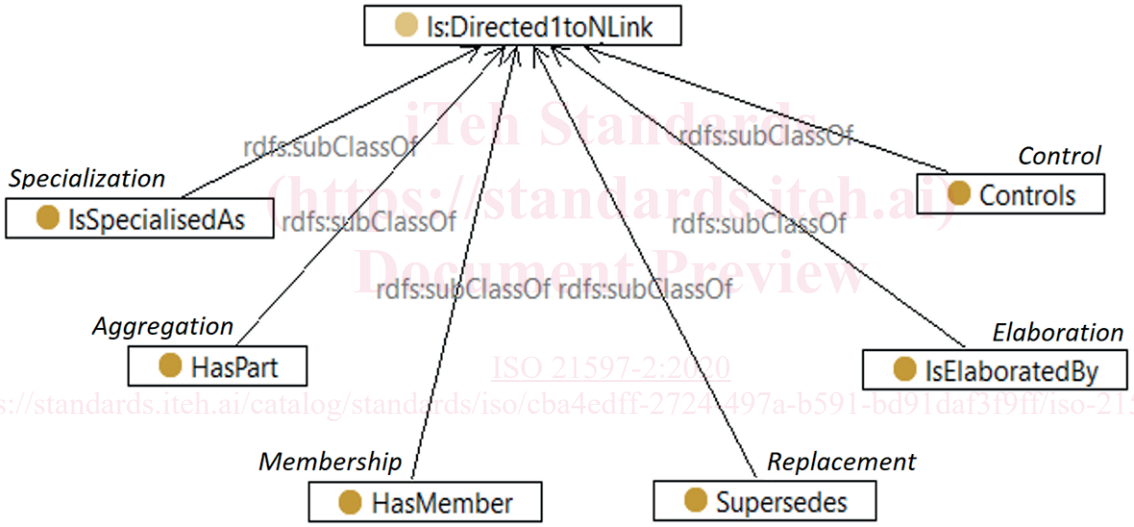

Figure 3 — Link types that use one-to-many relationships

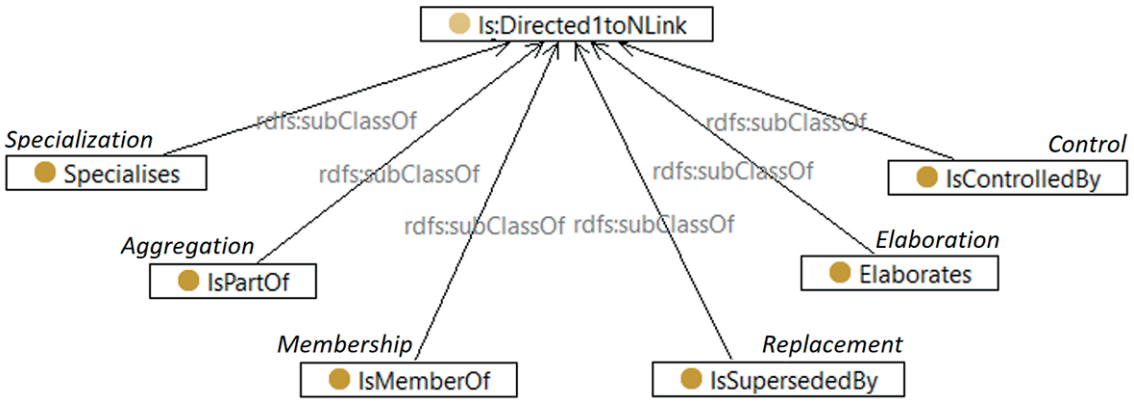

Figure 4 — Inverses of the link types that use one-to-many relationships